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Air Hygiene Foundation of America, Inc.,
4400 Fifth Avenue, Pittsburgh, Pa.
October 1, 1937

REFERENCES TO RECENT LITERATURE ON INDUSTRIAL DISEASES

(A) News Items.

475 OCCUPATIONAL DISEASES. Survey of Labor Law Admin., p. 6. (Aug. 1937)
Five States - Delaware, Indiana, Michigan, Pennsylvania, and Washington - have recently passed occupational disease compensation legislation. This makes 21 States and the District of Columbia that compensate for some or all occupational diseases. A new Pennsylvania law also provides a special State fund to handle the "accrued liability" problem in silicosis. Instead of placing the burden on the injured worker or his dependents through greatly curtailed benefits, as some States have done, Pennsylvania, out of a special fund, assumes the obligation of a part of the awards over a transition period of 10 years. Further legislation to compensate for occupational diseases is forecast by provisions for investigation this year in seven States - Arkansas, Idaho, Maine, Massachusetts, Montana, New Hampshire, and Oregon.

476 ATTENTION CALLED TO FOUNDATION'S PROGRAM. Bus. Week, p. 1. (Sept. 4, 1937)
Late in July the United Automobile Workers (C.I.O. subsidiary) announced the establishment of a Medical Research Institute to promote industrial hygiene and to assist workers in their accident and occupational disease cases. Both U.A.W. and some of the newspapers seemed to feel that the new agency was the only one doing serious work toward the conquering of silicosis, lead and chromium poisoning, and industrial skin diseases. Friends of Air Hygiene Foundation of America, Inc., Pittsburgh, have been quick to point out to the papers, and the papers even quicker to publish, that it is doing yeoman work along these lines and that the 180* companies supporting its non-profit endeavors will welcome the cooperation of additional company supporters. *Now 190.

477 OCCUPATIONAL DISEASE EXHIBIT, Safety Engineering, 74, 43 (Aug. 1937). No reprints are available but information may be secured from the Division of Labor Standards, U. S. Dept. of Labor, Washington, D. C.
A special occupational disease exhibit has been prepared by the U.S. Department of Labor and is available for display at conventions, exhibits, etc. It shows the effects of occupational diseases upon workers, employers and the general public. It also suggests remedies, emphasizing prevention rather than treatment. The display shows various corrective measures which may be taken to overcome occupational diseases hazards, adequate exhaust ventilation of the working atmosphere, and in general healthful sanitary working conditions. One panel contains four transparencies illustrating certain occupations wherein dust is the chief hazards. Stone finishing, underground mining, sand blasting and mixing of lead pigments are among the occupations included. Another panel illustrates the hazards from inhaling fumes and toxic gases.

478 SILICOSIS CHARGES REDUCED IN CALIFORNIA. Eng. News Rec. 119, 283 (Aug. 1937)
A 75% reduction in the silicosis surcharge rate on industrial compensation insurance was approved last month by the above commission. There is an indication of a trend towards elimination of surcharges.

BLANKETS VOID

NWBB-0009612

NOVEMBER 1937 INDUSTRIAL HYGIENE ABSTRACTS

479 PROGRAM OF THE INTERNATIONAL LABOR CONFERENCE OF JUNE, 1937. C. Goodrich. U.S. Monthly Lab. Rev. 44, 885-94 (Apr., 1937).
On the program of the International Labor Conference, which met in June, the following subjects were to be considered: the desirability of raising the age limits for employment; the reduction of hours of work in the textile, printing and chemical trades; safety provisions for workers in building construction and the planning of public works in relation to employment. Any agreements reached by the Conference, by a two-thirds majority, will be referred to the member governments for formal action. The United States has been a member since 1934.

480 BRITISH STUDY TOXIC GASES IN INDUSTRY. Heating & Ventilating, 34, 70 (Aug. 1937)
A series of booklets describing standard methods for the detection of toxic gases in industry is published by the British Department of Scientific and Industrial Research. The first issue deals with hydrogen sulfide. The use of an efficient system of mechanical ventilation or air purification is necessary wherever this gas appears. It is pointed out that in concentrations of one part in 1000 by volume this gas is nearly as poisonous as hydrocyanic acid and can kill almost as quickly.

481 NITE - CAPS FOR RESPIRATORS. H. S. Cover, South Bend, Ind., Nat. Safety News, 36, 100 (Sept., 1937) Information obtainable from the author, who is manufacturer.
A "nite-cap" is a knitted hood that may be slipped over the filter apertures of respirator, and is especially suitable for work in heavy dust. When a heavy deposit or cake is formed on the cap, it may be taken off and shaken, and usually replaced. It was especially designed for the manufacturer's respirators, but fits others having a similar flat surface.

482 GAS INDICATOR. The Linde Air Products Co., 30 E. 42nd. St., New York, N. Y. Heating, Piping, Air Conditioning 9, 136 (Sept., 1937) Information obtainable from company.
The company has developed a new gas detector known as "U.C.C." gas indicator. It shows presence of combustible gases, indicates oxygen deficiency and includes a toxic chamber for determining the presence of carbon monoxide and hydrogen sulfide in toxic concentrations.

483 WON'T HAVE DUST. Arthur Van Vlissingen. Factory Man. Main. 95, 83 (Sept. 1937)
No reprints.
A brief account of the air conditioning and dust removal system in the foundry o the Ford plant. It includes local exhausts for dust and pickling fumes and warm air blowers in hot locations. The materials used in the blowers, etc., are selected to fit local conditions. In cases where an ordinary blower will last 6 months or more, it is used and replaced, rather than one made from a more resistant material.

(B) Papers on Dust, Dust Diseases and General Industrial Hygiene

484 OCCUPATIONAL AND ENVIRONMENTAL ANALYSIS OF THE CEMENT, CLAY AND POTTERY INDUSTRI R.R.Sayers, J.M. DallaValle and S.G. Bloomfield. Public Health Bull. No. 238, 50 pp., 1937 Obtainable from Superintendent of Documents, Washington, D.C., fo 20 cents, cash.
The bulletin presents a complete occupational survey of the three industries, an is the result of a study of 9 cement mills, 16 potteries, and 47 clay plants, including brick, drain tile and other tile, sewer pipe, stove lining, terra-cotta products and other refractories. For each industry, a general description of th process is followed by flow-sheets showing the course of the materials and the operators who handle or control them, and by an alphabetical list of all occupations, with the materials handled, important and contributory exposures and a

brief description of the operations, for each listed occupation. A classified list of occupations by departments is also included. The survey does not involve an original study of occupational diseases, but the hazards are discussed and such studies of diseases as have been made are reviewed.

In the cement industry, workers are predisposed to certain diseases of the respiratory system and to diseases of the skin, eyes and ears, and the exposure to dust is possibly a factor in the high rate of digestive illnesses among workers in the finishing end of the mills. Although the frequency of minor respiratory diseases is high, the more serious diseases, such as pneumonia and tuberculosis, have caused relatively little disability among these workers.

The serious exposures in theclay industry appear to be the following: inhalation of clay and other dusts, extreme dry heat, exposure to weather and dampness, lead poisoning, and carbon monoxide. The dust hazard varies with the class of dust, free silica content, concentration, particle size and length of exposure. Many of the inorganic dusts appear to be harmless, but those containing free silica produce serious damage in a short time. These irritating dusts cause chronic catarrh, pleurisy, hard breathing, bronchitis, and predispose the workers to tuberculosis. Lead poisoning in the glazing department depends upon the method used and the lead content of the glaze. Pouring and "fettling" (removal of superfluous glaze) are the most hazardous occupations in glazing.

In the pottery industry the hazards are much the same as in clay work, especially silicosis and lead poisoning. Danish and English surveys have shown a high incidence of silicosis among pottery workers, although tuberculosis is not frequent. A survey of this nature has been much needed, both in the industries reported and in others, and the Bulletin will be valuable to all concerned with occupational hazards.

485 AN INQUIRY INTO THE HEALTH HAZARDS OF A GROUP OF WORKERS EXPOSED TO ALUMINA DUST. (British) Charles L. Sutherland, A. Meiklejohn and F.N.R. Price. J. Ind. Hyg. 19, 312-19 (Sept., 1937).

The serious mortality from silicosis among workers in the china biscuit process in the manufacture of English bone china has been traced to the fine flint used in the "placing" of the clay ware for the biscuit firing. Research directed toward discovery of a suitable substitute has led to the trial of alumina (aluminum oxide The question immediately arose whether alumina is free from any health risk comparable to that from silica. A representative group of workers in an aluminum factory, exposed to considerable amounts of fine alumina dust, were submitted to clinical and radiographic examination. No evidence of pneumoconiosis or other lung disease was discovered and there was no indication that any system or organ was adversely affected. In the manufacturing process gas containing faint traces of fluorine was generated, sufficient to cause a transient irritation of the upper respiratory passages, but no lesion arising from inhalation of the gas was discovered.

486 SILICOSIS - PART 3. LEGAL AND MORAL RESPONSIBILITY. Charles S. Pearce. Ceram. Ind. 27, 50-52 (July, 1937).

The author points out that the employer has a moral responsibility was well as a legal one, for accidents and industrial disease. Industry should carry its share of the cost of occupational disability and the manfuacturer should charge enough for his products to cover expenses incurred in the care of his workmen. Compensation laws are not made to tax the manufacturer but to compel him to protect his employees, and just as accidents in the plant are considered a liability on industry, so should lead poisoning, silicosis and other disease contracted in performance of indus trial activities be compensable. In the last few years suits in silicosis cases have reached a half billion dollars; compensation laws to cover all industrial diseases constitute a protection both to manufacturers and

NOVEMBER 1938 JOURNAL OF INDUSTRIAL HYGIENE AND TOXICOLOGY

NIOSH-BARN 4194000

employees. The question has arisen whether vitreous enamel spraying causes silicosis. However with the modern equipment for dust removal, working conditions may be made so ideal that the effect of this substance may never be determined, and reflection should not be cast on the enameling industry. In awarding compensation, the small weekly or monthly payment is better for the needs of the worker, than the payment of a large sum. The system of compensation should cover appropriations for investigation and research. Personal histories of employees should be kept and all workers entering an occupation involving lung hazards should have x-ray chest examinations.

487 DISCUSSION OF INDUSTRIAL ACCIDENTS AND DISEASES. 1936 CONVENTION, INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND COMMISSIONS, TOPEKA, KANSAS. U.S. Dept. Labor, Div. Labor Standards, Bull. No. 10, 1937. Obtainable from Supt. of Documents, Washington, D.C. for 20 cents, cash.
The next 5 abstracts and No. 523 include the papers of greatest interest from the standpoint of occupational diseases. In addition there is a good deal of discussion of compensation problems, several papers on [illegible] eye disabilities, one on preoccupational examinations, and others on injuries and occupational diseases outside our field.

488 A PRACTICAL DISCUSSION OF THE SILICOSIS PROBLEM. O. A. Sander. Above Bulletin pp. 253-9. Bulletin obtainable as above.
The author, who has had unusual experience in the diagnosis of silicosis and appraisal of disability, presents an account of the 4 year old survey of 15,000 Wisconsin workers. There has been no trouble in getting employees in this State to submit to x-ray and other examination, as the medical records remain the private property of the examining physician. Only individuals with advanced silicosis or with active tuberculosis are prohibited from reentering a dusty trade. The effect of silicosis is not noted by the individual until a great reduction in lung capacity has occurred. The author believes that only the unusually heavily dusted individual "progresses" toward increased fibrosis; progression of the slightly dusted person is so slow that injury would not be apparent in the course of an ordinary working life.

489 SILICOSIS EXPERIENCE IN ONTARIO. G. Wilkie and T. N. Doan. Above Bulletin pp. 164-75. Bulletin obtainable as above.
A description of the costs and practical operation of the Ontario Workmen's Compensation Act as it applies particularly to silicosis. The most significant facts shown by the tables are that in the mining industry the compensation rate is $2.43 per $100 payroll, including only those exposed to silica, and in stonecutting $3.50 per $100 payroll, while in foundries the rate is $0.36, and in all others, including porcelain and glass, agricultural implements, autos, etc., porcelain enamelware, and all other industries, the rate is below 10 cents per $100 payroll.

490 THE MAKING OF ARTIFICIAL SILK IN THE UNITED STATES AND SOME OF THE DANGERS ATTENDING IT. Alice Hamilton, M.D., Div. of Labor Standards, Dept. of Labor, Washington, D.C. Above Bulletin, pp. 151-9, 1937. Reprints obtainable from author, and entire bulletin obtainable as above.
A brief history and a good description of the rayon manufacturing processes is presented. The viscose process, which is most generally used, involves the hazards of exposure to hydrogen sulfide and carbon disulfide. We are badly in need of precise information on the effects of carbon disulfide; in fact, there is deplorable ignorance of the hazards of this occupation.

491 DIAGNOSIS OF SILICOSIS. A. L. Kefauver. Ohio State Med. J. 33, 910-11 (Aug. 1937). No reprints.
This paper is a brief review of the diagnosis of silicosis, first pointing out that there have been many theories to explain the action of silica on the lung but that they have been disproved by exhaustive animal experimentation. A brief account of the relation of particle size and time of exposure to silicosis is followed by a concise list of diagnostic signs, the most common being dyspnea, and the list emphasizes the fact that simple silicosis has few clinical symptoms. The importance of x-ray examination is stressed, and the relation of silicosis to tuberculosis is discussed briefly.

492 SILICOSIS. H.H.F. Behrman, M.D., 450 Sutter St., San Francisco, Calif. Calif. West. Med. 46 (Apr. 1937). Reprints obtainable from author.
This paper is a brief review of silicosis especially in its industrial aspects, and supplements an earlier paper paying more attention to the medical side. The well known facts about silicosis - prevalence, cost of claims, stages, susceptibility to tuberculosis - are presented briefly. The author believes that every silicosis victim is, or was, an active quiescent or potential tubercular, otherwise silicosis would not gain the headway it does, nor would tuberculosis kill 75% of silicosis victims. After a brief discussion of the legal phases, especially of responsibility for the "silicosis racket", he suggests the following measures as a solution of the problems of prevention of the disease and the honest disposition of half a billion dollars worth of claims: (1) compensation laws that will allow and recognize the physical and radiologic examination of applicants for employment in dusty trades; (2) periodical examination; (3) preventive measures, including dust counts, increased ventilation, wet processes, control of dust at its point of generation, determination of what is a harmful dust, prohibition of dusty work for tubercular workers, standardization of records, examinations and inspections, ascertainment of dust hazard and limits of safety, and the use of an efficient respirator; (4) creation of a medical board of appeal; (5) compensation awards made only on occupational disability, and (6) first-aid safety measures. For the disposition of cases now pending, the recommendations are: (1) cooperation between the legal profession, the doctor and the employer, and allowing only expert witnesses of the highest caliber, with approval of the expert, review of the testimony, or both, by the local or national Roentgen Ray Society; (2) expenditure by employers for estimation and elimination of hazards; (3) modern legislation, and (4) elimination of the quack and charlatan in medicine and law. The most important move in the author's opinion is the creation of a medical board of review, to decide whether a case is compensable, and a lay commission to decide to what degree a claimant is disabled.

493 THE SAMPLING OF INDUSTRIAL DUSTS BY MEANS OF THE "LABYRINTH". H.V.A. Briscoe Janet W. Matthews, F.F.Holt and Phyllis M. Sanderson. Bull. Instn. Min. Met. (June, 1937); Colliery Guardian, 155, 283-8 (Aug. 13, 1937).
Reprints obtainable from Institution of Mining and Metallurgy, Salisbury House, Finsbury Circus, London, E. C. 2, England, Price 1s 9 d.
When it is necessary to obtain large samples of industrial dust as for solubility tests, filtration methods are inadequate, and the authors developed an apparatus consisted of a rectangular box containing 32 copper plates, 6 x 3¼ in., alternately supported at the top and bottom, leaving a free space 6x3/4in. The collected dust is easily removed after taking off the side of the box, and may be taken separately from each of the 16 or 17 compartments. In a later form the baffles were similarly arranged in a copper tube 3 in. in internal diameter, with an inner celluloid tube which facilitated removal of the dust. This apparatus permitted an air flow of 1000 cu. m. per hour (about 600 cu. ft. per minute). In one case where there was little dust, it was run for 25 days, sampling about half a million cubic meters of air, and 100 grams of dust were collected. Tests were made with both instruments on several types of dust, flint, cement, asbestos and sillimanite.

UNITED STATES NOVEMBER 1, 1937

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NWBB-0009616

The dust was collected and weighed separately from each compartment, and in some cases size distribution counts were made. Both the weights and average particle sizes show a gradual decrease from the first to the last compartment. Both by extrapolation and by the use of the salicylic acid filter, an efficiency of collection averaging about 95% was found for the apparatus. On the other hand, using the particle count as a criterion and the thermal precipitator as a means of sampling, H. E. Watson found an overall efficiency of 44%. Of the particles from 0.2 to 0.8 micron in diameter, more were found at the outlet than at the inlet. Watson attributes this effect to the breaking up of aggregates, but the authors also suggest that large particles of hydrated materials may break up under the heat necessarily used in preparing the thermal precipitator samples forming many smaller particles. However, the object of the apparatus is not complete collection, but large scale collection for subsequent examination, and in one experiment in which two labyrinths were used in series, the dust at the outlet of the second had practically the same size gradation and apparent composition as at the outlet of the first. The advantages of this apparatus lie in large scale collection of dust without alteration of its original properties. The data are presented in a number of tables, and several illustrations show the apparatus and the gradations of dust obtained.

494 MEMORANDUM OF THE COMMITTEE ON DUST SAMPLING INVESTIGATIONS. (THE INSTITUTION OF MINING AND METALLURGY.) H.S.Patterson. J. Chem. Met. & Min. Soc. So. Africa 37, 356-7 (Feb. 1937).
This paper is a contribution to the discussion of a paper by Green and Watson, published in 1935. The author points out that the efficiency of the konimeter decreases with increase in the numbers of particles and that almost the same counts were obtained by the konimeter for clouds containing numbers varying between 4,000 and 2,000 particles per cc. For fine dusts (mostly below 0.5 micron), as found in South African mines, the efficiency of the konimeter is again much smaller, often far below 50%.

495 DIFFERENTIAL DIAGNOSIS IN PULMONARY DISEASE. P. H. Ringer. N. Y. State J. Med. 37, 1008-10 (June 1, 1937).
The author lists 9 diseases that may be expected if respiratory tract symptoms are in evidence. The discussion is devoted mainly to tuberculosis, but occupational dust diseases are mentioned as one of the possibilities, and the great importance of the patient's history is pointed out.

496 CLEANING THE FOUNDRY AIR. The American Foundry Equipment Co., Mishawaka, Ind. C. A. Snyder, Nat. Safety News 36, 54, 102 (Sept., 1937). Mimeographed copies obtainable from author or company.
The foundry operations involving a dust hazard include: (1) sandblasting; (2) tumbling barrels; (3) grinding wheels; (4) shakeouts; (5) sand handling equipment; and (6) miscellaneous operations. Sandblasting should be done in rooms with sufficient mechanically forced draft to keep the dust inside the enclosure It is also essential that each operator be supplied with an efficient air-pressure helmet. The airless centrifugal method, now used to some degree, eliminate the need for an operator in the blasting area. Tumbling barrels should be operated with ample ventilation. A vent pipe velocity of 4,000 to 5,000 feet per minute will give a sufficient air movement to keep dust concentration below this danger point. In shakeout and sand handling equipment each problem requires special consideration, no set rules being applicable. For general work the use of vacuum cleaners above the regular working zone is highly recommended. Various types of OK dust collectors are discussed. Centrifugal collectors, with efficiencies rated at 80 to 80% by weight, are not recommended. Multiple cyclone collectors have much greater efficiencies on account of the more effective application of centrifugal force. Wet collectors have attained an efficiency ranging from 90 to 95 per cent. Cloth screen arresters can be installed where requirements are severe, and efficiencies of 97 per cent are reached. Cloth

tube or bag collectors are favored by many industries because they are a more efficient cleaning mechanism, consume less power, are easily maintained and inspected and have efficiencies of 98 per cent or more by weight. Dust counts of discharged air show 10 million particles or less as determined by the impinger method. Although the electrical precipitation system is the most efficient of all air collecting devices, its usually prohibitive high installation cost limits its use to cases where reclaimed dusts are exceedingly valuable.

HWBB-0009617

497 CONTROL OF DUST IN ROCK DRILLING. Theodore Hatch, Nat. Safety News. 36, 23-24 (Sept. 1937). No reprints, but a fuller paper will be published later.
The author has written a number of papers on this subject, and the present paper is a brief review. Underground operations due to confined spaces are the most dangerous, as dust concentration builds up higher than it would be in the open. The principal sources of dust are: rock drilling, blasting, mucking and other rock handling operations. Pneumatic drills shatter rock to a powder, and particles thus generated vary in size from 1/4 of an inch to submicroscopic diameters. The amount of dust produced by a rock drill is surprisingly large. One rock drill operating at the rate of 100 feet of drilling per day actually crushes over 200 pounds of rock in 8 hours. It has been found that in one minute a rock drill produces as much as one billion particles of hygienic interest. Dust control methods in rock excavation include: (1) wet drilling and wetting down rock walls and muck piles; (2) general ventilation; (3) dust exhaust hoods on drills and over mucking operations and other sources of dust; and (4) personal protection by means of respirators and positive pressure masks.

498 HOW TO CONTROL DUST IN CLAY PLANTS. John M. Kane, American Air Filter Co., Brick & Clay Rec. 91, 69-71 (August 1937) No reprints.
Dust control in clay plants is practical, effective and inexpensive, and an important factor in the tendency toward improved working conditions is the confining of dusty operations. The usual dusts generated in brick plants are not as hazardous as those found in allied ceramic operations, because their free silica content is low and derived largely from impurities in the clay. However, the presence of silica, even in low concentrations, and the unfavorable effect on workmen of the presence of any dust, have been added incentives for confining the dust at its source, thereby preventing its dispersion in the workroom. Details of the application of confinement of dust are given for bucket elevators, conveyors, dry pans, screens and bins.
Protective measures for all these appliances can be summarized under two headings; adequate ventilation and tight casing wherever possible. In bucket elevators not only the exhaust from the elevator, but additional volumes from the point where the clay is fed to the elevator boot, must be taken into account. In conveyors, exhaust equipment is necessary only at the point of material transfer. Although the dry pan is one of the major dust producing units, it can be effectively hooded, and the dust generated can be completely confined by a dust hood made in sections and fitted tightly to the frame supporting the vertical shaft. The exhaust air will carry a minimum of fines from the process without distrubing batch ratios. The confinement of dust from screening equipment requires careful study. A hood with removable sides can be fitted closely to the screen deck, enclosing the screening operations without interfering with inspection and servicing. Storage bins for dry clay require exhaust connections, as the air displaced by the falling material carries with it the fine dust stirred up by the falling clay. Tables showing necessary air volumes and design of exhaust equipment are given for each operation to be protected. The principles of operation and relative advantages of the various types of collectors are discussed briefly, including the cyclone collector, the dynamic precipitator, the wet collector and the filter.

NOV 1 1937 U.S. PUBLIC HEALTH

499 FILTERING HARMFUL DUSTS. E. Kundig, Corpus Engineering Corp., Worcester, Mass. Safety Eng. 74, 41-42 (Aug. 1937). Information obtainable from author or Company.
A unit air filter so designed that the filter unit can readily be cleaned is described in this article. The size of such a unit is usually about 20 inches square in face area and will handle approximately 800 cu. ft. per min. with a pressure drop of 0.20 to 0.25 inch of water. Multiples of these filters are employed to suit the individual requirements. Portable air filters with connecting hose of 3 inches to 4 inches in diameter leads to the tools of the individual workers where the dust-laden air is drawn off and sucked at a high velocity into the filter chamber. The air then passes at a low velocity through the air filter and is freed from silica dust, and may be discharged back into the room through the fan.

500 A HIGH PRICE FOR NEGLECT, John Le Verne, Nat. Safety News, 36, 51-52, 76 (Aug. 1937).
Thousands of minor injuries become major ones because employees neglect treatment. Forty percent of all workers who have held skilled positions are obliged to pursue unskilled jobs after injury. Occupational skin diseases require the analysis of the material with which the worker comes in contact in order to determine the cause of the disease. Different kinds of dusts in varying atmospheric concentrations invade the lungs through inhalation. The danger of silica dust is not overestimated, and unless it is generally recognized it will be increasingly dangerous. The only direct means of attack on silicosis is prevention, involving removal from the atmosphere by exhaust systems and improved ventilation, and the use of respirators.

501 "PORTABLE" X-RAY APPARATUS. Roswell T. Pettit, MD. 728 Columbus St. Ottawa, Ill. Ind. Med. 6, 353-5 (July, 1936). Reprints obtainable from author.
The author calls attention to a number of requirements that must be met in order to obtain accurate roentgenograms in the diagnosis of silicosis and tuberculosis Too often these requirements have not been fulfilled, especially in "portable" x-ray apparatus, offered by a number of manufacturers. In spite of the claims made for them, they are not capable of the accurate representation of fine details that are essential in working with silicosis. Portability is not often a requirement for adequate x-ray apparatus; on the other hand, where transportation is necessary, a complete standard outfit can be carried on a one-ton truck. When apparatus is thus taken to a plant and set up the actual taking of photographs can be accomplished quickly - often 60 exposures in an hour.

502 SOLUBILITY OF SILICA DUSTS. E. J. King. Nature 140, 320 (Aug. 21, 1937)
In a recent paper, Emmons and Wilcox reported that sericite and asbestos have a much higher solubility in blood serum than free silica. The author criticizes their procedure in that the speed and time of centrifugalization was insufficient to separate fibrous materials, which settle more slowly than roughly spherical particles. Using the phosphomolybdic acid test as a measure of silica actually in solution, and keeping the materials suspended for 1 to 8 days at 37° C (the body temperature), King found that the quantity of silica dissolved from sericite (plate and fibrous) in sodium bicarbonate solution was decidedly less than that from quartz, and a similar relation held at 100° C. Also, in acetic acid solution, the solubilities of kaolin and mica were much lower than those of quartz and precipitated silica.

HW88-0009618

UNIVERSITY ARCHIVES November 1992

503 OCCUPATIONAL DISEASE DIAGNOSIS. Leonard Greenburg, M.D., Executive Director, Div. of Industrial Hygiene N. Y. State Dept. of Labor, 80 Centre St., New York, N.Y. Ind. Bull. 16, 306-7 (Aug., 1937). Reprints obtainable from author. Compensation for occupational disease presupposes that we know a great deal about such diseases. In order that we may adequately compensate we must necessarily know both diagnosis and treatment, for the amount of compensation is certainly correlated with the necessary duration of therapy. The essentials of diagnosis are outlined, including the two important factors of occupation and the history of any special exposure. Occupational diseases are directly traceable to the vast increase in the number of new substances in industry, chiefly as a result of chemical research. There are three sources of the difficulty of diagnosis. In medical colleges the students as a rule are not given sufficient training in occupational diseases, and in practice many physicians have no opportunity to learn about them by experience. Due to the rapid strides in chemical industries and the introduction of new substances little is known about their toxicity. For a more adequate examination of the worker it is necessary: (1) to secure his past occupational history as well as his present occupation; (2) to investigate the working environment, with reference to heat, cold, moisture, noise, ventilation, illumination, etc.; (3) to know what substances are used and to what hazards he is exposed, such as dust, fumes, gases, chemicals, etc. A well directed occupational history examination will suggest to the experienced physician just what to look for in the patient. In order that diagnosis may be made most effectively and uniformly, cooperation and supervision by the State is necessary. The ideal State administrative organization for dealing with the diagnosis of the occupational diseases should consist of: (1) well trained physicians, experienced in occupational disease; (2) chemists for the analysis of samples of material in the laboratory and in the work place; (3) a well equipped chemical laboratory to handle all the work expiditiously; (4) access to important reference books and periodicals; (5) facilities for the hospitalization of cases; (6) a board of impartial medical experts to pass on medical examinations, and (7) more time devoted by the medical schools to training the student in the field of occupational disease. There should be closer cooperation between the compensation unit and the industrial hygiene unit.

504 EXPERIENCE WITH SILICOSIS UNDER WISCONSIN'S WORKMEN'S COMPENSATION ACT, 1920 TO 1936. M. D. Kossoris. U.S.Monthly Labor Rev., 44, 1089-1102 (May, 1937). Wisconsin is the only State with a long and continuous experience in compensating silicotic disability. During the 17-year period surveyed, many important questions have been answered by the courts, necessitating amendments to the compensation act. Preliminary statistical data show a heavy concentration of claims during 1933 and 1934, due partly to unemployment and partly, it is claimed to the fact that as a result of subjecting employees to medical examinations many of those with symptoms of silicosis were discharged, although most of them were not disabled.

505 SOME FACTS ON COMPENSATION COSTS WITH SPECIAL REFERENCE TO INCLUSION OF OCCUPATIONAL DISEASES. Henry D. Sayer, Manager, Casualty Dept. Assoc. of Casualty & Surety Executives., 1 Park Ave. New York, N. Y. Safety Eng. 73, 51-2 (May '37), 73, 52-55 (June '37) 74, 45-46 (July '37). Reprints obtainable from author. The author calls attention to some difficult problems in the field of occupational disease compensation. The cost of workmen's compensation has been gradually increasing, largely because its field has been constantly broadened. It has been claimed that since the inclusion of occupational disease the cost of compensation has increased only by a small percentage, but that is true only if the additional cost is assumed to be spread over all industry, which is not a fair assumption. In Wisconsin, for instance, it has been increased tenfold among the industries actually affected. The "classical" occupational diseases, such as lead poisoning, do not involve a serious increase in compensation, especially with the development of protective methods. New industries, however, such as radium painting, present special difficulties, as the danger was not di-

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NOV 2 1937 ALBANY

NOVEMBER 1939 AIHA NEWS

covered until damage was done, and the companies involved have been subjected to true and false claims for large compensation sums. In the field of compensation for silicosis, "accrued liability" presents a difficult problem. Should the employer be responsible for the entire liability for silicosis and asbestosis which were developing slowly and unnoticeably, before it was made compensable? The author thinks not, and that it is not the insurer's liability. The worker must assume some considerable portion of it. Another point of view is that part of the burden should be publicly assumed, but there is no concensus of opinion on that point. Another difficulty is the estimation of the cost of compensation for silicosis or other lung diseases, in advance of the actual claims. Accrued cost is a large factor in accentuating this difficulty. The experience of other countries having compensation laws does not help materially in solving this problem, because the laws and systems of Ontario, Great Britain, South Africa, and other countries are so unlike ours. Another difficulty lies in the relation of dust diseases to tuberculosis. The tubercular should be removed from dusty occupations, but he should not be cast into the industrial scrap heap. Again, silicosis may be so slowly progressive as not to disable affected workmen appreciably before the usual termination of their working lives. An aged silicotic workman, retiring in old age may die from pneumonia, apoplexy or hardening of the arteries, where it may be credible that he would have pulled through for a few years longer had his lungs been unaffected. In such a case, is the disablement to be charged entirely to silicosis, and in case of death, are the deceased's dependents to be entitled to full death benefits? If so, the cost will be incalculable. How is partial disability to be compensated? An impartial and expert board of physicians is an imperative need to determine the medical questions involved. In Ontario the average medical cost per case is $3,000. Under the British law there are no medical benefits. The most vital factor in keeping down costs is prevention, but difficulties are involved even here. Too much cannot be expected from preventive measures. They will not obviate a lung fibrosis already formed. Prevention, however, is not a matter of dust control alone, or of silicosis. The safety engineer of the future must be disease prevention-minded, as well as accident prevention-minded, and the industrial chemist and hygienist must play a part. Finally, the author advocates compensation for specific diseases, rather than all-inclusive laws, as are now in force in several states, as mention of specific diseases will emphasize precautions against the particular disease.

506 COMPENSATED INJURIES. New York State Department of Labor, Division of Statistics and Information, Ind. Bull. 16, 256-63 (July 1937). A copy of the Bulletin is obtainable from the Industrial Commissioner State Office Building, Albany N.Y. for 10 cents cash.

In New York State in 1936, awards amounting to $500,000 were made in 1882 cases of disability caused by exposure to harmful substances or by continuous mechanical action such as rubbing, friction, pressure and vibration, excluding cases of accidents, injury, but including both occupational diseases and accidental injuries due to harmful substances. These cases are tabulated according to specific harmful substances and to industries. Out of 984 cases of occupational disease, 481 were cases of dermatitis, and soap, washing powder and cleaning solutions were responsible for 114, the highest number. Out of 597 accidental injuries due to corrosive substances, 175 were caused by lime. Claims for all classes of disease and injury showed an increase over the 1935 figures.

507 METHODS IN HANDLING THE SILICOSIS PROBLEM IN ONTARIO. G.C.Bateman, Secretary, Ontario Mining Assoc. 320 Bay St., Toronto 2, Ont. Am. Inst. Min. Met. Engrs. Tech. Pub. 822, in Mining Tech. 1, July 1937. 11 pp. Reprints obtainable from author.

The author gives the various stages through which the workmen's Compensation Act of Ontario passed, from its inception in 1915 to the present day. Results of examinations made by a doctor believed to be an expert in diagnosing silicosis showed an incidence so high that the accuracy of diagnosis was questioned, and advice was asked from South Africa where the technique of examining was well established. A survey disclosed that the number of silicotics was very much smaller than actually reported. This led to the adoption by Ontario of the South African methods and standards of diagnosis. However, a huge present and prospective liability was created. Men had been awarded sums ranging from $500 to $2,000 as silicotics and removed from industry with the idea that removal would arrest the disease. It was also thought that with this award the employer's legal responsibility ended. However, it developed that the legal position was different. Awards could only be considered as compensation, which could only be for disability and as a progression of the disease was considered a result of the original disability, the mines were held responsible. Later it was discovered that removal from dust exposure did not improve or arrest the disease. Men lost hope, their economic status was lowered, they were difficult to rehabilitate, and what was no doubt most important, the psychological effect of the notification that the individual was a silicotic was extremely bad. A careful analysis of progression rates shows practically no difference in favor of those removed. Eight of nine men classified as silicotic in 1926 are alive and working today. The ninth died of pneumonia. However it is only just to say that the basis of classification has been substantially raised since 1926. In 1933 some amendments were made to the act, discarding lump sum awards and making the industry responsible at any time for increased disability resulting from the progression of uncomplicated silicosis. The company would not be responsible for tuberculosis unless it developed within two years from the time of leaving dusty employment. The amendments are not quite clear, so individual cases are tried on their merits and there is a question regarding the two year period, which may possibly be lengthened. Competent diagnosis is a necessity, as there are practically no physical or clinical signs, and only an x-ray can give any indication of the disease; its interpretation, however, is to a great degree a matter of personal opinion. Emphasis is placed on the need for having competent unbiased examiners trained in diagnosis of silicosis. The article concludes with an explanation of how the act is administrated; -- examinations, compensations, assessments and costs. All applicants are examined and no one is accepte with the type of chest that would indicate a susceptibility to tuberculosis or silicosis. All workmen below ground must have certificates and must be examined annually. The responsibility of issuing or refusing certificates rests upon the physician. Compensation claims made to the Board include medical aid, hospital or sanatorium costs, without cost limit. In case of death compensation is paid to widow for life or until remarriage at $10 for each child up to 16 years of age. Compensation to the widow is a fixed sum, irrespective of what the claimant may have received. Assessments and costs are carried by the mines according to the number of men employed and the number of dust shifts worked. Every effort is made to reduce hazards and immense improvements have been accomplished through active and intelligent cooperation of the industry.

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NOVEMBER 1992

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NOV 10 1937 INDUSTRIAL HYGIENE ABSTRACTS

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508 PREVENTIVE AND INDUSTRIAL MEDICINE AND PUBLIC HEALTH. NEXT STEPS IN ORGANIZATION AND ADMINISTRATION. Leverett D. Bristol, M.D., Health Director, American Telephone and Telegraph Company, New York, N. Y. Ind. Med. 6, 425-8 (July 1937). J. Am. Med. Assoc. 109, 245-8 (July 24, 1937). Reprints obtainable from author.

The author predicts that the dividing line between curative and preventive medicine will be less and less evident, that medicine will become decreasingly pathologic and increasingly more physiologic, and that voluntary and state efforts for preventive medicine will be more adequately interlocked. He suggests as an immediate step in that direction, that a county association be selected, under the sponsorship of the American Medical Association, to carry on an experiment in the organization of preventive medicine. Four steps desirable in the future development of industrial medicine include: (1) more emphasis on preventive medicine; (2) better and more teaching of industrial hygiene in medical and public health schools; (3) a method now being planned for the measurement or appraisal of industrial health and safety activities, and (4) a plan whereby the quality and quantity of medical services in industry may be surveyed, measured and possibly approved and certified.

The American Medical Association has authorized the formation of a Council of Public Health, which will serve as a guide toward the two aims last mentioned. City health administration must become more decentralized with the possible development of neighborhood health districts and full time district medical officers, and committees of private physicians and health representatives should be set up for advisory supervision. On the other hand, rural health administration should be more centralized, with the county as the smallest unit, and the state department of health, with federal financing if possible, should assume more authority. No one pattern for usual health administration is applicable to all communities, but the isolated small town health departments must be succeeded by a better organization.

509 PERIODIC EXAMINATIONS OF INDUSTRIAL EMPLOYEES. W. S. Austin, Ind. Med. 6, 422-424 (July, 1937). No reprints.

The author deals with the desirability and importance of regular periodic examinations of the worker in industry and entrance examinations for the applicant. No employee should be discharged for his age alone, and the faithful, long-time employee is of more value to the company, provided he is physically fit, than the new worker who still must be trained. Examinations should be thorough, yet not fatiguing. The doctor's relationship to the employer and employee is a delicate one; he must have tact and be just to both parties. The old idea that a doctor is examining a worker to disqualify him for work should be removed from the patient's mind. He should be educated to understand that it is to increase his efficiency and keep him at work longer than otherwise. Also, there should be cooperation between the industrial examiner and the employee; for instance, abnormal conditions discovered on examination should be referred to the employee own physician, while in case of industrial injury or disease, the company physician should usually take charge.

510 AN ALTERNATE METHOD OF COMPARING THE DUST ARRESTANCE OF AIR CLEANING DEVICES. Arthur Nutting, Chief Research Eng. Am. Air Filter Co., Louisville, Ky. Heating, Piping & Air Conditioning. 9, 511-512 (Aug. '37). Reprints obtainable from author.

A method of testing air filters according to the Standard Code established by the A.S.H.V.E. has been used for approximately one year and numerous checkups were made. This code prescribes dust standardization, dust feeding method, rate of dust feed, air velocity through filter, method of rating resistance, method of sampling for arrestance rating and method of rating filter for dust holding capacity. The article includes calibration curves with standard dust and fly ash screened through a 325 mesh sieve.

NWBB-0009623

511 RECENT ADVANCES IN OUR KNOWLEDGE OF THE PROBLEM OF AIR CONDITIONING. C.-E.A. Winslow, Dr. P.H., Director, John B. Pierce Lab. of Hygiene, New Haven, Conn. Am. J. Pub. Health 27, 767-75 (Aug., 1937) Reprints probably obtainable from author.

Air is essential to life in supplying oxygen and regulating the supply of water, light and temperature, but is also a potential carrier of injurious substances and organisms. The broad purpose of air conditioning is to obtain the positive factors at their best and to eliminate sources of injury. Dust is first considered. The author believes that the total influence of silicosis and associated tuberculosis on the mortality of the working population may be more serious than that of industrial accidents, and that they are of vastly greater significance than industrial poisoning. Control of the dust hazard is one of the basic problems of air hygiene. The success in silicosis prevention in South Africa has shown what can be done. The effects of non-siliceous dusts, though not as acute a problem, must also be considered. Outside of industry, we have little exact information on the effect of atmospheric dusts upon health, but there are certain esthetic advantages, at least, in removal of dust and soot from air before it enters buildings, and removal of pollen from the air of a single room or of a large building has been proved practical in hay-fever treatment.

Other topics discussed can only be mentioned briefly here. They include the following: air-borne bacteria, which have been shown to be suspended in the air in considerable numbers, but still may not be of great practical importance; body and other odors, which have no direct harmful effect, but impair health indirectly by affecting the appetite and comfort; ionized air, about which earlier theories have been exploded, but which has a minor effect; and finally, heat interchange as related to comfort. The last is a complex problem, as the action of the body is more complicated than that of any of the instruments that have been devised to measure comfort.

The problem of the heating and ventilation engineer with reference to these various phases of air conditioning is discussed, and some new solutions for some of the problems are mentioned. The author says in conclusion that we should no longer be satisfied with the avoidance of obviously harmful conditions, but should achieve atmospheric conditions which produce an active sense of physical well-being.

512 SOME MEDICAL ASPECTS OF A MINER'S LIFE. S.W.Fisher. Sci. & Art of Mining 47, 290 (Mar. 27, 1937); Colliery Guardian 154, 469-90 (Mar. 12, 1937).

The author briefly discusses several occupational diseases including silicosis. In the case of silicosis he draws the conventional picture of the course of silica and other dusts after they reach the lungs. He adds, however, that the process described occurs in healthy lungs. If abnormal conditions are present, due to a previous acute lung disease, frequent colds, or perhaps an inherited tendency, the normal elimination of dust is seriously interfered with, and the inhalation of fine, presumably innocuous dust, may result in accumulations which greatly aggravate the original accumulation and lead to varying degrees of fibrosis. Thus many miners with little or no working history of drilling or shot firing develop fibrosis. In other words, if for any reason alveolar dust elimination does not keep pace with dust inhalation, any type of dust can be harmful.

513 THE SAMPLING OF MINE ROAD DUSTS. N. Simpkin and S. V. Wild. Sci. & Art of Mining 47, 262 (Feb. 27, 1937).

Methods in actual use may be divided into four classes: (1) removal of the dust, wholly or partially, in a definite strip from the roof, sides and floor; (2) removal of the dust in increments; (3) the use of some form of vacuum sampler, and (4) collection from smooth plates fixed at chosen points on the roadway. Investigations were undertaken with the object of throwing light upon two points: (1) a reliable but simple method that will ensure a true representation of the road dust from the viewpoint of combustible matter present; and (2) the reasonable and allowable deviation from the true composition of the dust. No conclusions are reported.

UNITED STATES NOVEMBER 1992

NWBB-0009624

514 ATMOSPHERIC CONDITIONS IN DEEP MINES. (25TH REPORT TO THE COMMITTEE ON "THE CONTROL OF ATMOSPHERIC CONDITIONS IN HOT AND DEEP MINES".) B.R.Lawton. Trans. Instn. Min. Engrs. London 93, 37-47 (Apr., 1937).
The results of investigations of temperature conditions in deep coal mines, carried on in Great Britain during the past few years, are summarized in this brief paper. The depth of the mines investigated are from 2700 to 3900 feet. At the coal-face the dry-bulb temperatures ranged up to 106°F., and the usual wet-bulb range was 70°-88°F. The air temperature was generally below the strata temperature by 7° to 35°. It was shown that the presence of men raises the humidity. The air velocities used insured comfortable working conditions in spite of the high humidity. Air velocities cannot be increased indefinitely without stirring up dust clouds. In one case 600 f.p.m. was found too high, at a particularly dusty location, although the usual range was from 100 to 800 f.p.m.

515 A SUGGESTED SCHEME FOR MINE COOLING BY COMPRESSED AIR. W. J. Walker. J. Chem. Met. & Min. Soc. S. Africa 37, 351 (Feb. 1937).
The author proposes a system of regenerative cooling similar to that used by Claude for liquefying gases. Air is compressed at the surface to a suitable pressure and then expanded to a pressure corresponding to about 33°F. The cooled air passes down the mine in an insulated pipe and then to the places where cooling is needed. Suitable heat exchangers extract heat from the mine air and the reheated air is finally utilized in driving air motors for various mine operations. The cold air discharged from these motors produces an additional cooling effect.

516 SURFACE REFRIGERATION AT THE TURF SHAFT OF THE ROBINSON DEEP, LIMITED. K.J. MacWilliam and J.T. McIntyre. J. Chem. Met. & Min. Soc. So. Africa 37, 438-57 (Mar. 1937).
A description of the largest mine-cooling system in the world, capable of cooling 12 tons of air per minute from 65° to 38° wet bulb, thereby allowing access to rich veins of gold ore heretofore inaccessible. An increase of stoping depth of 1,500 feet beyond the present depth of 8,500 feet is expected.

(C) Papers on Industrial Poisons, Cancer, Etc.

517 BRONCHOGENIC CARCINOMA. Carlton B. Pierce and Charles F. Ingersoll. Ind. Med. 6, 411-422 (July, 1937).
The article describes a series of cases of lung cancer taken from all occupations. According to this survey, farmers were most frequently afflicted, and housewives next, while laborers in the various industrial trades were least afflicted. However, the ratio for all trades and professions was about equal. In sex dominance, males were higher than females. Fourteen different cases are described with charts showing various stages of progression of the disease. Emphasized is the insidious character of the disease and the peculiarity of the oncoming symptoms. Concrete relation to industrial occupation in connection with the disease is not considered.

518 INDUSTRIAL HEALTH IN SHANGHAI, CHINA; II. A STUDY OF THE CHROMIUM PLATING AND POLISHING TRADE. B.E.Read, S.G.Hatom, Y.B.Dju and W.Y.Lee. Chinese Med. Assoc. Spec. Rept., Ser. No. 6, 1936.
This report deals with a study of diet and general health conditions in the plating and polishing industry in Shanghai. As a general practice workers are housed where they work and given their food as part of their remuneration. Twenty-seven per cent of the workers were boys aged 11 to 15 years, and the diets supplied were entirely inadequate for the needs of growing boys or for hard work, and very deficient in fats and animal proteins. Underweight, poor general health and diseases due to dietary deficiency are prevalent. The usual working day is 11 hours with only 2 rest days per month. Work is done under appalling conditions of overcrowding, bad ventilation and dustiness. Apprentices sleep on the workshop floo

and a loft above the shop is considered a superior sleeping accomodation. No protection against the irritant action of chromium fumes is afforded, and consequently nasal affections are common in the majority of workers, and serious cases are frequent. Altogether the report presents a sordid picture of work done in the worst possible environment, chiefly by children and young persons with little or no protection against the known hazards of their occupation.

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519 ULCERATION OF THE NASAL MEMBRANES AND PERFORATION OF THE SEPTUM IN A Copper-PLATING FACTORY, UNUSUAL AND SUDDEN INCIDENCE. M.H.Barsky, N.Y.State J. Med. 37, 1031-4 (June 1, 1937).
A sudden outbreak of ulcerated nasal membranes and other nasal disturbances occurred in a plant limited to copper, bronze and nickel plating, and was followed by one pneumonia death. The author's investigation showed that as a result of changes in the process and the working conditions, there had been an increase in the amount of spray amanating from the cyanide baths. The alkaline mist thus produced contained sodium copper cyanide, free sodium cyanide and caustic soda. The tanks to which most of the atmospheric contamination was traced were farthest from the windows which served as the main source of ventilation and which were closed in cold weather. After improving conditions, omearwhile closing the plant, no more trouble was experienced. The author believes that many such cases have not been recognized, as he has found no reports of similar cases in copperplating establishments.

520 LEAD POISONING DIAGNOSIS. May R. Mayers, MD. Division of Industrial Hyg., N.Y. State Dept. Labor, 80 Centre St., New York, N.Y. Ind. Bull. 16, 289-90 (July 1937) Reprints available at above address.
Under the present excellent development of laboratory technique, there is a tendency among physicians to rely on laboratory findings in diagnosis, to the extent of neglecting the clinical picture presented by the patient. This is especially true in lead poisoning cases. Instances of this situation include cases recovering very slowly from lead poisoning; others where, in a patient who has been discharged as cured, there is a recurrence of symptoms after an interval of time has elapsed; and in cases developing subacute or chronic symptoms where there has been lead absorption for a long time but never an acute attack of the disease, and other similar situations. In the cases mentioned, the laboratory information cannot possibly supply the complete picture The most puzzling situation arises when repeated laboratory reports show a very small but persistent number of stippled cells. Instead of prolonging laboratory tests, the patient should be examined for other causes, with the same thoroughness as in the original examination. For such patients there are two possible methods of treatment:- (1) de-leading, which will both indicate whether the stippled cells arise from the mobilization of stored lead, and remove as much of the stored lead as possible, and (2) therapy which insures the continuation of the lead in the stored state. De-leading must be carried on under carefully controlled conditions, as there is danger in excessive treatment. In lead poisoning, as in other industrial diseases, there is no short cut to an accurate diagnosis and all factors must be considered.

521 CHRONIC LEAD POISONING. A. Nyfeldt. Ugesk. f. Laeger, 99, 283 (March 11, 1937) (Danish).
Chronic lead poisoning was contracted by an employee of the criminal identification bureau of the police department whose daily occupation for 26 years has been the examination of articles for finger prints. White lead is dusted in large amounts on each article and brushed away, causing considerable quantities to be inhaled by the operator, who is bending over to make the examination. The first symptoms of lead colic and lead neuritis appeared 20 years ago, and recently symptoms of lead arthralgia have appeared. The presence of basophil punctuated erythrocytes confirmed the diagnosis.

NOV 1937 INDUSTRIAL HYGIENE ABSTRACTS

NWBB-0009626

522 LUMINOUS PAINT POISONING. Minnie K. McMahon, Division of Industrial Hygiene, N.Y. State Dept. of Labor, 80 Centre St., New York, N. Y. Ind. Bull. 16, 291-2 (July, 1937) Reprints available at above address.
Luminous paint is made from zinc sulfide crystals which have been made radioactive by combination with radium and sometimes mesothorium salts, mixed with either drying oil, varnish or a gum and water. It is used on watch and clock dials, gauges and dials for airplanes, and scientific instruments. The industry began in this country in 1913, and 2,000 workers of whom 350 were painters, were employed in 1929. The occupation proved to be hazardous, and a number of deaths and disabilities resulted.
In 1929 a survey of the industry in New York State was made by the above bureau, showing that 38 workers were using luminous paint. Seven were found to be radioactive, indicating that they were in danger of the consequences, including necrosis of the jaw and other bones, and anemia. No official code of preventive rules has been adopted, but rules have been formulated from the best practices observed. There are 26 of these rules, which include medical and dental examination, instruction in the hazards, the use of rubber gloves in all possible contacts with the paint, enclosure of materials in lead glass and metal containers, washing of utensils, covering the tables with paper, prohibition of eating or keeping food in the workroom, the use of smocks and caps during work, large and well ventilated rooms, and above all, strict prohibition of pointing the brushes with the mouth or fingers and of all contact of the paint with the skin. Neglect of this rule was the principal cause of the deaths that occurred in this industry in its early stages, and it is now rigidly enforced. However we do not yet know the effects of exposure to emanations of low power over long periods, and it must be considered potentially hazardous until further tests and studies have been made and sufficient time has elapsed to show any susceptibility under the best working conditions.

523 HEALTH PROTECTION FOR WELDERS. Metropolitan Life Insurance Co., New York City. Pamphlet, 27 pp. 1937. Free copies are obtainable from the Company.
The health hazards to which welders are exposed include electric shock, burns, action of injurious light or heat rays, toxic gases and fumes, and metallic dusts. In oxyacetylene welding, the greatest danger is that of gas fires and explosions, and in electric welding the greatest care must be taken to avoid accidental contacts, and in the treatment of shock. All emergency cases should be treated as respiratory failure. Men trained to give artificial respiration should be available at all times. The radiant energy given off in welding includes light and infrared and ultraviolet reys, in sufficient amounts to be injurious, and eye protection must be given by goggles and helmets. Specifications for such protection have been drawn by the U. S. Navy and by the American Standards Association.
Harmful gases generated by the flame or arc include nitrous gases, carbon monoxide, and ozone. The nitrous gases are formed in electric welding, but rarely in injurious amounts in gas welding, and include nitrous oxide, which has no particularly irritating effect, and nitric oxide and nitrogen peroxide or dioxide, which are highly irritating. In prolonged exposure, 39 parts per million is the maximum permissible concentration, and 240 to 775 parts per million are rapidly fatal. Cases of poisoning among welders from oxides of nitrogen and ozone have occasionally been published in the medical literature. Carbon monoxide acts as an internal asphyxiant and is particularly dangerous because it gives no warning of its presence. The maximum allowable concentration is placed at 100 to 200 parts per million for prolonged exposure. Carbon dioxide, on the other hand, is not so dangerous unless it is so abundant as to reduce the oxygen supply. The essential first aid treatment both for nitrogen oxides and for carbon monoxide consists in removal to fresh air and artificial respiration. The following preventive measures are recommended by the Harvard Laboratories of Industrial Hygiene: (1) general ventilation; (2) local exhaust ventilation; (3) use of respirators for gases and dusts, and (4) use of positive-pressure air helmets.

Harmful metallic oxides given off in the form of fumes or dusts in the welding process include lead, manganese, zinc (including brass and bronze), cadmium and some rarer metals, and non-metals, such as phosphorus, selenium, and silicon, in certain alloys, are possible sources of danger. Lead is the most dangerous, partly because when taken in the lungs it is not eliminated but is deposited in various organs. Absorption of lead, however, is not necessarily followed by poisoning, and individuals vary greatly in ability to absorb and eliminate lead. The only safe preventive measure is either a respirator designed especially for lead, or a positive pressure helmet. Cadmium is also definitely toxic, especially in vapor form, but manganese and zinc are not seriously so.
Workers with alloys containing silicon have shown fine nodulation in the lungs, resembling silicosis, but there was no clinical evidence of silicosis. Several possible explanations for this condition are suggested. Ventilating exhausts and suitable respirators should be provided for all possible sources of metal fume poisoning.

524 CARBON TETRACHLORIDE (TETRACHLORMETHANE). Industrial Data Sheet D - Chem. 25 Nat. Safety News 36, 38 (Sept. 1937). Supplied to members of National Safety Council at 5 cents each.
The principal hazard is that of poisoning by inhalation or by contact with the skin. A concentration of 100 parts per million parts of air is considered the safe maximum for continuous exposure, but intermittent exposures may be higher for shorter periods, for example 400 parts per million for 30 minutes. The health hazard is slight if proper equipment and ventilation are employed. Symptoms of chronic poisoning by inhalation include nervousness, loss of appetite, headache, nausea, jaundice, and kidney inflammation. Acute poisoning is indicated by headache, nausea and lachrymation. Coma and death rarely follow in industrial activity. A victim should be removed to fresh air, and a physician should be summoned if symptoms are severe. Closed containers should be used if possible, but if not, there should be adequate down draft ventilation, and gas masks and safety belts should be provided. Only selected persons should work with tetrachloride, excluding alcoholics, exceedingly fleshy or undernourished individuals and those with pulmonary disease, gastric ulcers, high blood pressures, liver, kidney or heart trouble. When carbon tetrachloride is mixed with other liquids, as in fire extinguishers, to reduce their flammability, only approved liquids should be used, and they should be mixed thoroughly, preferably by mechanical agitation, and tested frequently with a hydrometer to make sure that evaporation has not changed the proportions. Physical examination and frequent inspection of the processes are necessary. Carbon tetrachloride in contact with the skin dissolves the skin fat, causing it to dry and become irritated so that it will chap, and mild dermatitis may follow. Cocoa butter, vaseline or a good cold cream will restore the oil to the skin, and a lotion containing gum and glycerin is a good protective agent.

525 POISONING BY TRICHLORETHYLENE. E. Holstein. Zentr. Gewerbehyg. Unfallverhut (German) 24, 49-54 (1937).
"Tri" poisoning has occurred in Germany with 25 fatal results out of 280 cases during the last 20 years. The factories showed 75% of trichlorethylene cases due to cement used for fastening uppers.

526 APRAXIAS AND OTHER NEUROLOGICAL SEQUELAE OF CARBON MONOXIDE ASPHYXIA WITH A REPORT OF A CASE. I.C.Nichols and M. Keller. Am. J. Psychiatry 93, 1063-72 (Mar.'37
The paper describes autopsy findings in carbon monoxide poisoned patients who lived at least 7 weeks. Neurological and psychiatric manifestations are also discussed with special attention to aphasic disturbances. The case reported is that of a young man who could not relearn to write or copy simple geometric figures, and was finally taught to write by spoken directions for each movement. After 2 years in the institution he developed epileptic attacks. Other cases were mentioned in the discussion, and the condition was attributed to anoxemia.

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527 ASPHYXIATION AND DEATH IN OXYGEN DEFICIENT AIR. Edward J. Powers. Am. J. Pub. Health 27, 880-82 (Sept., 1937).
A case is described in which three men were killed in a linseed oil reservoir which had been closed for three months. Tests of the blood of the victims proved that they died from the effects of oxygen deficiency and a pressure of carbon dioxide that far exceeded that in alveolar air.

528 INFLUENZA AND INDUSTRY. W. Blood. Brit. Med. J. 1, 1079-81 (May 22, 1937)
A study of the epidemic of influenza affecting industrial workers showed that 19% of the 6,354 workers examined in a period of 2 months were attacked in spite of usually excellent working conditions, and that factory workers of both sexes were more subject than other classes of workers. The reason for this may be the unavoidable contacts of a large number of persons, rather than poor hygienic conditions. Females and young workers are the most susceptible. The relation of public conveyances to the spread of influenza was also considered, but no evidence was found.

NOVEMBER 1939
INDUSTRIAL HYGIENE ABSTRACTS