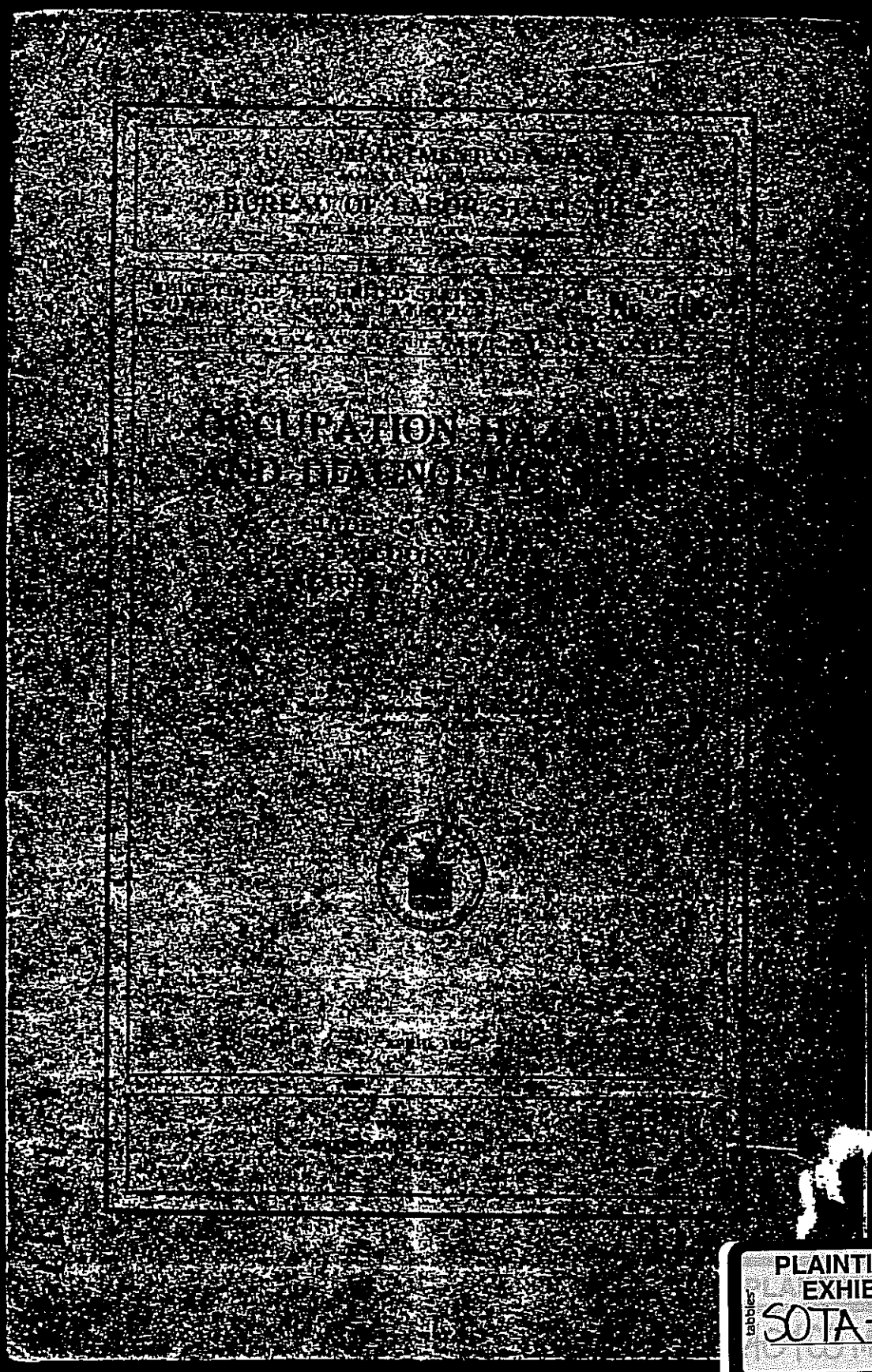
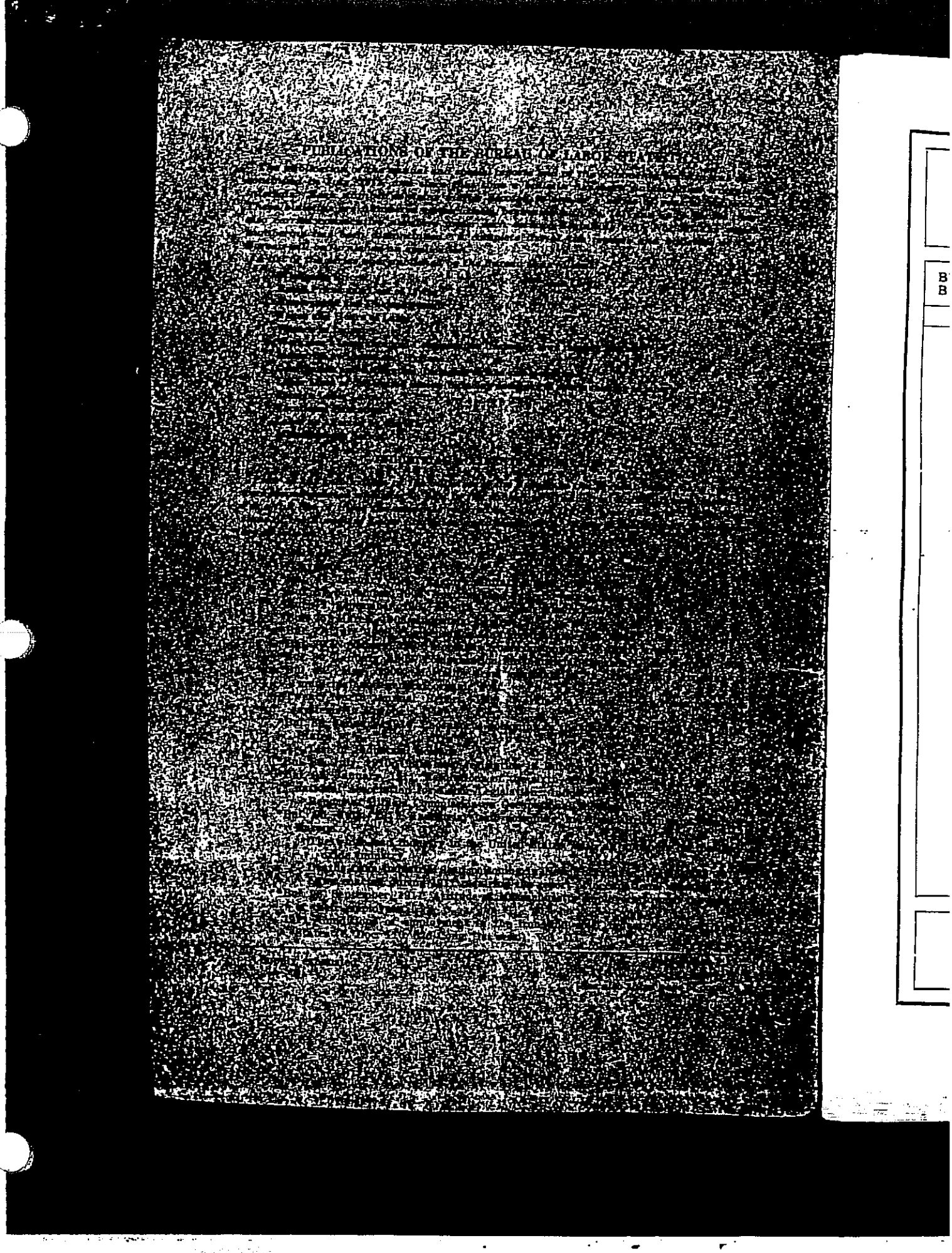


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BULLETIN OF THE UNITED STATES BUREAU OF LABOR STATISTICS . . . . . No. 306

INDUSTRIAL ACCIDENTS AND HYGIENE SERIES

OCCUPATION HAZARDS AND DIAGNOSTIC SIGNS

A GUIDE TO IMPAIRMENTS TO BE LOOKED FOR IN HAZARDOUS OCCUPATIONS

By LOUIS I. DUBLIN, Ph. D.
Statistician Metropolitan Life Insurance Co.
and PHILIP LEIBOFF

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PREFACE.

The first edition of this guide to the hazards of occupations and to the symptoms of the diseases they cause[1] was intended primarily to aid the 6,000 medical examiners of the Metropolitan Life Insurance Co. in the discovery of impairments among applicants for insurance. The pamphlet soon attracted the attention of others not immediately interested in insurance medical examinations. Large numbers of industrial physicians, directors of compensation boards, factory inspectors, safety engineers, industrial rehabilitation agents, medical colleges, and, most important of all, general practitioners of medicine have made a call for this work and have expressed their approval of it. The favorable response has encouraged us to proceed with the preparation of this second and much enlarged edition. While the form of the first pamphlet has been in general maintained, we have increased the number of hazardous occupations from about 450 to 700, and have increased the groups of hazards from 4 to 9. These now include abnormalities of temperature; compressed air; dampness; dust; extreme light; infections; poor illumination; repeated motion; pressure, shock, etc.; and the poisons. Under each of these the list of particular hazards has been extended.

Besides this extension of the old material, other important additions have been made. Each main hazard is now preceded by a descriptive paragraph, which, in a general way, discusses its pathological action and touches on the preventive measures which have proved most efficacious in reducing its effects. Other important facts regarding particular hazards, as, for example, the unsettled points regarding the effects of different types of dust, are discussed in these paragraphs. Obviously, in a bulletin of this size these large subjects can be only barely outlined. Those who wish to make an intensive study will find invaluable the works of the men whose names are listed below. But for others who have not the time for thorough study, yet feel the need of a general knowledge of the subject, these notes should prove instructive. A separate section of this bulletin has been given over to a discussion of skin irritants.

In preparing this revision the whole literature of industrial hygiene has been carefully examined, and we believe that the larger number of the more important occupations and hazards are now included. As a convenience to handling, we have reversed the order of the two lists and now present the alphabetical list of occupations first, following with the list of hazards and the diagnostic signs of disease. We hope that those physicians and others who use this work will be good enough to inform us of any errors which have crept into it and will let us have their suggestions for any occupations and hazards which we have omitted.

[1] See Monthly Labor Review of the U. S. Bureau of Labor Statistics, March, 1921, pp. 159–167.

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In presenting this, the second edition of the pamphlet, we desire to acknowledge our indebtedness to the members of the medical profession of the United States and Canada who have so courteously received the first effort and who have so enthusiastically cooperated in extending its scope. Special mention should be made of the work and personal assistance of Drs. R. P. Albaugh, W. I. Clark, jr., Henry S. Forbes, Alice Hamilton, Emery R. Hayhurst, Yandell Henderson, Clarence H. Kilker, H. R. M. Landis, A. J. Lanza, Carey P. McCord, D. C. Parmenter, Francis D. Patterson, Marvin D. Shie, H. F. Smyth, E. B. Starr, W. Gilman Thompson, R. Prosser White, and Messrs. Leonard Greenberg and Frederick G. Lange.

The detailed work of this compilation was carried out by Messrs. Robert J. Vane, jr., and Paul W. Cohen, of the Statistical Bureau of the Metropolitan Life Insurance Co.

LOUIS I. DUBLIN.

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NO. 306 WASHINGTON APRIL, 1922

OCCUPATION HAZARDS AND DIAGNOSTIC SIGNS: A GUIDE TO IMPAIRMENTS TO BE LOOKED FOR IN HAZARDOUS OCCUPATIONS.

INTRODUCTION.

Many occupations have injurious effects on the physical condition of those engaged in them. The health of those who work with the poisons, such as lead, arsenic, mercury, picric acid, etc., or those who are exposed for long periods to dust, heat, humidity, or to the infectious materials, etc., may be impaired seriously as the result of their work. The occupation is now recognized as of the very first importance as a factor in the causation of disability and even of death. Dr. Edsall has shown that in his clinic at the Massachusetts General Hospital many of the conditions for which treatment is sought by men of working ages are the effects of occupation.[2] Other industrial clinics are reporting similar results. With their attention directed to occupation as a possible factor, industrial physicians are able to diagnose a great many obscure cases which previously had puzzled even the most competent clinicians. In this way they discover a great many more cases of disease of occupational origin than had before been thought possible. Thus, in 1917 about 150 cases of lead poisoning were discovered at the Massachusetts General Hospital, which are more than were recorded by this clinic during the five-year period prior to the adoption of the more intensive methods of study. It is generally recognized that patients come to physicians with pains and complaints of an indefinite character, and it is only when consideration is given to the occupation and its possible effects that many of these cases are cleared up.

The medical examiner should, therefore, be very careful to see if any of the usual diagnostic signs of poisoning, dust, heat, or other hazards which are known to be inherent in occupations are in evidence among their patients where no other explanation of the case is readily available. In the case of those exposed to lead, such as employees of storage-battery plants, white-lead workers, paint mixers, painters, etc., the blue line on the gum, the pale, sallow appearance, and the trembling fingers are significant as indications of chronic lead poisoning, and the physician should look for these signs. Physical symptoms and conditions which ordinarily might be passed by, in this way become very important if they point to the possible effect of the occupation.

[2] See Monthly Labor Review of the U. S. Bureau of Labor Statistics, Dec., 1917, pp. 169–187.

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This handbook has been prepared to aid physicians in general practice, industrial hygienists, safety engineers, and others who come into close professional contact with those who are engaged in industrial processes. Nine major hazards of employment are listed; namely, abnormalities of temperature; compressed air; dampness; dust; extreme light; infections; poor illumination; repeated motion, pressure, or shock; and the poisons. A separate section of the bulletin is devoted to a discussion of skin irritants. Long exposure to any of these will usually leave definite physical signs which the medical examiner can discover if he will look for them. To aid him in detecting the hazards and their effects on the worker, two lists are presented. The first consists of the more common hazardous occupations, arranged alphabetically; the second consists of hazards, together with their effects or symptoms, as well as the occupations affected. After each occupation in the first list is a reference in code to the particular hazard in the second list. The capital letters after each occupation, "A," "B," "C," etc., refer to the general hazard. The Arabic numerals signify the particular hazard, as "D1," inorganic dust; "D2," organic dust.

The following example will show how this guide may be of value to the general practitioner: A man, who works in a garage, suffering from continuous headaches, visits his physician. The latter can find no cause for the patient's illness. The patient shows no signs of disease other than the subjective symptoms which he describes. Perhaps the physician will recommend an examination of the subject's eyes, ears, and sinuses, which will prove negative. A puzzling diagnosis such as this becomes very simple when the occupation is ascertained and this guide is utilized. Alongside of "Garage workers" in the "Alphabetical list of hazardous occupations," the physician finds the symbols J 16, 25. "J" represents the hazard poisons and "16, 25" the particular poisons—carbon monoxide and gasoline, respectively. Upon looking up the symptoms of these poisons in the second list he finds that both produce headache when inhaled in small quantities. In such a case the effective remedy lies in the removal of the etiological factor—the two poisons.

The following procedure is therefore recommended: The medical examiner or physician should ascertain the occupation of the applicant. He should then look for it in the "Alphabetical list of hazardous occupations" (p. 4). If found there, it is possible that the person has been exposed to and is possibly suffering from the effects of some hazard of his occupation. The numerals will indicate the particular hazards of the occupation. The physician should then make special effort to discover the symptoms or signs referred to in the second list. By this means he can readily determine whether the person examined is in fact suffering from the effect of his occupation. His examination is in this way made more illuminating. Physicians, not specialists in occupational hygiene, can thus learn to detect the effects of industry and, conversely, can eliminate the occupation as the cause when certain symptoms are observed which do not fit the usually observed effects of the occupation.

Medical examiners should remember that it is often necessary to keep in mind not only the present occupation, but the former one as well. Persons suffering from certain ailments may no longer be

engaged in the industry which was originally responsible for their condition. But careful inquiry into their occupational history will sometimes result in the recording of an occupation the effects of which are clearly those from which the patient is suffering. The medical profession must give occupational findings greater weight in forming their judgments regarding physical conditions and in diagnosing and treating disease.

It is hoped in this way that the medical profession will become more and more acquainted with occupational diseases and help in the movement to discover and eliminate cases thereof. In our country, it is still true that very large numbers of working people are constantly exposed to serious occupational hazards and suffer, often unnecessarily, very seriously from the effects of such exposure. The greater interest of medical practitioners will help materially in the campaign of prevention. Medical schools can aid greatly in bringing about this result by giving due weight to the subject in their courses of study. Already the form and content of the pamphlet have recommended it to several schools, which report its value. In the same way, plant executives and safety engineers must take cognizance of the existence of these occupational diseases and look carefully into their own establishments to see to what degree the processes in their shops are devoid of the dangers which are usually associated with industrial operations. Factory inspectors, labor officials, and workmen's compensation boards will find it helpful in inspecting and rating numerous industries. Many hazards should be revealed which they have not known were associated with the processes of manufacture and of which the employers themselves have been ignorant. The comparatively new but rapidly expanding field of industrial rehabilitation should find this bulletin an aid in selecting occupations for those with arrested cases of tuberculosis and for others weakened by disease.

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Acetylene makers, D 1, J 4, 16, 43.
Acid dippers, C, J 10, 22, 26, 37, 48.
Acid finishers (glass), J 26, 28, 48.
Acid makers. *See* particular acid.
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Acid recoverers, J 26, 37, 48.
Acid transporters, J. 26, 37, 48.
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Aldehyde pumpmen, J 1, 30.
Alkali salt makers, C, J 14, 18, 26, 46, 47.
Amber workers, J 28.
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Aniline makers, J 7, 10, 12, 26, 34, 37.
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Antimony fluoride extractors, J 27.
Antipyrin makers, J 31, 40.
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Artificial ice makers, A 2, C, J 4.
Artificial leather makers, J 7, 9, 12, 37, 48.
Artificial manure makers. *See* Fertilizer makers.
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Bakelite makers, J 39.
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Batch makers (rubber works). *See* Compounders (rubber).
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Fur pullers, D 2, F 1.

Galvanizers, C, J 3, 4, 9, 10, 13, 26, 28, 37, 46, 48.
Garage workers, J 16, 25.
Garbage workers, F 3.
Gardeners, J 9.
Gas (illuminating) workers, A 2, J 4, 12, 16, 22, 39, 47, 49.
Gas purifiers, J 4, 22, 39, 47.
Gatherers (glass), A 1.
Gilders, J 5, 11, 12, 25, 30.
Glass blowers, A 1, D 1, E.
Glass cutters, C, D 1.
Glass finishers, C, D 1, J 26, 27, 28, 48.
Glass-furnace workers, A 1, E.
Glass mixers, D 1, J 8, 9, 21, 26, 28.
Glass polishers, J 28.
Glaze dippers (pottery), C, J 8, 9, 21, 28.
Glaze mixers (pottery), D 1, J 8, 9, 21, 28.
Glost-kiln workers, A 2, J 16, 28.
Glove makers (leather preparers), C, D 2. *See also* Tannery workers.
Glue workers, A 2, C, D 2, F 3, J 4, 11, 12, 15, 26, 37, 46, 47.
Gold beaters, D 1, H.
Gold refiners, D 1, J 9, 22, 28, 29.

Grain elevator workers, D 2.
Granite workers. *See* Stonecutters.
Graphite workers, A 1, D 1.
Grinders (colors). *See* Color makers.
Grinders (metals), C, D 1, J 8, 28.
Grinders (rubber), D 2, J 8, 28.
Guncotton dippers, J 37, 48.
Guncotton pickers, D 2.
Guncotton washers, C.
Guncotton wringers, J 37.
Gypsum workers, D 1.

Hair workers, C, D 2, F 1, 3.
Hammermen, H.
Hardeners (felt hats), J 29, 30.
Hardeners (metals), A 1.
Harness makers, D 2.
Hat makers, felt. *See* Felt-hat makers.
Heater boys (riveters), J 28.
Heel makers (shoes), D 2
Hemp workers, D 2.
Horn workers, D 1.
Hothouse workers, A 2.
Hot-rod rollers (iron and steel), A 1.
Hydrochloric-acid makers, J 26, 48.

Ice (artificial) makers. *See* Artificial-ice makers.
Ice-cream makers, A 2, C.
Imitation-pearl makers, J 28, 37.
Incandescent-lamp makers, J 5, 16, 28, 29, 30, 37. *See also* particular occupation.
Incandescent-mantle hardeners, E.
Ink makers, J 21, 30.
Insecticide makers, J 9, 15, 28, 42.
Insulators, J 49.
Iron and steel workers (all departments), A 1. *See also* particular occupation.
Ironers, A 2.

Japan makers, A 2, J 9, 11, 28, 30, 52.
Japanners. *See* Japan makers.
Jewelers, D 1, G, H, J 5, 9, 26, 28, 29, 37, 48.
Junk metal refiners, A 1, D 1, J 13, 28.
Jute workers, D 2.

Kiln tenders, A 1, J 16.
Knitters, H.
Knitting-mill workers, D 2.

Labelers (paint cans), J 28.
Lace makers, D 2.
Lacquerers. *See* Lacquer makers.
Lacquer makers, J 5, 11, 12, 28, 30, 52.
Lampblack makers, J 38, 39.
Lapidaries, D 1.
Lard makers, J 3.
Lasters (shoes), A 2, C, D 2, J 30.
Lathe turners, H.
Laundry workers, A 2, C, J 16, 17, 18.
Layer pullers (glass), A 1.
Lead burners, J 10, 28.
Leadfoil makers, A 1, J 28.
Lead miners, J 28. *See also* Miners.
Lead pipe makers, J 28.
Lead salts makers, J 28.
Lead smelters, A 1, D 1, J 8, 9, 16, 28, 46.
Leather workers, D 2, F 1. *See also* Tannery workers.
Leer tenders (glass), A 1.
Letter sorters, H.
Levermen (iron and steel), A 1.
Lifters-over (glass), A 1.
Lime burners, D 1, J 10, 14, 16.
Limekiln chargers, D 1, J 14, 16.
Lime pullers (tannery), C, F 1.
Lime workers, D 1.
Linen workers, D 2.
Linoleum colorers, J 9, 21.
Linoleum makers, A 2, C, D 1, J 3, 5, 11, 28, 30, 48, 52.
Linotypers, J 8, 28.
Linseed-oil boilers, J 3, 28.
Lithographers, D 1, H, J 7, 9, 11, 12, 21, 28, 37, 52.
Litho-transfer workers, J 28.
Locksmiths, H.
Longshoremen, F 1.
Lumbermen, A 2, F 2.
Luters (zinc smelting), A 1, J 13.

Machinists, H.
Marble cutters, D 1.
Marblers (glass), A 1.
Masons, C, D 1, H.
Match-factory workers, C, D 1, 2, J 15, 21, 28, 42, 47.
Mattress makers, D 2.
Meat inspectors, F 1.
Melters (foundary; glass), A 1.
Mercerizers, J 4, 48.
Mercurial-vapor-lamp makers, J 29.
Mercury bronzers, J 29.
Mercury miners, J 29. *See also* Miners.
Mercury salts workers, J 29.
Mercury smelters, A 1, J 16, 29, 46.
Mercury-solder makers, J 29.
Mercury-still cleaners, J 29.
Metal polishers, G.
Metal-polish makers, J 25.
Metal turners, D 1.
Metal workers. *See* particular occupation.
Mica strippers or splitters, D 1.
Mica workers, D 1.
Microscopists, H.
Milkers, H.
Millinery workers, J 7, 11, 12, 30, 38, 52.
Miners, A 2, C, D 1, F 2, G, H, J 14, 16, 37, 47.
Mirror silverers, A 2, C, J 1, 28, 29.
Mixers (felt hats), D 2, J 29.
Mixers (rubber), A 2, D 1, J 7, 8, 9, 11, 12, 21, 28.
Mixing-room workers (miscellaneous), D 1, 2.

Mold breakers (foundry), D 1.
Molders. *See* Bench molders, Floor molders.
Monotypers, J 8, 28.
Mordanters, J 6, 8, 9, 11, 12, 21, 37.
Motion-picture-film makers. *See* Celluloid makers.
Motormen, A 2.
Mottlers (leather), J 5, 30.
Moving-picture-machine operators, E.
Muffle tenders, A 1.
Muriatic-acid makers. *See* Hydrochloric-acid makers.
Muriatic-acid mixers. *See* Acid mixers.
Musical-instrument makers, J 28.
Musicians, H.

Nickel platers, C. *See also* Electroplaters.
Nitrators, J 37, 48.
Nitric-acid workers, J 28, 37, 48.
Nitroglycerin makers, J 10, 28, 35, 37, 48.

Oilcloth makers. *See* Linoleum makers.
Oil extractors, J 15.
Oil-flotation-plant workers, J 38, 46, 47, 48.
Oil refiners. *See* Petroleum refiners.
Oil-well workers, J 38.
Open-hearth-department workers (iron and steel), A 1.
Oxy-acetylene cutters, E.

Packing-house employees, A 2, C.
Painters, H, J 7, 11, 12, 25, 28, 30, 52.
Paint makers, C, J 7, 11, 12, 15, 28, 29, 30, 49, 52.
Paint removers, D 1, J 28.
Pair heaters (tin-plate), A 1.
Paper-box makers, H.
Paper glazers, J 9.
Paperhangers, D 1, J 9, 21, 28.
Paper makers, A 2, C. *See also* particular occupation.
Paraffin workers, J 15, 38, 49.
Patent-leather makers, A 2, J 5, 16, 28, 30, 48, 52.
Pavers, A 1, H, J 49.
Pencil (colored) makers, J 7, 9, 21.
Perfume makers, J 23, 30, 34.
Petroleum refiners, A 1, C, J 25, 26, 28, 38, 46, 47, 48, 49.
Phenol makers. *See* Carbolic-acid makers.
Phosgene makers, J 16, 18, 41.
Phosphate-mill workers, A 2, C, D 1, J 42. *See also* Fertilizer makers.
Phosphor-bronze workers, J 42.
Phosphorus-compounds makers, J 42.
Phosphorus-evaporating-machine operators, A 2, C, J 48.
Phosphorus extractors, J 42, 43.
Phosphorus (red) makers, J 43.
Photo-engravers, J 12, 21, 30, 37.
Photographers, E, G, J 30, 44.
Photographic workers, J 7, 12, 18, 21, 22, 29.
Photograph retouchers, J 28.
Picklers, C, J 10, 22, 26, 37, 48.
Picric-acid makers, J 37, 39, 44, 48.
Pigment makers. *See* Color makers.
Pipe fitters, J 28. *See also* liquid piped.
Pitch workers, J 9.
Pit molders (foundry), A 1, D 1.
Planer men (stone, metal), D 1.
Plasterers, C, D 1.
Plaster of Paris workers, D 1.
Platers. *See* Electroplaters.
Plumbers, J 28. *See also* substance manufactured.
Pneumatic-tool workers, D 1, H.
Polishers, D 1, J 5, 25, 28, 30.
Polishers (furniture). *See* Furniture polishers.
Porcelain makers. *See* Pottery.
Porters, H.
Pot fillers (glass), A 1.
Pot lifters (iron and steel), A 1.
Pot pullers (foundry), A 1.
Pot-room workers (aluminum foundry; carbide plant), A 1.
Pot setters, A 1.
Pottery workers, A 1, C, D 1, J 9, 14, 16, 26, 28, 46. *See also* particular occupation.
Pouncers (felt hats), D 1, 2.
Pourers (brass foundry), A 1; J 13.
Preparers (tannery), C, F 1, 3.
Pressers, H, J 16.
Pressman (oil refining), C.
Pressmen (printers), D 1.
Pressroom workers (rubber), A 2, J 7, 8, 9, 11, 12, 21.
Primers (explosives), J 29.
Printers, D 1, J 7, 8, 9, 11, 28, 52.
Puddlers (iron and steel), A 1, E.
Pullers-out (felt hats), C.
Pulp-mill employees, C. *See also* particular occupation.
Putty makers, D 1, J 11, 15, 28.
Putty polishers (glass), D 1, J 28.
Pyrites burners, A 1, D 1, J 9, 46, 47.
Pyroxylin makers. *See* Guncotton.

Quarrymen, D 1, F 2.

Rag workers, D 2, F 3.
Reclaimers (rubber), J 7, 12, 15, 26, 28, 48.
Red-lead workers, J 28.
Refiners (metals), A 1, J 9, 10, 16, 28, 29, 37, 46. *See also* particular metal.
Refiners (sugar). *See* Sugar refiners.
Refrigerating-plant workers, A 2, C, J 4.
Riveters, H, J 28.
Roller coverers (cotton mills), C, D 2.
Rollers (metals), A 1.

Roll setters (iron and steel), A 1.
Roll wrenchers (iron and steel), A 1.
Roofers, A 2, J 28, 49.
Roofing-paper workers, J 49.
Rope makers, D 2.
Roughers (iron and steel), A 1.
Rubber-glove makers, J 11.
Rubber-substitute makers, J 45.
Rubber-tire builders, J 9, 11, 12, 21.
Rubber washers, J 9, 11, 12, 21.
Rubber workers, A 2, D 1, 2, J 7, 8, 9, 11, 12, 21, 25, 26, 28, 39, 46, 52. *See also* particular occupation.

Sagger makers, C, D 1, J 28.
Sailors, A 2, H.
Salt extractors (Coke-oven by-products), J 4, 48.
Salt preparers, A 2, C, D 1.
Sand blasters, D 1.
Sand cutters, D 1.
Sanders, D 1.
Sanding-machine operators, D 1.
Sandpaperers (enameling and painting auto bodies, etc.), D 1, J 28.
Saw filers, D 1.
Saw-mill workers, D 2, F 2.
Sawyers, H.
Scissors sharpeners, H.
Scourers, wood lasts (shoes), D 2.
Scrapers (foundry), D 1.
Screen tenders (pulp mill), C.
Screen workers (lead and zinc smelting), D 1, J 28.
Sealers (incandescent lamps), J 16.
Sealing-wax makers, J 9, 52.
Seamstresses, H.
Sewer workers, C, J 4, 14, 47.
Sewing-machine operators, H.
Shale-oil workers. *See* Petroleum refiners.
Shavers (felt hats, fur, tannery), C, D 2, F 1, 3.
Shaving-brush makers, D 2, F 1.
Sheep-dip makers, J 9.
Sheet-metal workers, J 28.
Shellackers. *See* Shellac makers.
Shellac makers, J 4, 5, 11, 12, 28, 30, 52.
Shell filers, J 35, 44, 51.
Shepherds, F 1.
Shoddy workers, D 2, F 3, J 10, 26, 48.
Shoe-factory operatives, D 2, J 5, 12, 30. *See also* particular occupation.
Shoe-finishers, A 2, J 4, 5, 6, 11, 12, 25, 30.
Shoemakers. *See* Cobblers.
Shot makers, J 8, 9, 28.
Shove-in boys (glass), A 1.
Sifters, D 1, 2.
Silicate extractors, J 27.
Silk workers, D 2, F 3.
Silo workers, J 14.
Silverers (mirrors). *See* Mirror silverers.
Silver melters, A 2, J 16.
Silver refiners, J 22.
Singers (cloth), J 16.
Sintering-plant workers, D 1.
Sizers (felt hats), C, J 29.
Skimmers (glass), A 1.
Slag-machine tenders (iron and steel), A 1.
Slate workers, D 1.
Slip makers (pottery), C, D 1, J 28.
Slushers (porcelain enameling), J 28.
Smelters. *See* particular metal.
Smokeless-powder makers, J 5, 12, 15, 34, 39, 44.
Smoothers (glass), C, D 1.
Soap makers, .. 2, C, F 3, J 3, 30, 34.
Soda makers, C, J 4, 14, 16, 37, 47.
Sodium-hydroxide makers, C.
Sodium-sulphide makers, J 47.
Softeners (tannery), D 2.
Solderers, J 26, 28.
Sole stitchers (Blake machine), J 29.
Spinners (asbestos), D 1.
Spinners (textiles), D 2, H.
Spongers, C.
Sprayers, C.
Sprayers (trees), J 9, 28.
Spreaders (rubber works), A 2.
Stablemen, F 1.
Stainers (shoes), J 28.
Stamp-mill workers, C, D 1.
Starch makers, D 2, J 14, 47.
Starters (felt hats), C, J 29.
Statuary workers, D 1.
Steam fitters. *See* pipe fitters.
Stearic-acid makers, A 2, J 3.
Steel engravers, G, J 28, 29, 37. *See also* Engravers.
Stereotypers, A 2, J 8, 28.
Stiffeners (felt hats), J 29, 30.
Still (coal-tar) cleaners, A 1, J 12, 49.
Stillmen (carbolic acid), A 1, J 39.
Stillmen, operating, A 1.
Stitchers (shoes), J 30.
Stokers, A 1, E, J 16.
Stonecutters (dry), D 1, H.
Stonecutters (wet process), C, D 1, H.
Storage-battery makers, J 28, 29, 46, 48.
Straw-hat makers, A 2, D 2.
Submarine (storage-battery) workers, J 10.
Sugar refiners, A 2, C, D 1, J 4, 14, 46, 47.
Sulphite cooks (pulp mill), A 2, C, J 46.
Sulphur burners, A 1, D 1, J 9, 46.
Sulphur-chloride makers, J 18, 26.
Sulphurers (hops and malt), J 46.
Sulphur extractors, J 15.
Sulphuric-acid workers, J 9, 10, 28, 37, 46, 48.
Sumackers (tannery), C, F 1.
Surgical-dressing makers, J 39.

Table hands (tannery), C, F 1.
Table operators (iron and steel), A 1.

Table turners (enameling), A 2, D 1, J 28.
Tailors, H.
Takers-down (glass), A 1.
Tallow refiners, F 3, J 3, 15, 48.
Tank men, C.
Tannery workers, C, F 1, 3, J 7, 9, 11, 17, 21, 22, 28, 46, 47, 48.
Tapers (airplanes) J 50.
Tappers (smelting), A 1.
Tar workers, J 49.
Taxidermists, D 2, F 1, J 9, 29.
Tenzers (glass), A 1, J 16.
Telegraphers, H.
Telephone linemen (trench work), C.
Temperers, A 1, C, J 16, 22, 28, 38, 48.
Textile-comb makers, D 1.
Textile printers. *See* Calico printers.
Textile workers, A 2, C, D 2. *See also* particular occupation.
Thermometer makers, J 29.
Thread glazers, A 2, C.
Tile makers, A 2, C, D 1, J 28.
Tin-foil makers, A 1, J 28.
Tinners, A 1, C, J 3, 4, 9, 10, 26, 28.
Tin-plate mill workers. *See* Iron and steel workers.
Tire builders. *See* Rubber-tire makers.
Tobacco moisteners, C.
Tobacco rollers, D 2.
Tobacco workers, D 2.
Tongsmen (iron and steel), A 1.
Tool makers, D 1.
Top fillers (foundry), A 1, D 1.
Towermen (sulphuric acid), J 10, 37, 46, 48.
Toy makers, J 5, 9, 28.
Transfer workers (pottery), J 28, 52.
Transporters of hides and wool, F 1.
Treaders (rubber), J 12.
Tree sprayers. *See* Sprayers (trees).
Trench diggers, F 2.
Tubemakers (glass), A 1.
Tubulators (incandescent lamps), J 16.
Tumbling barrel workers, D 1.
Tunnel workers, B, F 2, G.
Turners-out (glass), A 1.
Turpentine extractors, C, J 52.
Type cleaners, J 11, 30.
Type founders, J 28.
Typesetters, J 28.
Typists, H.

Upholsterers, D 2, J 30.

Vapor curers. *See* Vulcanizers.
Varnish boilers, J 3.
Varnish makers, A 2, J 1, 3, 4, 11, 12, 30, 52.
Vatmen, C.
Velvet makers, C, J 9.
Veterinarians, F 1, 3.
Vignetters, J 26.
Vinegar workers, J 1.
Vinters, J 14.
Vulcanizers, A 2, C, J 7, 8, 11, 12, 15, 21, 30, 45.
Vulcanizers (steam) A 2, C.

Wallpaper printers, A 2, C, J 9, 21, 28.
Warming-house employees (guncotton), A 2.
Washers, C.
Washers (rubber), C.
Washwomen, C, H.
Watchmakers, G, H.
Water gilders, J 29.
Waterproof-cloth makers, J 25.
Weavers, D 2, H.
Weighers, D 1, 2.
Welders, A 1, E, J 13, 28.
White-lead workers, J 14, 28.
Wire drawers, J 9, 48.
Wirers (incandescent lamps), J 5.
Wood-alcohol distillers, J 30.
Wood-last scourers (shoes), D 2.
Wood preservers, J 9, 39, 49.
Wood stainers, J 21, 28.
Woodworkers, D 2, J 25, 30.
Wool carders, D 2, F 1.
Wool scourers, A 2, C.
Wool spinners, D 2, F 1.
Wool workers, D 2, F 1. *See also* particular occupation.
Wringers (guncotton), J 37.

X-ray workers, E.

Yeast makers, J 14.

Zinc-chloride makers, J 10, 18, 26.
Zinc-electrode makers, J 29.
Zinc miners, J 9. *See also* Miners.
Zinc smelters, A 1, J 13, 16, 28, 46.

Section II.—LIST OF HAZARDS, SYMPTOMS, OCCUPATIONS EXPOSED, AND PREVENTION.

A. ABNORMALITIES OF TEMPERATURE.

The primary physiological effect of abnormal temperatures is the disturbance of the heat-regulating system of the body. Heat dilates the blood vessels on the surface of the body, increasing the supply of blood in this region. Cold, on the other hand, constricts the blood vessels, causing a diminished blood supply on the body surface. Continuous abrupt changes from one extreme of temperature to another may cause serious congestion of the internal organs, the heat-regulating system of the body not being capable of adapting itself to sudden variations. It is in this way that a cold draft, which causes a sudden variation of the temperature, may produce neuralgia, paralysis, and respiratory diseases. Extremes of temperature may produce pathological changes by direct action. Thus, extreme dry heat will cause conjunctivitis, cataract, and the familiar sunburn. Extreme cold may cause frostbite and eczema. With the above data in mind, abnormalities of temperature have been classified under only two headings; namely, "Sudden variations of temperature" and "Extreme dry heat." Extreme cold has not been listed as a distinct hazard, because a temperature so low as to cause the direct effects mentioned above is rarely met in industry. It is evident that the occupations listed in the division "Extreme dry heat" are exposed, not only to the danger of the direct action of the high temperatures but also to the hazard "Sudden variations of temperature."

The prevention of disease due to exposure to extremes of temperature consists, obviously, in the avoidance of sudden variations of temperature. Drafts are particularly hazardous, and may be practically eliminated by the use of vestibule and storm doors. Workers in cold processes should keep active and avoid chill. The hot-process worker should allow his body to cool off gradually after completion of the day's work. He should carefully regulate his diet, drinking plenty of water and avoiding meats. As direct preventive measures for the effects of extreme heat, it is advisable to make use of shields, helmets, goggles, water-cooled furnace doors, exhaust systems, cold air, fans, etc.

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A. Abnormalities of Temperature.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
1. Extreme dry heat.	Anemia, general debility, catarrh, stiff joints, cramps, lumbago, Bright's disease, skin eruptions, premature old age, cataracts, retinitis, conjunctivitis.	Ammonium salts makers; annealers; antimony extractors (refiners); arsenic roasters; bar-mill workers (iron and steel); benzol-stillmen; Bessemer-converter workers (iron and steel); beta-still operators (beta naphthol); billet-mill workers (iron and steel); bisque-kiln workers; blacksmiths; blast-furnace workers; blooming-mill workers (iron and steel); blowers-out (zinc smelting); bluers (revolvers); boiler-room workers; brass founders; braziers; brick burners; brick makers; burners (enameling); cappers (window glass); carbide makers; carborundum makers; case hardeners; casters (iron and steel); catchers (iron and steel); cement workers; chargers (smelting); chargers (zinc smelting); coke-oven workers; color makers; copper smelters; core makers; cranemen (glass industry); cranemen (iron and steel); crucible-steel-department employees; cupola men (foundries); cyanamid makers; dressers (glass); drop forgers; enamelers; flatteners (glass); floor molders (foundry); forgemen; foundry workers; furnace workers; gatherers (glass); glass blowers; glass-furnace workers; graphite workers; hardeners (metals); hot-rod rollers (iron and steel); iron and steel workers (all departments); junk (metal) refiners; kiln tenders; layer pullers (glass); leadfoil makers; lead smelters; leer tenders (glass); levermen (iron and steel); lifters-over (glass); luters (zinc smelting); marblers (glass); melters (foundry; glass); mercury smelters; muffle tenders; open-hearth-department workers (iron and steel); pair heaters (tin plate); pavers; petroleum refiners; pit molders (foundry); pot fillers (glass); potlifters (iron and steel); pot pullers (foundry); pot-room workers (aluminum foundry; carbide plant); potsetters; pottery workers; pourers (foundry); puddlers (iron and steel); pyrites burners; refiners (metals); rollers (metals); roll setters (iron and steel); roll wrenchers (iron and steel); roughers (iron and steel); shove-in boys (glass); skimmers (glass); slag-machine tenders (iron and steel); still (coal-tar) cleaners; stillmen (carbolic acid); stillmen operating; stokers; sulphur burners; table operators (iron and steel); takers-down (glass); tappers (smelting); teazers (glass); temperers; tin-foil makers; tinners; tongsmen (iron and steel); topfillers (foundry); tube makers (glass); turners-out (glass); welders; zinc smelters.
2. Sudden variations of temperature.	Congestion of internal organs, catarrh, neuralgic and rheumatic affections, gastrointestinal and vesical catarrh, pneumonia, Bright's disease.	Artificial-ice makers; bakers; bleachers; brewers; butchers; caisson workers; calenderers (rubber); calico printers; candy makers; canners; cartridge shot shell paraffin dippers; charcoal workers (sugar refining); clay and bisque makers (pottery); cold-storage-plant workers; cooks; digester-house workers (paper and pulp); dresser tenders (textile); drivers; dry cleaners; dryers (felt hats); drying-room workers (miscellaneous); dye makers; dyers; electrotypers; extractor operators (soap); fat renderers; felt-hat makers; fishermen; flangers (felt hats); gas (illuminating) workers; glost-kiln workers; glue workers; hothouse workers; ice cream makers; ironers, japan makers; lasters (shoes); laundry workers; linoleum makers; lumbermen; miners; mirror silverers; mixers (rubber); motormen; packing-house employees; paper makers; patent-leather makers, phosphate-mill workers; phosphorus-evaporating machine operators; press-room workers (rubber); refrigerating-plant workers; roofers; rubber workers; sailors; salt preparers; shoe finishers; silver melters; soap makers; spreaders (rubber works); stearic-acid makers; stereotypers; straw-hat makers; sugar refiners; sulphite cooks (pulp mill); table turners (enameling); taxtile workers; thread glazers; tile makers; varnish makers; vulcanizers; wall paper printers; warming-house employees (guncotton); wool scourers. *See also* occupations exposed to extreme dry heat.

B. COMPRESSED AIR.

In building tunnels, laying deep foundations for large buildings, etc., it is necessary for the work to be carried on under increased air pressure in order to prevent the entrance of water into the excavations. The laborer is lowered gradually and at short intervals the

pressure of the air in the compartment is increased. The first sensation of compression is felt on the eardrums, which may be relieved by the act of swallowing. If the air is too quickly compressed hemorrhage may occur. The greater part of the danger of working in compressed air lies in hasty decompression. While under compression the blood and tissue juices dissolve an increased amount of air, the gases of which are released when the pressure is suddenly decreased. The bubbles thus formed cut off the blood supply from various parts of the body by blocking up the capillaries. The symptoms of compressed air illness, the so-called "bends," are the result.

Workers in compressed air must follow strictly the rules governing gradual compression and decompression, especially the latter. It is not advisable for boys and for men over 40 years of age to work under high pressure.

B. Compressed Air.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
Compressed air.....	Weakness, vertigo, pains in the back and legs, paralysis of legs and arms, painful constriction of the chest, cerebral hemorrhage and aphasia, coma, subcutaneous hemorrhages, impairment of hearing.	Caisson workers; divers; tunnel workers.

C. DAMPNESS.

The moisture content of the air is very important for the proper adjustment of the physiologic processes of the body. Damp air will prevent the evaporation of moisture from the body and will therefore affect the body temperature. High humidity tends to increase the effects of high temperature. Moist cold air has the effect of undermining the general vitality of the organism, weakening its resistance to diseases of the respiratory passages, and to neuralgic and rheumatic affections. The same effects are noticed among workers around open tanks and vats, who are continuously working in wet clothes. Excessive dampness suggests dry air as a hazard. The latter causes chapped skin and catarrhal conditions. It has not been listed among the hazards because it is not characteristic of any one occupation but is prevalent generally, especially during the winter months.

When dampness is a feature of an industrial process the following precautions should be taken to avoid ill effects:

(1) Provision of exhaust systems wherever steam is generated.

(2) Provision of floors with drain channels to prevent the accumulation of water.

(3) Provision of adequate waterproof clothing, such as rubber boots, rubberized aprons, etc.

Wherever there is dampness special measures should be taken to keep the humidity at its proper percentage. In this connection the wet-bulb thermometer is invaluable in determining the degree of moisture in the air. By circulating the air the effects of high humidity may be mitigated.

C. Dampness.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
Dampness.....	Diseases of the respiratory passages, neuralgic and rheumatic affections.	Acid dippers; alkali-salt makers; artificial-ice makers; artificial-silk makers; auto painters; baters (tannery); beam-house workers (tanners); beatermen (paper and pulp); bleachers; bleachery dryers; blockers (felt hats); boiler washers; brewers; brickmakers; cable splicers; caisson workers; calico printers; candy makers; canners; cartridge-cup washers; cartridge felt and wad makers; cartridge shot shell paraffin dippers; charcoal workers (sugar refining); clay and bisque makers (pottery); clay-plug makers (pottery); cloth preparers; concentrating-mill workers (lead and zinc); cotton-mill workers; creosoting-plant workers; digester-house workers (paper and pulp); doffers (textile); dresser tenders (textile); drivers; dye makers; dyers; electroplaters; enamelers; explosives workers; extractor operators (soap); felt extractors; felt-hat makers; fertilizer makers; filter-press workers; fishermen; flax spinners; flush tenders (aluminum); galvanizers; glass cutters; glass finishers; glaze dippers (pottery); glove makers (leather preparers); glue workers; grinders (metals); gun-cotton washers; hair workers; ice-cream makers; lasters (shoes); laundry workers; lime pullers (tannery); linoleum makers; masons; match-factory workers; miners; mirror silverers; nickel platers; packing-house employees; paint makers; paper makers; petroleum refiners; phosphate-mill workers; phosphorus-evaporating-machine operators; picklers; plasterers; pottery workers; preparers (tannery); pressmen (oil refining); pullers-out (felt hats); pulp-mill employees; refrigerating-plant workers; roller coverers (cotton mills); sagger makers; salt preparers; screen tenders (pulp mill); sewer workers; shavers (felt hats, fur, tannery); sizers (felt hats); slip makers (pottery); smoothers (glass); soap makers; soda makers; sodium-hydroxide makers; spongers; stamp-mill workers; starters (felt hats); stone cutters (wet process); sugar refiners; sulphite cooks (pulp mill); sumackers (tannery); table hands (tannery); tank men; tannery workers; telephone linemen (trench work); temperers; textile workers; thread glazers; tile makers; tinners; tobacco moisteners; turpentine extractors; vatmen; velvet makers; vulcanizers (steam); wall-paper printers; washers; washers (rubber); wool scourers.

D. DUST.

Dusts have here been divided into two kinds, according to their chemical composition, namely, organic and inorganic. The difference in symptoms listed under each is based on the findings of recent investigators that organic dusts do not cause pulmonary lesions. Dr. H. R. M. Landis[1] has found that wherever fibrosis was present in the lungs of men exposed to organic dust, the latter was always mixed with some form of mineral or metallic dust. Tobacco workers exposed to organic dust for years showed no pulmonary changes other than those found in people living in the city. Mineral and metallic dusts, however, produce fibrosis of the lung tissue, the extent of which depends on the time of exposure and the particular dust inhaled. Of the inorganic dusts, silica is the most harmful, producing serious pulmonary damage in a comparatively short period of time, while the least harmful are those which produce slight changes and then only after long exposure, for example, lime, coal, etc. The relationship between occupational dust and tuberculosis is rather a doubtful one. Authorities disagree as to the effect of fibrosis on the resisting power to the tubercle bacillus. Dust, by acting as a carrier of the bacilli, may increase their number in the

[1] See article on "The Pathological and Clinical Manifestations Following the Inhalation of Dust," in The Journal of Industrial Hygiene, July, 1919, pp. 117–139.

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lungs. In this way, men exposed to dust may be in greater danger of contracting tuberculosis than others. Dr. H. R. M. Landis claims, however, that in the trades exposed to inorganic dust, mistaken diagnosis of pneumoconiosis swells the mortality statistics for tuberculosis. As a means of avoiding incorrect diagnosis of pneumoconiosis, Roentgen ray examinations of the lungs and sputum analyses are invaluable.

There are four effective methods that may be used to prevent the inhalation of dust generated during industrial processes. No one of these can apply to all conditions, but the particular method to be used must be adapted to the peculiarities of the process.

(1) The use of water to dampen the dust and thus prevent it from rising and filling the atmosphere.

(2) The use of exhaust systems which remove the dust at the point of origin.

(3) The use of enclosing chambers in which the dust-producing processes are confined, being regulated from the outside.

(4) The use of respirators and helmets.

In many cases it may be necessary to combine several of these measures effectively to prevent the inhalation of dust by the worker.

D. Dust.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
1. Inorganic dust.....	Cough, dyspnea, pleuritic pains, hemoptysis, clubbed fingers, marked flatness of chest, deficient expansion (unilateral), dullness, diminished resonance, mucous rales, fibrosis, inflammatory condition of eyes, ears, nose and throat; colds, chronic catarrh of respiratory tract, chronic catarrh of digestive tract, pleurisy, tuberculosis.	Acetylene makers; asbestos workers; basic slag (artificial manure) workers; battery (dry) makers; bed rubbers (marble and stone); bench molders (foundry); bevellers; bisque-kiln workers; bone workers; brickmakers; bronzers; buffers; burrers (needles); burr filers; button makers; calenderers (rubber); carbide makers; carbon-brush makers; carborundum workers; card grinders (textiles); casting cleaners (foundry); cement workers; charcoal workers (sugar refining); chargers (smelting); chargers (zinc smelting); chasers (steel); chimney sweepers; chippers; clay and bisque makers (pottery); clay-plug makers (pottery); color makers; compositors; compounders (rubber); concentrating-mill workers (lead and zinc); core makers; crucible mixers; crushermen (clay and stone); cut-glass workers; cutlery makers; cyanamid makers; diamond cutters; electrotypers; emery-wheel makers; engravers; fertilizer makers; file cutters; filers; flint workers; floor molders (foundry); flue cleaners; foundry workers; glass blowers; glass cutters; glass finishers; glass mixers; glaze mixers (pottery); gold beaters; gold refiners; graphite workers; grinders (metals); gypsum workers; horn workers; jewelers; junk (metal) refiners; lapidaries; lead smelters; lime burners; lime-kiln chargers; lime workers; linoleum makers; lithographers; marble cutters; masons; match-factory workers; metal turners; mica strippers or splitters; mica workers; miners; mixers (rubber); mixing-room workers (miscellaneous); mold breakers (foundry); paint removers; paperhangers; phosphate-mill workers; pit molders (foundry); planer men (stone, metal); plasterers; plaster of Paris workers; pneumatic-tool workers; polishers; pottery workers; pouncers (felt hats); pressmen (printers); printers; putty makers; putty polishers (glass); pyrites burners; quarrymen; rubber workers; sagger makers; salt preparers; sand blasters; sand cutters; sanders; sanding machine operators; sandpaperers (enameling and painting auto bodies, etc.); saw filers; scrapers (foundry); screen workers (lead and zinc smelting); sifters; sintering-plant workers; slate workers; slip makers (pottery); smoothers (glass); spinners (asbestos); stamp-mill workers; statuary workers; stone cutters (dry); stone cutters (wet process); sugar refiners; sulphur burners; table turners (enameling); textile-comb makers; tile makers; tool makers; top fillers (foundry); tumbling-barrel workers; weighers.

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D. Dust—Concluded.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
2. Organic dust.....	Dryness of nose, throat and mouth, cough, anaphylaxis, asthma, bronchitis, emphysema, tuberculosis.	Bakers; beamers (textiles); blowers (felt hats); broom makers; brushers (felt hats); brush makers; buffers; button makers; carbonizers (shoddy); carders (textiles); card grinders (textiles); carpet makers; celluloid polishers; celluloid workers; cigar makers; cobblers; comb makers (celluloid); coners (felt hats); cork workers; cotton-mill workers; cotton twisters; curriers (tannery); devil operators (felt hats); doffers (textiles); feather curers; feather workers; felt-hat makers; fiber workers; finishers (leather); flax spinners; flour workers; formers (felt hats); fur carders; fur clippers; fur cutters; fur handlers; fur preparers; fur pullers; glove makers (leather preparers); glue workers; grain-elevator workers; grinders (rubber); gun-cotton pickers; hair workers; harness makers; heel makers (shoe); hemp workers; jute workers; knitting-mill workers; lace makers; lasters (shoes), leather workers; linen workers; match-factory workers; mattress makers; mixers (felt hats); mixing-room workers (miscellaneous); pouncers (felt hats); rag workers; roller coverers (cotton mills); ropemakers; rubber workers; sawmill workers; scourers, wood lasts (shoes); shavers (felt hats, furs, tannery); shaving-brush makers; shoddy workers; shoe-factory operatives; sifters; silk workers; softeners (tannery); spinners (textiles); starch makers; straw-hat makers; taxidermists; textile workers; tobacco rollers; tobacco workers; upholsterers; weavers; weighers; wood-last scourers (shoes); wood workers; wool carders; wool spinners; wool workers.

E. EXTREME LIGHT.

Intense light is usually a product of a process associated with heat. Among the different kinds of light included under this heading are the arc light, furnace glare, glowing metal or glass, and X-ray. Poor illumination as a hazard is treated under "G. Poor illumination." Continuous exposure to strong light is not only irritating to the conjunctiva, but may also cause a degeneration of the retina and decomposition of the visual purple. Repeated electric flashes of brilliant light have caused severe ophthalmia, retinitis, and even blindness. Glass blowers and steel puddlers, who have to look at a glowing molten mass, are apt to develop cataracts. It seems that the invisible ultra-violet rays and infra-red rays are responsible. The introduction of X-rays into the medical field has brought to light the highly dangerous character of the radiographer's work. Severe dermatitis and cancer may ensue after exposure to X-rays.

The following protective devices prove effective in preventing the injurious action of extreme light:

(1) Shields.
(2) Helmets.
(3) Goggles which eliminate the ultra-violet and infra-red rays.
(4) Clothing which covers the skin completely.
(5) X-ray apparatus should be inclosed as completely as possible with lead plates.

E. Extreme Light.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
Extreme light.....	Cataracts, retinitis, conjunctivitis, dermatitis, ulceration and exfoliation of the skin, electrical ophthalmia, cancer.	Blacksmiths; electricians; electric linemen; furnace workers; glass blowers; glass-furnace workers; incandescent-mantle hardeners; moving-picture machine operators; oxyacetylene cutters; photographers; puddlers (iron and steel); stokers; welders; X-ray workers.

F. INFECTIONS.

There are many infectious diseases, such as tetanus, trachoma, and syphilis, which are often of occupational origin. They are not, however, specifically occupational; that is, they do not arise from a condition caused by an industrial process. The conditions which cause these diseases in industry are identical with those which cause them out of industry. The above-mentioned diseases have not therefore been included in this list of occupational infections. Those diseases which have been included arise primarily in occupational exposure. There are a number of other diseases which occur in occupations, but these are of such little numerical importance that they also have not been included.

Besides the general rules of sanitation, the following measures are recommended:

(1) *Anthrax.*—All hides and animal hair must be thoroughly sterilized. Foreign skins or hair should not be carried on the unprotected shoulder. The hands should be frequently washed with bichloride of mercury. Hair sorters should wear respirators.

(2) *Hookworm.*—Workers in mines and others who are exposed to infected soil should make special effort to keep the skin clean. Shoes must always be worn and gloves are also of value in preventing the entrance of the hookworm through the skin. Infected soil should be disinfected and kept dry. The stools of infected individuals must be disinfected immediately.

(3) *Septic infections.*—Workers should avoid puncturing the skin. Cuts, scratches, or abrasions should be treated at once to avoid infection. Men having open wounds should not be allowed to work with putrid material.

F. Infections.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
1. Anthrax: External	1. *Malignant pustule.*—Begins as inflamed pimple or boil. Papule becomes hard, with a purple center and deep red zone of infiltration surrounding, appearance of minute vesicular areola. Central papule becomes vesicular, discharges thick, bloody serum, later forming a brown gangrene. A painful lymphangitis with hard edema extending over neck and arm. Local phlebitis in the edematous area, chilliness, anorexia, vomiting, prostration, high temperature, feeble pulse. 2. *Malignant edema.*—A spreading inflammation of loose connective tissue accompanied by sloughing and gangrene. Constitutional symptoms those of pyemia.	Animal handlers; hiders (tannery); beamhouse workers (tannery); brush makers; butchers; carpet makers; cattle salesmen; cobblers; curriers; farmers; fertilizer makers; fur carders; fur clippers; fur cutters; fur handlers; fur preparers; fur pullers; hair workers; leather workers; lime pullers (tannery); longshoremen; meat inspectors; preparers (tannery); shavers (felt hats, fur, tannery); shaving brush makers; shepherds; stablemen; sumackers (tannery); table hands (tannery); tannery workers; taxidermists; transporters of hides and wool; veterinarians; wool carders; wool spinners; wool workers.
Internal	High fever, pains in head and back, vomiting, constipation, pain and tenderness in the abdomen, rapid, feeble pulse, palpable spleen, dyspnea, cyanosis. May be hemorrhage from bowels. When lungs are involved, there are additional symptoms—cough, pain in the chest, suffocation.	
2. Hookworm (ankylostomiasis).	Anemia, pallor of the face even when the blood count is not very low; a dull, heavy, listless expression, manner, speech, and gait; increasing muscular weakness; occurrence of parasites in stool. Victims often complain of gastrointestinal pains and cramps; in exaggerated cases there are edema, ascites, progressive emaciation, protuberant abdomen, and increasing stupor.	Brick makers; construction camp workers; farmers; lumbermen; miners; quarrymen; sawmill workers; trench diggers; tunnel workers; workers who come in contact with infected soil, especially prevalent in gold mines of California.
3. Septic infections.	Skin infections such as boils, carbuncles, blood poisoning, localized lymphangitis or cellulitis.	Animal handlers; butchers; canners; feather workers; fertilizer makers; garbage workers; glue makers; hair workers; preparers (tannery); rag workers; shavers (felt hats, fur, tannery); shoddy makers; silk workers; soap makers; tallow refiners; tannery workers; veterinarians; handlers of putrid or decomposing animal products.

G. POOR ILLUMINATION.

The effects of poor illumination are not easily apparent. The hazard may be present in any plant, but is especially prevalent in a limited number of occupations because of the peculiar conditions that make it difficult properly to illuminate the workroom. Miner's nystagmus is the outstanding example of the effects of this hazard. Poor illumination is not only the cause of the conditions listed below but is also an important factor in the causation of accidents.

Artificial light is least harmful to the worker when it comes from overhead, reflected from the ceiling by inverted bowl-shaped reflectors. Light-colored walls and ceilings aid materially in properly illuminating a room. Special precaution must be taken to avoid glare. All lights should be shaded so that only diffused light reaches the eye.

G. Poor Illumination.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
Poor illumination...	Nystagmus, eyestrain, deficient vision due to astigmatism or hyperopia, headache, giddiness. Eyestrain contributes to neurasthenia.	Buffers; burnishers (iron and steel); caisson workers; compositors; embroidery workers; jewelers; metal polishers; miners; photographers; steel engravers; tunnel workers; watchmakers; any factory worker.

H. REPEATED MOTION, PRESSURE, SHOCK, ETC.

Under this heading are included those muscle-strain conditions which are caused by the continuous repetition of movements, pressure, or blows. This section is not concerned with the neurasthenic phenomena which are sometimes called occupational neurosis. Everyone is familiar with the muscular strain experienced in performing for the first time some exercise, such as rowing, long walking, etc. Men newly introduced into a process requiring such repeated action are affected similarly but often much more severely, so as to disable them temporarily for the particular job. The injury does not stop with muscular strain but may even cause inflammation of the surrounding sheaths or paralysis of the parts concerned.

Many types of occupational neurosis may be avoided by working at a comfortable pace, avoiding fatigue. Where continuous pressure or shock is the cause, pads or cushions are often beneficial. Workers who have to grasp tools tightly would do well frequently to change their method of holding the instrument, if this is possible. Occasional rest periods will do much towards the prevention of muscular pains and cramps.

H. Repeated Motion, Pressure, Shock, Etc.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
Repeated motion, pressure, shock, etc.	Pain of muscle used, set up by a myositis, bursitis, synovitis, or other local changes of a chronic inflammatory nature; trembling, gradual emaciation and partial paralysis of parts, acropuresthesia.	Artificial-flower makers; barbers; bicyclists; blacksmiths; carpenters; chauffeurs; clerks; cobblers; compositors; cotton twisters; dancers; diamond cutters; elevator runners; enamelers; engravers; gold beaters; hammermen; jewelers; knitters; lathe turners; letter sorters; lithographers; locksmiths; machinists; masons; microscopists; milkers; miners; musicians; painters; paper box makers; pavers; pneumatic tool workers; porters; pressers; riveters; sailors; sawyers; scissors sharpeners; seamstresses; sewing machine operators; spinners (textiles); stone cutters (dry); stone cutters (wet process); tailors; telegraphers; typists; washwomen; watchmakers; weavers.

J. POISONS.

The continued introduction of new processes making use of new poisonous substances in industry makes this section of more and more importance. The enormous increase in the production of dyestuffs and other chemicals will no doubt show its effects on the workmen in the form of industrial poisoning. During the war the increased production of trinitrotoluol and tetrachlorethane for air-

plane dope resulted in a large number of cases of poisoning from these substances. For the data presented under this heading, the revised "List of industrial poisons," compiled by Sommerfeld and Fischer for the International Association for Labor Legislation, has been drawn upon largely. The arrangement is similar.[3] The material in that list has been revised and brought up to date. Several poisons have been added and all the occupations exposed are given for each poison. The symptoms are those given by recent investigators. In order to avoid swelling the list of poisons to unwarranted proportions, substances the effects of which are similar have been grouped. Thus, all nitro compounds of benzol and its homologues have been included under one heading and the same procedure has been followed with amido compounds. An endeavor has been made to limit this list to those substances the actions of which are mainly constitutional. The next section (p. 29) is devoted to the substances occurring in industry which act as skin irritants. Because of the very large number of substances in the latter class, it has not been possible to treat them as fully as the other poisons.

To prevent industrial poisoning the following precautions should be taken: Personal cleanliness must be maintained. Workers must be instructed as to the toxicity of the substance handled. Frequent medical examinations of workers must be made to detect early symptoms of disease. Men should not be allowed to eat in workrooms where poisonous substances are handled. Work clothes should be removed at end of day's work. Proper lavatory facilities should be provided. Work clothes should receive special attention. The use of gloves and boots are often necessary. Mechanical devices for confining the poisons are of prime importance. (See also preventive measures, under "Dust.") Fumes and gases should be taken care of by proper ventilation, the use of exhaust systems, fans, and blowers. Men who work in an atmosphere polluted by poisonous fumes and gases should always wear gas masks properly suited for the obtaining conditions.

J. Poisons.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
1. Acetaldehyde	Irritation of the mucous membranes of the nose, larynx, bronchi, and eyes; acceleration of the heart's action; profuse night sweats.	Aldehyde pump men; celluloid makers; dye makers; explosives workers; mirror silverers; varnish makers; vinegar workers.
2. Acridine	Irritation and inflammation of skin and mucous membranes, severe burning and itching of the skin, violent sneezing.	Dye makers.
3. Acrolein	Itching in the throat, irritation of the eyes, exciting lachrymation, conjunctivitis, irritation of the air passages, bronchial catarrh.	Bone renderers; fat renderers; galvanizers; lard makers; linoleum makers; linseed oil boilers; soap makers; stearic-acid makers; tallow refiners; tinners; varnish boilers.

[3] See United States Bureau of Labor, Bulletin No. 100, May, 1912.

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J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
4. Ammonia.....	Acute inflammation of the respiratory organs, cough, edema of the lungs, chronic bronchial catarrh, redness of the eyes, increased secretion of saliva, retention of the urine.	Acetylene makers; ammonium-salts makers; artificial-ice makers; artificial-silk makers; boneblack makers; bronzers; coke-oven workers; dye makers; dyers; galvanizers; gas (illuminating) workers; gas purifiers; glue workers; mercerizers; refrigerating-plant workers; salt extractors (coke-oven by-products); sewer workers; shellac makers; shoe finishers; soda makers; sugar refiners; tinners; varnish makers.
5. Amyl acetate.....	Nervous symptoms, headache, fullness of the head, giddiness, numbness, nausea, disturbances of digestion, palpitation of the heart, inflammation of the respiratory organs, fatty degeneration of the liver.	Alcohol-distillery workers; art-glass workers; artificial-silk makers; battery (dry) makers; bronzers; buffers (rubber); celluloid makers; cutlery makers; enamelers; explosives workers; furniture polishers; gilders; incandescent-lamp makers; jewelers; lacquer makers; linoleum makers; mottlers (leather); patent-leather makers; polishers; shellac makers; shoe factory workers; shoe finishers; smokeless-powder makers; toy makers; wirers (incandescent lamps).
6. Amyl alcohol.....	Congestion of the head, oppression of the chest, irritation of the air passages, lowering of the blood pressure, faintness, nausea.	Alcohol-distillery workers; dye makers; fruit-essence makers; mordanters; shoe finishers.
7. Anilines and other amino compounds of benzol and its homologues.	Pallor of the skin, vertigo, unsteady gait, loss of appetite, increased frequency of respiration, anemia, slowing of the pulse, eczematous eruptions, bloody urine, spasmodic muscular pains, cyanosis.	Aniline makers; artificial-leather makers; calico printers; coal-tar workers; compositors; compounders (rubber); dye makers; explosive workers; feather workers; lithographers; millinery workers; mixers (rubber); painters; paint makers; pencil (colored) makers; photographic workers; pressroom workers (rubber); printers; reclaimers (rubber); rubber workers; tannery workers; vulcanizers.
8. Antimony and its compounds.	Itching eruptions of the skin; inflammation of the mouth, throat, and stomach; albumin in the urine, weakness of the heart, vertigo, faintness, coryza, dyspepsia, intestinal colic, nephritis.	Antimony extractors (refiners); brass founders; burnishers (iron and steel); burnishers (rifle barrels); calico printers; color makers; compositors; compounders (rubber); dye makers; enamel makers; filers; fireworks makers; glass mixers; glaze dippers (pottery); glaze mixers (pottery); grinders (metals); grinders (rubber); lead smelters; linotypers; mixers (rubber); monotypers; mordanters; pressroom workers (rubber); printers; rubber workers; shot makers; stereotypers; vulcanizers.
9. Arsenic and its compounds.	Headache, melancholia, sleeplessness, gastric disturbances, emaciation, catarrh of the mucous membranes, skin diseases of various forms, falling out of the hair and nails, melanosis, perforations of the nasal septum, bleeding gums, peripheral multiple neuritis, paralysis.	Arsenic roasters; artificial-flower makers; artificial-leather makers; bookbinders; brass founders; bronzers; calico printers; candle (colored) makers; carpet makers; carroters (felt hats); chargers (zinc smelters); color makers; colored-paper workers; compounders (rubber); copper founders; copper smelters; curriers (tannery); cut-glass workers; decorators (pottery); dye makers; electroplaters; enamelers; feather curers; feather workers; felt-hat makers; ferrosilicon workers; fur handlers; fur preparers; galvanizers; gardeners; glass mixers; glaze dippers (pottery); glaze mixers (pottery); gold refiners; insecticide makers; japan makers; jewelers; lead smelters; linoleum colorers; lithographers; mixers (rubber); mordanters; paper glazers; paperhangers; pencil (colored) makers; pitch workers; pottery workers; pressroom workers (rubber); printers; pyrites burners; refiners (metals); rubber-tire builders; rubber washers; rubber workers; sealing-wax makers; sheep-dip makers; shot makers; sprayers (trees); sulphur burners; sulphuric-acid workers; tannery workers; taxidermists; tinners; toy makers; velvet makers; wallpaper printers; wax-ornament makers; wire drawers; wood preservers; zinc miners.
10. Arseniureted hydrogen.	General malaise, difficulty of breathing, fainting fits, gastric disturbance, jaundice, bluish discoloration of the mucous membrane, pain in the region of the spleen and kidney, darkened urine, fetor of the mouth resembling garlic.	Acid dippers; aniline workers; balloon (toy) fillers'; battery (dry) makers; bronzers; carbonizers (shoddy) dimethyl-sulphate makers; dye makers; enamelers; ferrosilicon workers; fertilizer makers; galvanizers; lead burners; lime burners; nitroglycerin makers; picklers; refiners (metals); shoddy workers; submarine (storage battery workers); sulphuric acid workers; tinners; towermen (sulphuric acid); zinc chloride makers.

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
11. Benzine.....	Headache, vertigo, nausea, cough, irregular respiration, weakness of the heart, drowsiness, cyanosis, twitching of the muscles, psychosis, skin lesions.	Art-glass workers; bronzers; buffers (rubber); cast scrubbers (electroplaters); celluloid makers; cementers (rubber shoes); cement mixers (rubber); compositors; compounders (rubber); curriers (tannery); decorators (pottery); degreasers (fertilizer, leather); dippers (rubber); dry cleaners; electroplaters; enamelers; feather workers; furniture polishers; gilders; glue workers; japan makers; lacquer makers; linoleum makers; lithographers; millinery workers; mixers (rubber); mordanters; painters; paint makers; pressroom workers (rubber); printers; putty makers; rubber-glove makers; rubber-tire builders; rubber washers; rubber workers; shellac makers; shoe finishers; tannery workers; type cleaners; varnish makers; vulcanizers.
12. Benzol.....	Headache, vertigo, anemia, muscular tremor, scarlet lips, spots of extravasated blood in the skin, irritant cough, fatty degeneration of liver, kidneys, and heart.	Aniline makers; artificial-leather makers; battery (dry) makers; benzol stillmen; bronzers; carbolic-acid makers; cast scrubbers; cementers (rubber shoes); cement mixers (rubber); coal-tar workers; coke-oven workers; color makers; compounders (rubber); decorators (pottery); degreasers (fertilizer, leather); dry cleaners; driers (rubber); dye makers; electroplaters; explosives workers; feather workers; fertilizer makers; gas (illuminating) workers; gilders; glue workers; lacquer makers; lithographers; millinery workers; mixers (rubber); mordanters; painters; paint makers; photo-engravers; photographic workers; pressroom workers (rubber); reclaimers (rubber); rubber-tire builders; rubber washers; rubber workers; shellac makers; shoe-factory workers; shoe finishers; smokeless-powder makers; still (coal-tar) cleaners; treaders (rubber); varnish makers; vulcanizers.
13. Brass (zinc).....	Headache, general malaise, throat irritation, cough, nausea, vomiting, constipation, trembling, muscular pains, accelerated respiration, profuse sweating, deposit of green tartar on the teeth, metallic taste in the mouth, anemia, premature old age, respiratory and degenerative diseases.	Bench molders (foundry); blowers-out (zinc smelting); brass founders; braziers; bronzers; chargers (zinc smelting); core makers; floor molders (foundry); galvanizers; junk-dry; metal refiners; luters (zinc smelting); pourers (brass founders (rubber); varnish makers; vulcanizers.
14. Carbon dioxide..	Anemia, cyanosis, headache, drowsiness, vertigo, tinnitus, and general nervousness.	Alkali-salt makers; blacksmiths; boiler-room workers; brass founders; brewers; brick burners; caisson workers; carbon-dioxide makers; charcoal burners; drying-room workers (miscellaneous); fertilizer makers; furnace workers; lime burners; limekiln chargers; miners; pottery workers; sewer workers; silo workers; soda makers; starch makers; sugar refiners; vinters; white-lead makers; yeast makers.
15. Carbon disulphide.	Headache, pain in the extremities, trembling, deafness, reduction of the reflexes, acceleration of the heart's action, nausea, digestive trouble, emaciation, disturbance of sense of vision, excitement and violent temper followed by depression, hyperstimulation of sexual instinct, later its abnormal decline, chronic dementia.	Ammonium-salts makers; artificial-silk makers; asphalt testers; carbon-disulphide makers; celluloid makers; cementers (rubber shoes); cement mixers (rubber); dry cleaners; driers (rubber); enamelers; glue workers; insecticide makers; match-factory workers; oil extractors; paint makers; paraffin workers; putty makers; reclaimers (rubber); smokeless-powder makers; sulphur extractors; tallow refiners; vulcanizers.

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
16. Carbon monoxide.	Headache (usually frontal), dizziness, sense of fullness of the head, fatigue, nausea, general weakness, polycythemia.	Acetylene makers; bakers; bisque-kiln workers; blacksmiths; blockers (felt hats); boiler-room workers; brass founders; cable splicers; calico printers; carbide makers; celluloid makers; charcoal burners; chargers (zinc smelting); chimney sweepers; coal-tar workers; coke-oven workers; copper smelters; core makers; drying-room workers (miscellaneous); enamelers; felt-hat makers; filament makers (incandescent lamps); finishers (incandescent lamps); flangers (felt hats); flue cleaners; foundry workers; furnace workers; garage workers; gas (illuminating) workers; glost-kiln workers; incandescent-lamp makers; kiln tenders; laundry workers; lead smelters; lime burners; limekiln chargers; mercury smelters; miners; patent-leather makers; phosgene makers; pottery workers; pressers; refiners (metals); sealers (incandescent lamps); silver melters; singers (cloth); soda makers; strokers; teazers (glass); temperers; tubulators (incandescent lamps); zinc smelters.
17. Chloride of lime.	Irritating cough, inflammation of upper air passages, difficulty of breathing, bronchitis, asthma, sometimes hemoptysis, conjunctivitis, lachrymation, hyperhidrosis, burning eruption on the skin.	Bleachers; chloride of lime makers; chloroform makers; disinfectant makers; dye makers; laundry workers; tannery workers.
18. Chlorine.....	Pallid countenance, emaciation, decayed teeth, bronchial irritation and asthma, gastric disturbances, irritation of the skin, chloracne.	Alkali-salt makers; beatermen (paper and pulp); bleachers; broom makers; calico printers; chloride of lime makers; chlorine makers; disinfectant makers; dye makers; laundry workers; phosgene makers; photographic workers; sulphur-chloride makers; zinc-chloride makers.
19. Chlorodinitrobenzol.	*See* Nitrobenzol.....	
20. Chloronitrobenzol.	*See* Nitrobenzol.....	
21. Chromium compounds.	Pitlike, phagedenic ulcers, very difficult to heal and very painful; perforation of the nasal septum at the cartilaginous portion, irritation of the conjunctiva, small areas of inflammation in the lungs, inflammation of the kidneys, chronic gastritis, anemia.	Artificial-flower makers; battery (dry) makers; bleachers; calico printers; candle (colored) makers; chromium workers; color makers; compounders (rubber); dye makers; dyers; enamelers; glass mixers; glaze dippers (pottery); glaze mixers (pottery); ink makers; linoleum colorers; lithographers; match-factory workers; mixers (rubber); mordanters; paperhangers; pencil (colored) makers; photo-engravers; photographic workers, pressroom workers (rubber); rubber-tire builders; rubber washers; rubber workers; tannery workers; vulcanizers; wall-paper printers; wax-ornament workers; wood stainers.
22. Cyanogen compounds.	Headache, vertigo, unsteadiness of gait, nausea, loss of appetite, disturbance of gastric and intestinal functions, slowing of the pulse, albuminuria.	Acid dippers; ammonium-salts makers; blacksmiths; blast-furnace workers; browners (gun barrels); calico printers; case hardeners; celluloid makers; dye makers; electroplaters; fulminate mixers; fumigators; gas (illuminating) workers; gas purifiers; gold redners; photographic workers; picklers; silver refiners; tannery workers, temperers.
23. Dimethyl sulphate.	Strongly corrosive effect on the skin and mucous membranes, hoarseness, lachrymation, conjunctivitis, edema, photophobia.	Dimethyl-sulphate makers; dye makers; perfume makers.
24. Dinitrobenzol...	*See* Nitrobenzol.....	
25. Gasoline.....	*See* Naphtha.....	
26. Hydrochloric acid.	Irritation of mucous membranes; conjunctivitis; coryza; pharyngeal, laryngeal, and bronchial catarrh; dental caries.	Acid dippers; acid finishers (glass); acid mixers; acid recoverers; acid transporters; alkali-salt makers; ammonium salts makers; aniline makers, battery (dry) makers; calico printers; camphor makers; carbolic-acid makers; carbonizers (shoddy); cartridge dippers; dye makers; dyers; enamel makers; fertilizer makers; galvanizers; glass finishers; glass mixers; glue workers, hydrochloric acid makers; jewelers; petroleum refiners; picklers; pottery workers; reclaimers (rubber); rubber workers; shoddy workers; solderers; sulphur-chloride makers; tinners; vignetters; zinc-chloride makers.

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
27. Hydrofluoric acid.	Intense irritation of the eyelids and conjunctiva, coryza, bronchial catarrh with spasmodic cough; ulceration of the nostrils, gums, and oral mucous membrane; painful ulcers of the cuticle, erosion and formation of vesicles, suppuration under the finger nails.	Antimony fluoride extractors; art-glass workers; bleachers; dyers; etchers; fertilizer makers; glass finishers; silicate extractors.
28. Lead and its compounds.	Sallow, pale, yellowish hue of the skin; metallic taste, nausea, anorexia, constipation, lead line, asthenia, lassitude, headaches, arthralgias and neuritis, weakness of grip, tremors of fingers and tongue; lead paralyses, especially of muscles used most; atrophy of optic nerve.	Acid finishers (glass); amber workers; art-glass workers; artificial-flower makers; babbitters; battery (dry) makers; bench molders (foundry); blacksmiths; blooders (tannery); bookbinders; bottle-cap makers; brass founders; brass polishers; braziers; brick burners; brickmakers; bronzers; browners (gun barrels); brush makers; buffers (rubber); burners (enameling); cable makers; cable splicers; calico printers; canners; cartridge makers; celluloid makers; chargers (zinc smelting); color makers; colorers (white) of shoes; compositors; concentrating-mill workers (lead and zinc); cut-glass workers; cutlery makers; decorators (pottery); diamond polishers; dye makers; dyers; electroplaters; electrotypers; embroidery workers; emery-wheel makers; enamel makers; file cutters; filers; floor molders (foundry); galvanizers; glass finishers; glass mixers; glass polishers; glaze dippers (pottery); glaze mixers (pottery); glost-kiln workers; gold refiners; grinders (metals); grinders (rubber); heater boys (riveters); imitation-pearl makers; incandescent-lamp makers; insecticide makers; japan makers; jewelers; junk-metal refiners; labelers (paint cans); lacquer makers; lead burners; lead-foil makers; lead miners; lead-pipe makers; lead-salts makers; lead smelters; linoleum makers; linotypers; linseed-oil boilers; lithographers; lithotransfer workers; match-factory workers; mirror silverers; mixers (rubber); monotypers; musical-instrument makers; nitric-acid workers; nitroglycerin makers; painters; paint makers; paint removers; paperhangers; patent-leather makers; petroleum refiners; photograph retouchers; pipe fitters; plumbers; polishers; pottery workers; printers; putty makers; putty polishers (glass); reclaimers (rubber); red-lead workers; refiners (metals); riveters; roofers; rubber workers; sagger makers; sandpaperers (enameling and painting auto bodies, etc.); screen workers (lead and zinc smelting); sheet-metal workers; shellac makers; shot makers; slip makers (pottery); slushers (porcelain enameling); solderers; stainers (shoes); steel engravers; stereotypers, storage-battery makers; sulphuric-acid workers; table turners (enameling); tannery workers; temperers; tile makers; tin-foil makers; tinners; toy makers; transfer workers (pottery); tree sprayers; type founders; typesetters; wallpaper printers; welders; white-lead workers; wood stainers; zinc smelters.
29. Mercury and its compounds.	Ptyalism; swelling, inflammation, and bleeding of the gums; blue line on the gums, rodent ulcers, pallor, mercurial tremor, digestive disturbances, localized white spots in the mucosa surrounded by pale blue or reddened area, general weakness of the hand and digital extensors, foul breath, corrosion of the teeth, furunculosis, sleeplessness and depression or drowsiness and apathy, loss of energy and initiative.	Artificial-flower makers; battery (dry) makers; blowers (felt hats); bronzers; browners (gun barrels); brushers (felt hats); cap loaders; carroters (felt hats); cartridge makers; chlorine makers (electrolytic); color makers; coners (felt hats); dentists; detonator cleaners; detonator fillers; detonator packers; devil operators (felt hats); dye makers; Edison storage battery workers; explosive workers; felt-hat makers; fireworks makers; fulminate mixers; fur handlers; fur preparers; gold refiners; hardeners (felt hats); incandescent-lamp makers; jewelers; mercurial-vapor-lamp makers; mercury bronzers; mercury miners; mercury-salts workers; mercury smelters; mercury-solder makers; mercury-still cleaners; mirror silverers; mixers (felt hats); paint makers; photographic workers; primers (explosives); refiners (metals); sizers (felt hats); sole-stitchers (Blake machine); starters (felt hats); steel engravers; stiffeners (felt hats); storage-battery makers; taxidermists; thermometer makers; water gilders; zinc-electrode makers.

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J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for	Occupations which offer such exposure.
30. Methyl alcohol.	Headache, nausea, abdominal cramps, ringing in the ears, muscular prostration, insomnia, delirium, difficulty of breathing, inflammation of the throat and mucous membrane of the air passages, conjunctivitis, serious affections of the retina and optic nerve resulting in blindness, fatty degeneration of the liver.	Aldehyde pumpmen; art-glass workers; artificial-flower makers; artificial-silk makers; bookbinders; bronzers; brush makers; calicoprinters; celluloid makers; cementers (rubber shoes); dimethylsulphate makers; dry cleaners; dryers (felt hats); dye makers; explosives workers; feather workers; felt-hat makers; filament makers (incandescent lamps); fitters (shoes); furniture polishers; gilders; hardeners (felt hats); incandescent-lamp makers; ink makers; japan makers; lacquer makers; lasters (shoes); linoleum makers; millinery workers; mottlers (leather); painters; paint makers; patent-leather makers; perfume makers; photo-engravers; photographers; polishers; shellac makers; shoe-factory operatives; shoe finishers; soap makers; stiffeners (felt hats); stitchers (shoes); type cleaners; upholsterers; varnish makers; vulcanizers; wood-alcohol distillers; woodworkers.
31. Methyl bromide.	Vertigo, headache, staring look, pallor of the skin, retarded pulse, constipation, excitability, trembling.	Antipyrin makers; dye makers.
32. Naphtha.	Headache, vertigo, nausea, vomiting, dyspnea, palpitation, insomnia, hysteria.	Bronzers; chauffeurs; degreasers (fertilizer, leather); dyers; furniture polishers; garage workers; gilders; metal-polish makers; painters; petroleum refiners; polishers; rubber workers; shoe finishers; waterproof-cloth makers; woodworkers.
33. Nitraniline.	*See* Aniline.	
34. Nitrobenzol and other nitro compounds of benzol and its homologues.	Icterical skin which gradually becomes cyanotic, methemoglobin formation, general debility, anemia, presence of hematoporphyrin, albumin, and sometimes free poison in the urine; skin eruptions, visual disturbances, dyspnea, odor of bitter almonds in breath.	Aniline makers; dye makers; explosives workers; perfume makers; smokeless-powder makers; soap makers.
35. Nitroglycerin.	Severe headache, vertigo, nausea, paralysis of the muscles of the head and eyes as well as of the lower extremities, cyanosis, reddening of the countenance, burning in the throat and stomach, disturbances of digestion, trembling, neuralgia, colic, retarded respiration and heart action, obstinate ulcers under nails and on the finger tips, eruptions on the plantar aspect of the feet and interdigital spaces, with extreme dryness and formation of fissures.	Explosives workers; nitroglycerin workers; shell fillers.
36. Nitronaphthalene.	*See* Nitrobenzol.	
37. Nitrous gases and nitric acid.	Irritation of air passages, cough, labored respiration, inflammation of the eyes, corrosion of the teeth, erosion and perforation of nasal septum.	Acid dippers; acid mixers; acid recoverers; acid transporters; aniline makers; artificial-leather makers; bleachers; carroters (felt hats); cartridge dippers; celluloid makers; dimethyl-sulphate makers; dippers (guncotton); enamelers; etchers; explosives workers; felt-hat makers; fertilizer makers; fur preparers; galvanizers; glue workers; guncotton dippers; guncotton wringers; imitation pearl makers; incandescent-lamp makers; jewelers; lithographers; miners; mordanters; nitrators; nitric-acid workers; nitroglycerine workers; photo-engravers; picklers; picric-acid makers; refiners (metals); soda makers; steel engravers; sulphuric-acid workers; towermen (sulphuric acid); wringers (guncotton).

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J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
38. Petroleum.....	Inflammation of the skin, acne, suppurating ulcers; papilloma; numbness and irritation of the Schneiderian membrane; headache and sensory disturbances; affections of the respiratory organs.	Browners (gun barrels); feather workers; furniture polishers; lampblack makers; millinery workers; oil-flotation-plant workers; oil-well workers; paraffin workers; petroleum refiners; temperers.
39. Phenol.....	Erosion of the skin, eczema, irritation of respiratory organs, digestive disturbances, symptoms of degeneration of the blood, emaciation, nephritis, gangrene, icterus.	Bakelite makers; calico printers; coal-tar workers; dye makers; dyers; etchers; gas (illuminating) workers; gas purifiers; lampblack makers; picric acid makers; rubber workers; smokeless powder makers; stillmen (carbolic acid); surgical-dressing makers; wood preservers.
40. Phenyl hydrazine.	Vesicular eruptions on the skin with itching and burning, diarrhea, loss of appetite, granular degeneration of the blood corpuscles, formation of methemoglobin, a sense of general malaise.	Antipyrin makers; dye makers.
41. Phosgene.....	Destruction of lung tissue, emphysema and edema, myocardial insufficiency due to the emphysema, pleural thickening and adhesions, chronic bronchitis, mild diffuse bronchiectasis, nocturnal dyspnea, polycythemia.	Dye makers; phosgene makers.
42. Phosphorus.....	Inflammation and sclerosis of the bones and of the periosteum, necrosis of the bones of the jaw, swelling and ulceration of the gums and buccal membrane, loosening and falling out of the teeth, suppuration and destruction of jawbone with fistulous channels burrowing through the cheek, meningeal inflammation, brittleness of bones, digestive disturbances, emaciation.	Boneblack makers; brass founders; fertilizer makers; fireworks makers; insecticide makers; match-factory workers; phosphate-mill workers; phosphor-bronze workers; phosphorus-compounds makers; phosphorus extractors.
43. Phosphuretted hydrogen.	Oppressed feeling in the chest, headache, vertigo, tinnitus aurium, general debility, loss of appetite, great thirst.	Acetylene makers; ferrosilicon workers; phosphorus extractors; phosphorus (red) makers.

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
44. Picric acid.....	Itching, inflammation of the skin, vesicular eruptions, yellow pigmentation of epidermis and conjunctiva, inflammation of buccal mucous membrane, digestive disturbances, vertigo, jaundice, nasal catarrh, nephritis.	Dye makers; dyers; explosives workers; photographers; picric acid makers; shell fillers; smokeless-powder makers.
45. Sulphur chloride.	Symptoms are due to the combined effects of chlorine, hydrochloric acid and sulphur dioxide. Sulphur chloride when in contact with moisture reacts with water to form these products.	Rubber-substitute makers; vulcanizers.
46. Sulphur dioxide.	Irritation of the mucous membrane of respiratory organs and eyes, spasmodic cough, bronchial catarrh, digestive disturbances, blood-tinged mucous.	Alkali-salt makers; blast-furnace workers; bleachers; brass founders; brick makers; broom makers; carbolic acid makers; chambermen (sulphuric acid); chargers (zinc smelting); copper smelters; dye makers; fertilizer makers; flue cleaners; fruit preservers; fumigators; galvanizers; glue workers; lead smelters; mercury smelters; oil-flotation-plant workers; petroleum refiners; pottery workers; pyrites burners; refiners (metals); rubber workers; storage battery makers; sugar refiners; sulphite cooks; sulphur burners; sulphurers (hops and malt); sulphuric-acid workers; tannery workers; towermen (sulphuric acid); zinc smelters.
47. Sulphuretted hydrogen.	Headache, debility, vertigo, nausea, disturbances of digestion, sallow complexion and emaciation, slowing of the pulse, conjunctival catarrh, tendency to the formation of boils.	Alkali-salt makers; artificial-silk makers; blast-furnace workers; bronzers; cable splicers; celluloid makers; dye makers; fertilizer makers; flax-rettery workers; gas (illuminating) workers; gas purifiers; glue workers; match-factory workers; miners; oil-flotation-plant workers; petroleum refiners; pyrites burners; sewer workers; soda makers; sodium sulphide makers; starch makers; sugar refiners; tannery workers.
48. Sulphuric acid....	Inflammation of respiratory organs, injury to teeth through softening of the dentine, chronic catarrh.	Acid dippers; acid finishers (glass); acid mixers; acid recoverers; acid transporters; ammonium-salts makers; ammonium-sulphate makers; artificial-leather makers; beta-still operators (beta naphthol); burnishers (iron and steel); calico printers; carbolic acid makers; carbonizers (shoddy); cartridge dippers; celluloid makers; chambermen (sulphuric acid); dimethyl-sulphate makers; dye makers; explosives workers; felt-hat makers; fertilizer makers; galvanizers; glass finishers; guncotton dippers; hydrochloric acid makers; jewelers; linoleum makers; mercerizers; nitrators; nitric-acid makers; nitroglycerine makers; oil-flotation-plant workers; patent-leather makers; petroleum refiners; phosphorus-evaporating machine operators; picklers; picric acid makers; reclaimers (rubber); salt extractors (coke-oven byproducts); shoddy workers; storage-battery makers; sulphuric-acid workers; tallow refiners; tannery workers; temperers; towermen (sulphuric acid); wire drawers.
49. Tar.....	Tar itch, diffuse acne, eczema or psoriasis, loss of appetite, nausea, diarrhea, headache, numbness, vertigo, albuminuria, edema, ischuria, conjunctivitis, bronchitis.	Battery (dry) makers; briquet makers; brush makers; chimney sweepers; coke-oven workers; cord makers; flue cleaners; gas (illuminating) workers; insulators; paint makers; paraffin workers; pavers; petroleum refiners; roofers; roofing-paper workers; still (coal-tar) cleaners; tar workers; wood preservers.

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J. Poisons—Concluded.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
50. Tetrachlorethane (acetylene tetrachloride).	Abnormal sense of fatigue, profuse perspiration, general discontent and grouchiness, inability to concentrate, nocturia, slight polyuria, dreaming, headache, vertigo, nervousness, insomnia, loss of appetite, constipation, diarrhea, gas in stomach, general abdominal pain, nausea, eructations of gas, vomiting, loss of weight, jaundice, enlarged liver, bile in the urine, abdominal tenderness, increase of mononuclear cells, appearance of many immature large mononuclears, elevation in the white count, slight anemia, slight increase in number of platelets.	Airplane-wing varnishers; artificial-silk makers; tapers (airplanes).
51. Trinitrotoluol	Nose and throat irritation, obstinate cough, bluish color of the lips and lobes of the ears, yellowing of the whites of the eyes, expectoration of yellow mucous, discoloration—a mixture of lividity and jaundice, rash on the skin, shortness of breath, anemia, palpitation of the heart, bile-stained urine, rapid weak pulse.	Explosive workers; shell fillers.
52. Turpentine	Irritation of the mucous membrane of the eyes, nose, and upper air passages; cough, bronchial inflammation; salivation; giddiness, headache, irritation of the kidneys, odor of violets in urine, severe irritation of the skin, eczema and hardening of the epidermis.	Art-glass workers; cable splicers; calico printers; camphor makers; cementers (rubber shoes); decorators (pottery); dry cleaners; dye makers; enamelers; enamel makers; feather workers; furniture polishers; japan makers; lacquer makers; linoleum makers; lithographers; millinery workers; painters; paint makers; patent-leather makers; printers; rubber workers; sealing-wax makers; shellac makers; transfer workers (pottery); turpentine extractors; varnish makers.

Section III.—SKIN IRRITANTS.

Because of the fact that dermatoses form such a large proportion of all occupational diseases and are often disabling, the more important occupations that are exposed to skin irritants have been listed separately. A complete enumeration of such occupations would be impossible. Almost any foreign substance can become a skin irritant if it is in continuous contact with the skin. Thus soap and water, which ordinarily do not irritate the skin, may cause severe dermatoses in washerwomen.

The data presented below are a compilation of the literature on the subject, taken largely from Dr. R. Prosser White's compilation of "Occupational Affections of the Skin."

Skin affections caused by different external irritants often show the same clinical picture. A number of occupational skin eruptions have no specific lesions or special pathology, which makes their differential diagnosis very difficult. Most superficial industrial skin diseases show simply a difference in degree of catarrhal inflammation, depending on the intensity of the irritant. For these reasons the symptoms for each irritating substance have not been listed as has been done for the other hazards.

Occupational dermatoses are characterized by their grouping, situation, mode of appearance, spread, and evolution. They crop up in series, retaining their initial type throughout, unless they are secondarily infected. They are most often local, except when they are a differentiating sign of the toxemias. The onset and development are usually sudden. The inflammation is sharply outlined. Exudation is excessive and there is deep-seated edema. The eruption usually predominates on the right side.

There are many cases of dermatitis which are caused by physical agents, such as heat, cold, friction, etc. In this bulletin these conditions are dealt with only as they are related to the hazards listed. Thus among the symptoms for "Extreme dry heat" and "Extreme light" we find skin eruptions.

The following is the list of the more common occupations exposed to dermatoses with the irritating substances concerned:

Occupations Exposed to Specified Skin Irritants.

Occupation exposed.	Skin irritants.
Acetylene makers	Calcium carbide.
Acid workers	Acids.
Alkali-salt makers	Caustic alkali
Artificial-flower makers	Caustic alkali, dyes.
Bakelite makers	Formaldehyde, phenol.
Barbers	Soap, hair tonics.
Battery (dry) makers	Acids, zinc chloride, ammonium salts, charcoal.
Beatermen (paper and pulp)	Caustic alkali, dyes.
Bleachers (cloth)	Acids, bleaching powder, caustic alkali, hydrogen peroxide, sodium silicate.
Blooders (tannery)	Dyes.

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Occupations Exposed to Specified Skin Irritants—Continued.

Occupation exposed.	Skin irritants.
Bobbin carriers	Nitrobenzol, aluminum salts, formaldehyde, magnesium salts, sodium fluosilicate.
Bricklayers	Lime.
Bronzers	Dyes.
Broom makers	Dyes, vegetable dust.
Calico printers	Dyes.
Candy makers	Sugar.
Cap loaders	Mercury compounds.
Carbide makers	Calcium carbide.
Carbolic-acid makers	Caustic alkali, phenol.
Cardboard stickers	Sodium silicate.
Carroters (felt hats)	Acids, mercury compounds.
Cartridge dippers	Acids, soap.
Celluloid makers	Dyes.
Cementers (rubber shoes)	Benzine, coal-tar products, naphtha, methyl alcohol.
Cement workers	Lime.
Cloth preparers	Acids, caustic alkali, lime, soap, potassium salts, sodium salts, sodium silicate.
Confectioners	Sugar.
Cotton sizers	Acids, zinc, chloride, arsenic salts, phenol.
Curriers (tannery)	Paraffin, benzine.
Dampers (conditioning cotton)	Nitrobenzol, aluminum salts, formaldehyde, magnesium salts, sodium fluosilicate.
Dentists	Procain.
Detonator cleaners	Mercury compounds.
Detonator fillers	Mercury compounds.
Detonator packers	Mercury compounds.
Disinfectant makers	Formaldehyde.
Druggists	Bleaching powder, soap, iodoform, sodium salts, sugar.
Dye makers	Acids, benzine, caustic alkali, coal-tar products, dye intermediates, dyes, turpentine, antimony compounds, barium salts, calcium salts, cresol, dextrins, ferrocyanides, formaldehyde, gums, hydroquinone, lead salts, phenol, potassium chlorate.
Dyers	Dyes.
Electroplaters	Acids, benzine, caustic alkali, lime, potassium cyanide, soap, nickel sulphate.
Embalmers	Formaldehyde.
Engravers	Acids, caustic alkali, ferric chloride, potassium cyanide.
Etchers	Acids, caustic alkali.
Explosives workers	Dye intermediates, explosives (TNT, etc), ammonium salts, bromine, mercury compounds.
Felt-hat makers	Acids, mercuric nitrate, dyes.
Fish dressers	Brine.
Flax spinners	Lime, brine.
Furniture polishers	Benzine, caustic alkali, naphtha, turpentine, methyl alcohol, pyridin, rosin.
Fur workers	Dyes.
Galvanizers	Ammonium chloride.
Gas-mantle impregnators	Thorium compounds.
Glass blowers	Charcoal, pitch, rosin.
Glass mixers	Caustic alkali.
Ink makers	Dyes.
Lampblack makers	Soot.
Laundry workers	Caustic alkali, soap.
Lime burners	Lime.
Lime pullers (tannery)	Lime.
Linoleum makers	Dyes.
Machinists	Cutting compounds, lubricants, oils.
Masons	Lime.
Match-factory workers	Dyes, dextrins, gums.
Mercerizers	Acids, caustic alkali.
Mixers (rubber)	Accelerators (hexamethylenetetramine).
Mordanters	Acids, caustic alkali, chromates, zinc chloride, aluminum salts, antimony compounds, arsenates, chromium salts, copper salts, iron salts, lead salts, phosphates, silicates, tin salts
Mottlers (leather)	Dyes.
Nickel platers	Zinc chloride, nickel sulphate.
Nitroglycerin makers	Acids, explosives.
Packing-house employees	Brine.
Painters	Acids, caustic alkali, paints, zinc chloride.

Occupations Exposed to Specified Skin Irritants—Concluded.

Occupation exposed.	Skin irritants.
Paint makers	Paints.
Paper-box makers	Glue.
Paraffin workers	Paraffin.
Parchment makers	Zinc chloride.
Pencil (colored) makers	Dyes.
Petroleum refiners	Caustic alkali, paraffin.
Photographers	Acids, caustic alkali, chromates, metol, pyrocatlic acid, turpentine, amidol, bronzing powder, hydroquinone, rodinal.
Photographic plate cleaners	Caustic alkali.
Pitch workers	Pitch.
Plasters	Lime.
Polishers	Caustic alkali, naphtha.
Polishers (silver and brass	Potassium cyanide.
Printers	Ink, benzine.
Rock-salt workers	Brine.
Rope makers	Oil, tar.
Rubber workers	Accelerators (hexamethylenetetramine).
Salt preparers	Brine.
Scratch brushers (electroplating)	Acids, benzine, lime, oils.
Shell fillers	Explosives (TNT, etc.).
Shoe finishers	Benzine, coal-tar products, naphtha, methyl alcohol.
Sizers (cotton)	Zinc chloride, aluminum salts, calcium salts, magnesium salts.
Soap makers	Caustic alkali, soap, vegetable oils, sodium silicate.
Sodium hydroxide makers	Caustic alkali.
Solderers	Acids, zinc chloride.
Sugar refiners	Sugar.
Tannery workers	Acids, lime, sodium sulphide, arsenic salts, brine, calcium hydrosulphide, chromium salts.
Temperers	Oil, brine.
Tinners	Zinc chloride.
Tobacco rollers	Vegetable dust, vegetable oils.
Tube layers (cotton conditioning)	Nitrobenzol, aluminum salts, formaldehyde, magnesium salts, sodium fluosilicate.
Typists	Carbon paper.
Vulcanizers	Accelerators (hexamethylenetetramine).
Washers	Caustic alkali.
Washwomen	Caustic alkali, soap, sodium salts.
Watchmakers	Potassium cyanide.
Waterproofers (paper)	Paraffin.
Wax-ornament makers	Dye intermediates, potassium cyanide.
Wet-bobbin winders	Lime, aluminum salts, formaldehyde, magnesium salts, sodium fluosilicate.
Wood preservers	Tar, zinc chloride.
Zinc-chloride makers	Acids, zinc chloride.

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*1911-1912. Report on condition of women and child wage earners in the United States. (S. Doc. 645, 61st Cong., 2d sess.)

Vol. I. Cotton textile industry.
Vol. II. Men's ready-made clothing.
Vol. III. Glass industry.
Vol. IV. Silk industry.
Vol. V. Employment of women in the metal trades.
Vol. VI. Employment of women in laundries.
Vol. XIV. Causes of death among women and child cotton-mill operatives.
Vol. XVII. Hookworm disease among cotton-mill operatives.
Vol. XVIII. Employment of women and children in selected industries.
Vol. XIX. Labor laws and factory conditions.

Bul. 98, January, 1912. Conciliation, arbitration, and sanitation in the dress and skirt industry in New York City.

Bul. 100, May, 1912. List of industrial poisons and other substances injurious to health found in industrial processes.

List of the bulletins published since July 1, 1912, in the series "Industrial Accidents and Hygiene" is as follows:

Bul. 104, August, 1912. Lead poisoning in potteries, tile works, and porcelain enameled sanitary ware factories.

Bul. 120, May, 1913. Hygiene of the painters' trade.

Bul. 127, August, 1913. Dangers to workers from dusts and fumes, and methods of protection.

Bul. 141, February, 1914. Lead poisoning in the smelting and refining of lead.

Bul. 151, March, 1914. Industrial accident statistics.

Bul. 156, December, 1914. Lead poisoning in the manufacture of storage batteries.

Bul. 179, October, 1915. Industrial poisoning in the rayon (viscose) industry.

Bul. 201, March, 1916. Report of British departmental committee on the danger in the use of lead in the painting of buildings.

Bul. 201, August, 1916. Report of the committee on statistics and insurance of the International Association of Industrial Accident Boards and Commissions. (Revised edition.)

Bul. 205, January, 1917. Anthrax as an occupational disease.

Bul. 207, March, 1917. Causes of death by occupation.

Bul. 208, April, 1917. Hygiene of the painting trade.

Bul. 216, August, 1917. Accidents and accident prevention in machine building.

Bul. 219, May, 1917. Industrial poisons used or produced in the manufacture of explosives.

Bul. 221, April, 1917. Hours, fatigue, and health in British munition factories.

Bul. 230, July, 1918. Industrial efficiency and fatigue in British munition factories.

Bul. 231, June, 1918. Mortality from respiratory diseases in dusty trades.

Bul. 234, July, 1918. Safety movement in the iron and steel industry, 1907 to 1917.

Bul. 236, July, 1918. Effect of the air hammer on the hands of stonecutters.

Bul. 251, Preventable deaths in the cotton manufacturing industry.

Bul. 253, February, 1919. Women in the lead industry.

Bul. 256, November, 1919. Accidents and accident prevention in machine building. Revision of Bul. 216.

Bul. 267, July, 1920. Anthrax as an occupational disease. (Revised.)

Bul. 278, December, 1920. Standardization of Industrial Accident Statistics.

Bul. 280, May, 1921. Industrial poisoning in making coal-tar dyes and dye intermediates.

Bul. 281, Carbon monoxide poisoning.

The following bulletins, published since July 1, 1912, but not included in the series "Industrial Accidents and Hygiene," also contain important material relating to the subject of industrial hygiene:

Bul. 101, July, 1912. Care of tuberculous wage earners in Germany.

*Bul. 122, May, 1913. Employment of women in power laundries in Milwaukee.

Bul. 142, February, 1914. Administration of labor laws and factory inspection in certain European countries.

Bul. 145, April, 1914. Conciliation, arbitration, and sanitation in the dress and waist industry of New York City.

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