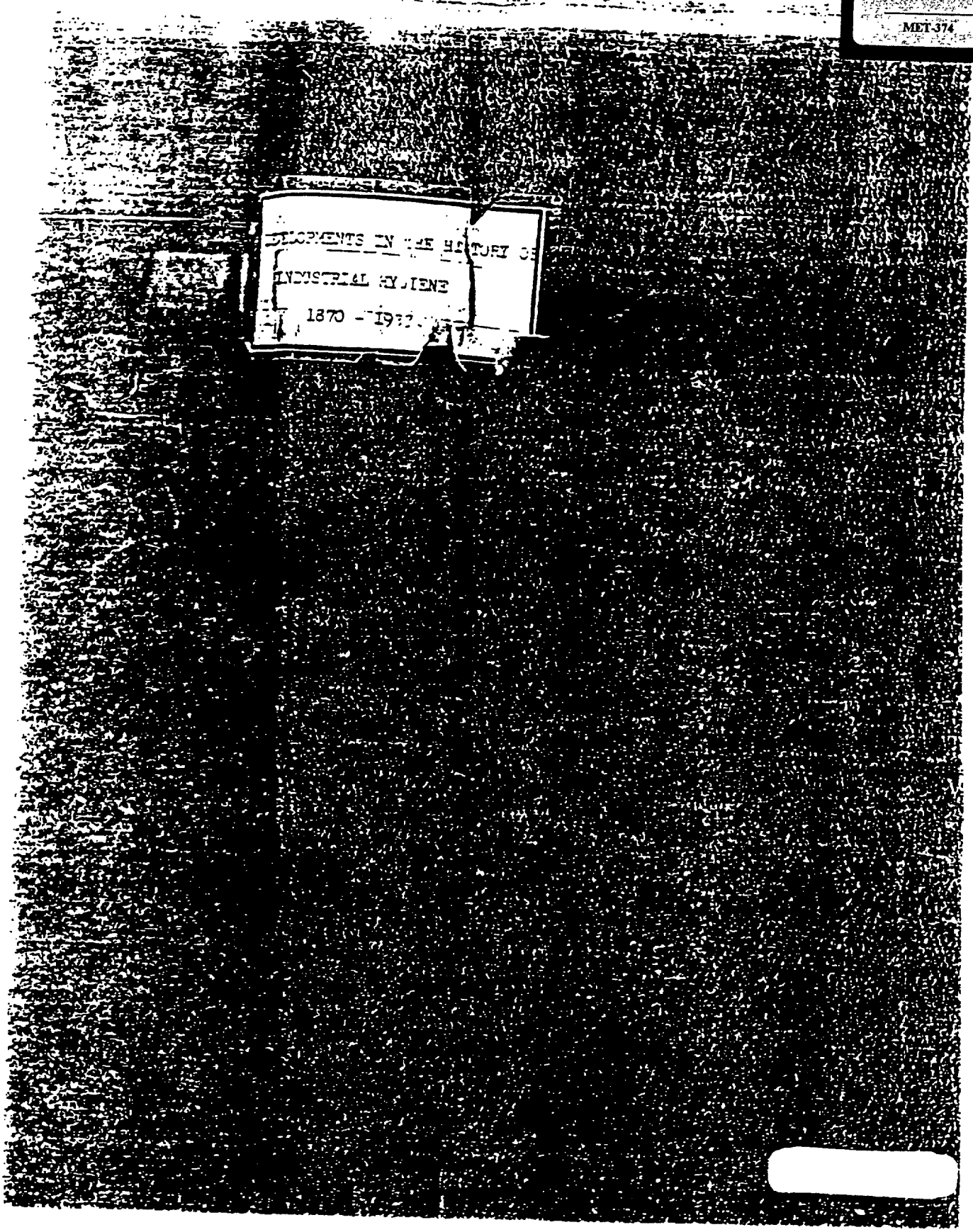
PLAINTIFF'S EXHIBIT

MET-374



DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1870 - - - 1933

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1870 - 1900

V

Industrial Clinics and Departments of Medical Education

Industrial medical service in the United States was first established by the railroad industry for the care of accidents and illness about 1870. Medical department with full time doctors was established by the Homestake Mining Company in 1887, followed by the Crane Company, Chicago; John B. Stetson; Cambria Steel; and others.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1870 - 1900

I

Partial List of Publications, Books, and Journals

Hirt, (Germany) 1870:
Diseases of Workers.

* Layet, (France) 1876:
Hygiene of Industries (one of the earliest lists of hazardous occupations).

Eulenberg, (Germany) 1876:
Handbook of Industrial Hygiene.

Delpech & Hilairet, (France) 1876:
Diseases of Chrome Workers - Carbon Bisulphide in Rubber Industry.

Mantigazza, (Italy) 1881:
Occupational Hygiene.

Gruber, Max (Germany) 1882:
Carbon Monoxide and Sulphurous Acid Asphyziation with Respiration Apparatus.

Popper, (Germany) 1882:
Text-book on Industrial Hygiene.

* Robe, G. H. (United States) 1884:
Hygiene of Occupations.

Ireland, J.H. (United States) 1886:
Preventable Causes of Disease.
Injury and Death in American Manufacturing and Workshops.

* Arlidge, (England) 1892:
Diseases of Occupation.

* Kobert, (Germany) 1893:
Text-book of Industrial Poisons.

Lloyd, J. H. (England) 1895:
Diseases of Occupation.

Sanarelli & Trambusti, (Italy) 1895:
Occupational Pathology and Hygiene.

Albrecht, (Germany) 1896:
Handbook of Practical Industrial Hygiene.

* Weyl, T. (Germany) 1897:
Handbook of Industrial Hygiene.

* Sommerfeld, (Germany) 1898:
Handbook of Practical Industrial Hygiene.

Laudenheimer, R. (Germany) 1899:
Carbon Bisulphide Poisoning in the Rubber Industry.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1870 - 1900

II

Associations, Congresses, and Bureaus

American Chemical Society, organized 1875.
The work of this society has included many important contributions to the study of poisonous substances in industry, and it has actively promoted industrial hygiene work in many ways. Three journals are published:
Journal of the American Chemical Society
Journal of Industrial and Engineering Chemistry
Chemical Abstracts

U. S. Bureau of Labor Statistics, established 1884.
Carroll D. Wright, first commissioner.
This bureau has published, since its formation, a great many valuable studies on occupational mortality, morbidity, workmen's compensat industrial health hazards including investigations of lead poisoning in painting, enameling, storage battery plants, printing plants, potteries by Dr. Alice Hamilton and others; tuberculosis in dustry trades and in printing establishments by Dr. F. L. Hoffman and others. Phosphorus poisoning in the match industry by Mr. John B. Andrews. Causes of Death by Occupation and Occupational Hazards and Diagnostic Signs by Dr. Louis I. Dublin.
Radium Poisoning Survey in the Radium Watch Dial Industry, and a host of others.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1870 - 1900

III

Investigations and Statistics

Investigation and Report on Lead Poisoning in Broken Hill Mines by Commission, New South Wales, Australia, 1893 (later resulted in compensation scheme - 1922)
(lead poisoning was well known, having been mentioned by Hippocrates - 370 B.C.)

Investigation and Report of British Home Office Departmental Committee on Miscellaneous Dangerous Trades, 1898 (at this time the British factory inspection system had long been in effect, the first inspectors having been appointed as early as 1844)

In 1895 under the Workmen's Compensation Act, occupational diseases were made notifiable compulsorily. Statistics on mortality in various trades or industrial mortality in various trades or industrial districts had been published and in general industrial hygiene was more advanced than in the United States.

British Employers' Liability and Workmen's Compensation Acts were established in 1880 and 1897 covering accidental injuries. These acts and the later revisions covering occupational diseases have served largely as a model for the workmen's compensation laws throughout the British Dominions and some of the United States.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1870 - 1900

IV

Legislation
(Labor)

First labor laws in the United States were those on Child Labor in Massachusetts in 1836 and 1842.(a)

First Federal Labor Act in the United States was in 1875 and had nothing to do with health but was about Chinese Labor.

Laws for the protection of women in factories and mercantile establishments date back to 1881 in New York and are now on the books in nearly all States.

The first act regulating hours of labor (except for children) was a Federal Act of 1888 on an 8-hour day for letter carriers. Now about half of the States regulate hours of labor in industries generally.

The first compilation of United States Labor Laws was made 1892.

Workmen's Compensation laws had been enacted by Switzerland, 1877; German, 1884; Great Britain 1897; and France and Italy, 1898. At the present time nearly all countries and states of Europe, South America, Mexico, British Empire, and the United States (all but 4 States) have compensation laws in force.

The first factory inspectors were appointed in the United States in Massachusetts in 1897. This led the way for the other important industrial States New Jersey, Ohio, Wisconsin, Connecticut, Minnesota, Maine, Pennsylvania, Missouri, Tennessee, Illinois, Michigan and Rhode Island. Som form of factory inspection now exists in nearly all States and codes on safety and sanitation of factories have resulted in many States.

British factory inspection system and the appointment of "certifying surgeons", a custom peculiar to British legislation, dates from 1844 and is of great interest and importance in the development of occupational disease control.

European factory laws in France and German also date from about the middle of the century.

(a) National Child Labor Committee.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

187C - 1900

VI

Laboratories and Experimental Research

Experiments on the effects of industrial gases on animals and humans, K. L. Lehmann, Wurtzburg, 1884.
Experimental studies of the effects of dust on the lungs, Arnold, Leipzig, 1885.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1900 - 1910

I

Publications

"Il Lavoro" - Journal first published at Pavia, Italy, in 1901 - now called "La Medicina del Lavoro" and published at Milan.
Pierracini: Milan, Italy, 1902 - Pathology of Work

Neisser: "International Review of Industrial Hygiene," at International Congress on Hygiene, Berlin, 1907.
Leymann: "Industrial Lead Poisoning," Jena, 1908.

Greenwood, Major: "Physiological Effects of Exposure to Compressed Air," London, 1908.
Kober, George M. "Report on Industrial and Personal Hygiene" (for Committee on Social Betterment) 1908, President's Homes Commissions, United States.
Von Jaksch: "Industrial Poisons," Vienna, 1910

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1900 - 1910

II

Associations, Congresses and Bureaus

Berlin Museum of Safety established in 1904. (a)

Vienna Museum of Safety established in 1906.

* First meeting of the International Permanent Committee on Occupational Diseases, Milan, 1906; followed by meetings at Brussels in 1910; Vienna, 1914; Lyons, 1929. It met jointly with International Congress on Occupational Accidents and Diseases for one convention held at Amsterdam, 1925 (but not in Budapest, 1928; or Geneva, 1931).

Industrial Hygiene Exhibit held at 6th International Congress for Prevention of Tuberculosis at Washington, D.C., 1908.

* First symposium on industrial medicine at the annual meeting of the American Medica Association (prepared by Dr. Otto Geier of Cincinnati Milling Machine Co.), 1908. (There is now a section on Preventive Medicine and Industrial Hygiene of the American Medical Association and during the years 1932-1935 exhibits showing progress in industrial hygiene have been held at the meetings.)

** Establishment of the Bureau of Mines in the United States Department of Commerce, 1909. Since its inception, the Bureau of Mines has produced a volume of studies on mine safety and exposions, as well as the factors in mining that affect the workers' health which is second to none. Atmospheric conditions, mine ventilation, poisonous gases, heat, dust and other hazards in mines, quarries, oil fields and even in other industries have from the first been intensively studied in the field and in the laboratory. The list of publications fill a volume in itself. A laboratory building on a large scale was built at the Pittsburg Mine Experiment Station and dedicated in 1919. All sorts of experimental research on explosions and on ventilation and poisonous gases is carried on there. Dr. A. J. Lanza, and Dr. R. R. Sayers have each been Chief Surgeon of the United States Bureau of Mines. The present (1933) Chief Surgeon is Dr. A. E. Russell.

First Annual Safety Congress met in 1910.

(a) A number of the larger cities in Europe have such museums.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1900 - 1910

III

Investigations and Statistics

British Home Office Committee Report on Conditions in Potteries, 1901.

* First investigation and report of Commission of Enquiry into the Question of Silicosis among Gold Miners on the Witwatersrand, South Africa. (This investigation set off a train of events which is indirectly responsible for most of our modern knowledge of the causes and prevention of this disease (silicosis), though the disease itself was discussed long ago by Paracelsus and others)

Study of Silicosis among Rock Choppers and Sewer Miners in the Cumberland District of Sydney, New South Wales, Australia, by the Sewer Works Ventilation Baord, 1902. (This much later led to a special act covering workmen's compensation for these workers)

Investigation by Royal Commission (the first of many such enquiries) on Ventilation and Sanitation of Mines in Western Australia (Kalgoorlie); in 1910 and 1911 a commission enquired into pulmonary disease among the miners. This also resulted in compensation in 1922.

Report of British Home Office Departmental Committee on Compensation for Industrial Diseases, 1907 (a number of occupational diseases were studied by this Commission).

* First sanitary inspection of factories by the Massachusetts Department of Health, 1905, Dr. William C. Hanson, - report and exhibit, 1907.

Investigation and report by Dr. Summons on the Health of Miners in the Bendigo District of Victoria, Australia, 1907. (This enquiry did not result in a compensation act for silicosis, though it revealed a high incidence of the disease).

British Home Office Dept. Committee Report of Investigation on Humidity and Ventilation in Cotton Weaving Industry, 1909-1911.

British Royal Commission of Enquiry Report on Metalliferous Mines and Quarries, 1909-1914.

* In 1908 and 1909 the United States Bureau of the Census made its only published analysis of mortality statistics showing deaths by occupation. The Registrar-General's statistics for England have been thus compiled regularly.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1900 - 1910

IV

Legislation
(Labor)

British Factory & Workshop Act 1901, dealing with sanitary conditions.

* British Workman's Compensation Act extended to cover scheduled list of of 25 occupational diseases, 1906. This list has been further extended several times since.

A code was developed in Massachusetts for permissible humidities in textile mills as early as 1910.

* In the United States the first workmen's compensation acts for industrial accidental injuries (apart from liability acts for railroads and United States civil employees) were enacted in Washington, Nevada, New Jersey, California, and Wisconsin in 1911. None at that time covered occupational diseases but nevertheless the growth of compensation legislation in the United States from 1910 on was probably the greatest single factor in influencing the employer to supervise and protect the health of his workers. Now (1933) 44 states ar 4 territories have workmen's compensation laws and most all the Canadian Provinces. Starting with California, from 1917 on these acts were extended to cover occupational diseases in eleven States, 3 territories, and 8 Canadian Provinces. Practically all of the act make provision for allowing medical and surgical care for injured workers at the employer's expense.

State legislation requiring physical examinations for fitness of compressed air workers was passed in New York in 1909, followed in 1914 by New Jersey, Pennsylvania, 1917, and in Massachusessts by administrative order.

Following a Federal investigation on phosphorus poisoning in the match industry, a prohibitory tax was placed on matches containing white phosphorus in the United States, 1912. This substance had been prohibited in match manufacture in Europe at an earlier date.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1900 - 1910

V

Industrial Clinics and Departments of Medical Education

Massachusetts Institute of Technology, Boston, conducted courses in industrial hygiene as early as 1905. Until 1920, such courses were about the only form of medical education available in industrial hygiene subjects. The University of Pennsylvania Medical School gave such courses in 1906.

Physical examinations of workers are thought to have been started by Dr. Frank Fulton of Providence, R.I., who undertook a physical survey for tuberculosis in a saw factory in 1909. Physical examinations were also carried on by Dr. Harry Mock at Sears Roebuck in Chicago and one or two other plants conducted them about that time.

The Metropolitan Life Insurance Company began offering free visiting nursing service and health educational work to its industrial policyholders in 1909.

* The first clinic and hospital for occupational diseases was opened at the University of Milan, Italy in 1910, Dr. L. Devoto, Director.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1900 - 1910

VI

Laboratories and Experimental Research

* First Research Institute for Industrial Hygiene was established at Frankfort-am-Main in 1910.(a)It has to its credit a long list of reports by prominent German pathologists and industrial doctors on occupational diseases and poisons, many of which appear in Col. 1 and Col. 3 by name. This series of publications goes by the name of Schriften aus dem Gesamtgebiet für Gewerbehygiene. The authors of these studies are L. Teleky, Kaestle, Koelsch, Jötten, Arnoldi, Saupe, and many others

* The first psychological tests for the selection of street car motormen were conducted by Prof. Hugo Munsterberg of Harvard on the Boston Elevated Railway employees in 1911. Since then similar tests have been quite widely developed.

Similar tests were carried on by Gradenwitz at Berlin on tramway employees; in Paris by Bacquegyrisse and Verdollin; in Milwaukee by Dr. Morris Viteles and Dr. Sadie M. Shellow; in Philadelphia on the Philadelphia Rapid Transit by Dr. Viteles; and more recently on auto truck drivers of R. H. Macy & Co. in New York by Dr. V. V. Anderson. Many psychological studies of accident proneness among groups of such workers grew out of this work.

(a) Twenty or thirty European cities now have similar institutes.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1910 - 1920
WORLD WAR PERIOD

Period of rapid growth in Industrial Hygiene began following the War.

I

Publications

Legge and Goadby: Lead Poisoning, London, 1912.

Agasse-Lafont & Heim: Researches on Industrial Hygiene, Paris, 1912.

Goldmark, J.: Fatigue and Efficiency, New York City, 1912

Gilbreth, F. & F.: Fatigue Study, New York, 1912

* Rambousek, J.: Industrial Poisoning, Prague, 1913.

Münsterberg, Hugo: Psychology and Industrial Efficiency, Boston, 1913.

Thompson, W. G.: Occupational Diseases, New York City, 1914

Price, George M.: Modern Factory, New York City, 1914

* Collis, E. L.: Pneumoconiosis: Dust Diseases of the Lungs, Milroy Lectures, London, 1915 (Published 1919)

* Kober, G. M. and Hanson, W. C.: Diseases of Occupation and Vocational Hygiene (text-book), Philadelphia, 1916 (Revised by Kober and Hayhurst, 1924)

Lee, Frederick S. (Columbia University): The Human Machine, New York, 1916

Wright, Florence S.: Industrial Nursing, New York, 1919.

* Hill, Leonard,: Science of Ventilation, British Medical Research Council, London, 1919.

Mock, H. A .: Industrial Medicine and Surgery (text-book), Philadelphia, 1919.

* Journal of Industrial Hygiene (International Board of Editors), Harvard School of Public Health, Boston, 1919 (now published at Baltimore)

Modern Medicine: Chicago (later Nation's Health, later combined with American Journal of Public Health, New York City, 1919.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1910 - 1920

II

Associations, Congresses, and Bureaus

United States Children's Bureau, established under Department of Labor, 1911. (Julia C. Lathrop, first chief.) Although some States had child labor laws greatly antedating this Bureau, its work in the promotion of the health and welfare of working children and child labor legislatic has been outstanding and many studies have been published.

Child labor laws were first enacted in Massachusetts in 1836, followed by Connecticut, Pennsylvania and others. By 1920 all States had some form of child labor legislation.

American Museum of Safety established in New York City, 1911.

National Safety Council formed at Chicago, 1911. Its work dealt principally with education in accident prevention, but later on a health section was established and various reports on occupational health hazards were issued. (Publishes National Safety News and Safe Practices and Health Practices Pamphlet series.)

* Fifteenth International Congress on Hygiene and Demography had a section devote to occupational hygiene at meeting in Washington, D.C., 1912.

* Division of Industrial Hygiene and Sanitation established under the United Stat Public Health Service, 1912. (Dr. J. W. Schereschewsky, first director This bureau has had an immense influence on the development of industr hygiene through the filed surveys which it has conducted for the study of the health of large groups of workers in a variety of industries - through physical examinations of different classes of workers and the tabulation of statistics on physical defects. The subject of sanitation has been widely studied and publications dealing with fatigue; illumination, industrial medical service and so on have been frequent and have constituted a valuable guide to industrial hygienists in the United States. Laboratory research on occupational diseases and poisons was instituted early in the history of this division and many valuable reports of investigations such as the enquiry on lead poisoning in potteries, health of workers in dustry trades, benzol, and other too numerous to mention were published. The research work was first carried on at the Hygienic Laboratory, now combined with the National Institute of Health. (a) The present director of the Industrial Hygiene and Sanitation Division is Dr. R. R. Sayers.

The Division of Statistics of the United States Public Health Service, under Dr. D. K. Brundage, issues practically the only statistics on a large scale dealing with morbidity among industrial workers.

* New York State Department of Labor, Division of Industrial Hygiene, 1913, and other States (see Col. 3).

Conference Board of Physicians in Industry established 1914 to act as medical advisory board to National Industrial Conference Board, New York City Dr. Alexander Magnus, Dr. J. J. Moorehead, Dr. W. Irving Clark, Dr. F. L. Rector, executive officer. (A number of surveys of medical service in industry have been published by this Board.)

(a) U.S.P.H.S., 1912. Laboratory and field research are also carried on in collaboration with Yale University School of Medicine under Dr. C.E.-A. Winslow.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1910 - 1920

IIa

British Medical Research Council, founded in 1914, published many studies on industrial hygiene subjects.

* Industrial Hygiene Section organized in the American Public Health Association at Rochester, N.Y. meeting in 1915. Dr. George M. Kober, first president of section. In 1933, the following list of standing committees gives an idea of the scope of the work in which this section is interested. Some of these committees were recently transferred to a new section on Research and Standards, but they are really studying subjects in the industrial hygiene field:

- Committee on Air Standards
- Committee on Industrial Plant Sanitation
- Committee on Industrial Anthrax
- Committee on Standard Practices in the Problem of Compensation for Occupational Diseases
- Committee on Volatile Solvents
- Committee on Lead Poisoning
- Committee on Pneumoconiosis
- Committee on Skin Irritants
- Committee on Industrial Fatigue
- Committee on Ventilation and Atmospheric Pollution

* American Association of Industrial Physicians and Surgeons, organized at Detroit, 1916.

* Council of National Defence, Section on Industrial Medicine, organized under Dr. Franklin Martin, 1917.

Working Conditions Service of the United States Public Health Service, Division of Industrial Hygiene, established, 1917, Grant Hamilton, Director. Died out 1919 - lack of funds.

* Harvard Mercentile Health Work, established at Boston; cooperative undertaking by Harvard Medical School, Department of Industrial Medicine, and a group of leading Boston merchants to study health conditions in department stores, Dr. A. B. Emmons, 2nd Director, 1919.

* First International Labour Office convention, Washington, D.C., 1919, with Division on Industrial Hygiene established.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1910 - 1920

III

Investigations and Statistics

British Home Office continued to appoint departmental committees to study occupational diseases and sanitary conditions in factories. During the decade 1910-1920, the following are among the reports which were issued, forming an important basis of knowledge on the aspects of industrial hygiene covered:

- Lead Poisoning in Potteries, 1910
- Ulceration of Skin and Epitheliomatous Cancer, 1911
- Incidence of Phthisis in Relation to Occupations (by British Medical Research Council), 1915; 1919-1920
- Lead in Painting, 1915
- Miners' Nystagmus (British Medical Research Council), 1915
- Lighting of Factories and Workshops, 1915 and 1922.
- Health of Munitions Workers (special committee) covered by fatigue, hours, ventilation, causes of accidents, etc., 1916-1918
- Dietaries of Munitions Workers (British Medical Research Council), 1917
- Silicosis in Quarry Workers of the Wheatley County District was also studied by the Medical Office of Shropshire, 1911.

In Australia, a Technical Committee of Investigation studied pneumoconiosis among the lead miners of the Broken Hill District of New South Wales, 1914. This enquiry led later on in 1920 to a workmen's compensation scheme for miners' phthisis and silicosis including a medical control board.

A survey of occupational diseases in Illinois was made by an Illinois State Commission, report published 1911, Chicago.

New York State Factory Investigating Commission surveyed New York industries, 1912-1913. Following the recommendations of this Commission, a Division of Industrial Hygiene was created in the State Department of Labor. It was not until 1924, however, that outstanding educational work in industrial hygiene was organized by this Division under Dr. Leland Cofer. Medical inspectors, both men and women, were appointed and did excellent work. Since its inception, studies on the following subjects, among others, have been issued by this State Bureau:

- Hygiene in Steam Laundries, 1924
- Silicosis, 1925
- Posture and Seating (Women's Bureau), 1926
- Benzol, 1927
- Lead Poisoning, 1928
- Carbon Monoxide, 1930
- Effects of Noise on Hearing, 1930
- Silicosis among Rock Drillers in Excavation Work, 1930

and many others. The Engineering Division maintains a permanent exhibit of protective devices and equipment used in factories in New York City office.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1910-1920

IIIa

In New York City, Dr. Louis I. Harris, Health Commissioner, conducted a study of Health in Fur and Hatters' Fur Trades (where mercury poisoning is a hazard), 1913

* A survey of occupational diseases in Ohio industries was made under the direction of Dr. Emery R. Hayhurst of the State Department of Health in 1915. (This study and the survey in Illinois led to the establishment of Divisions of Industrial Hygiene in the State Health Departments in several States, for instance, Ohio and Connecticut, (also Ontario), instead of under the Department of Labor as was done in New York, New Jersey, and Pennsylvania.

* Investigations were begun at this time by the United States Bureau of Mines on the health of metal miners in the Joplin District of Missouri. These studies opened the investigation of silicosis among miners in the United States, which was later extended to Butte, Montana, 1921, Tri-state District of Oklahoma, Missouri, and Kansas, 1925.

A survey of eye hazards in industry was carried out and a report published by the National Committee on the Prevention of Blindness in 1917. This proved to be an important basis for work on the prevention of industrial eye accidents and diseases, and it was followed by similar surveys and reports, bringing the subject up to date in 1922 and 1924 (Resnick and Carris).

* In 1920, a volume was published by the United States War Department in which the records of the draft boards during the World War were analyzed, and the statistics on the physical defects found in our army draft personnel were compiled. This data undoubtedly had a profound effect in demonstrating to industrial management the need for routine physical examination of labor applicants. Later, growing out of this, the health examination movement for the periodic examination of all workers began to spread in the larger industrial plants, 1924, et.seq.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1910 - 1920

IV

Legislation
(Labor)

* Miners' Phthisis Act for compensation of miners on the Rand in South Africa was enacted in 1911. (This was the first of nine acts on this question. A Medical Board of control was set up - the Miners' Phthisis Medical Board, which did pioneer work in the study of silicosis and the radiology of miners' lungs.)

Miners' Phthisis Acts were also enacted in Australia:
Western Australia, 1912
Queensland, 1916
Broken Hill Miners, New South Wales, 1920

Regulations requiring periodic examination of workers in lead were instituted in Ohio and Pennsylvania in 1913 and in New Jersey in 1914.

* The first of the States in the United States to extend workmen's compensation acts to cover occupational diseases were Hawaii, 1917; California, 1918; Connecticut and Wisconsin, 1919; followed later on by the Philippines, North Dakota, and the District of Columbia. Massachusetts awarded compensation in such cases by court interpretation. Illinois, Minnesota, New Jersey, New York, Ohio and Porto Rico covered occupational diseases by scheduled list during the years 1920-1925.

* The British Workmen's Compensation Act was amended to empower the Secretary of State to make schemes for the compensation of silicosis in groups of industries in 1918.. Under this provision, the following schemes were rapidly drawn up for the Refractories Industry, 1925; Sandstone Industry, 1929; Metal Grinding Industries, 1927; Various Industries, 1928; Asbestos Industry, 1931; (a complete revision of all schemes took place in 1931).
(By 1933, compensation had been extended to silicosis and allied diseases in Great Britain and most of her dominions, 6 European countries and practically all of Latin America.)

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1910 - 1920

V

Industrial Clinics and Departments of Medical Education

Occupational disease clinics were established as follows:

- Sprague Memorial Institute of Chicago, Rush Medical College, 1911
- University of Pennsylvania Hospital Consultation Clinic on Occupational Disease, 1914
- New York City Department of Health, 1915 (Dr.S.S.Goldwater,Director)
- Ohio State University Medical College, 1915
- Washington University School of Medicine, St.Louis, Mo., 1915
- Massachusetts General Hospital (Harvard University Department of Industrial Medicine), Boston, 1916 (Dr. Wade Wright,Director)
- New York City Reconstruction Clinic for Rehabilitation of Disabled Soldiers and Workers, 1918 (Dr. W. G. Thompson, Director)

* In 1918, the Department of Industrial Medicine at Harvard University Medical School was the first in the United States to offer a complete course and a degree in Industrial Medicine,

* New Jersey operated six State Rehabilitation Clinics for industrial workers in different cities, 1919. The clinics at Newark and Jersey City under the direction of Dr. H. H. Kessler have done valuable work on the rehabilitation of occupational disease cases, such as lead and benzol poisoning.

- American Hospital, Chicago, 1920

- Detroit Delray Industrial Hospital, 1920

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1910 - 1920

VI

Laboratories and Experimental Research

* Experimental work was carried on by Beatie on the effects of coal dust on the lungs, London, 1912.
* The John Howard McFadden Researches on Cancer included the pioneer studies of Ross and others on the causes of cancer among gas works, tar and pitch workers, London, 1913
* A research division and laboratory for study of occupational disease was established at Pittsburgh Marine Hospital in connection with the United States Public Health Service (see Col. 2).
* At the South African Institute for Medical Research at Johannesburg from 1916 to date, a tremendous amount of valuable work has been done on the pathology, etiology, and radiology of silicosis and tuberculosis and on the causes of the excessive incidence of simple tuberculosis among the native mine laborers. The names of those prominent in this research are well known: Mavrogordato, Watkins-Pitchford, McCrae, Irvine, Simpson and Strachan. The present day knowledge of the nature and action of silica particles is largely due to the efforts of this group.
* At the Saranac Laboratories for the Study of Tuberculosis at Trudeau Foundation Saranac Lake, N.Y., under Dr. L. U. Gardner, Director, and Mr. Donald Cummings, Assistant Director, important animal experimentation work has been conducted on the effects of the inhalation of mineral dusts on the lungs in relation to tuberculosis. Among the types of dust studied are quartz, carborundum, granite, and asbestos. These studies were started in 1918.
* In 1919, new buildings elaborately equipped for all kinds of research in connection with the United States Bureau of Mines (see Col. 2) were dedic and are known as the Pittsburgh Experiment Station. Some years later, the American Society of Heating and Ventilating Engineers began using this building also for experimentation on ventilation. Through the work of a committee of these two bodies, research has been carried out which has revolutionized the ideas on ventilation, 1919-1925. Houghto Yaglou and McConnell developed the principle of three factors in air c ditioning affecting human comfort and efficiency, i.e., temperature, humidity, and air motion. The American Society of Heating and Ventila Engineers has published a standard code for ventilation of various ~~typ~~ of buildings based on these studies.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1910 - 1920

VIa

* British Industrial Fatigue Research Board, established in London by the Home Office in 1918, has done a vast amount of studying and experimentation on the various aspects of industrial fatigue and its causes, including ventilation, lighting, hours of work, monotony, etc. A series of valuable reports has been published. This organization is now called Industrial Health Research Board and is under the direction of the British Medical Research Council. Dr. H. M. Vernon has long been prominently identified with it as a research investigator.

The Industrial Health Conservancy Laboratories at Cincinnati, O.,(Dr. Carey P. McCord, Director) were established in 1920. A number of studies and investigations have been made on the toxicity of substances used in industry (lead, benzol, and others,) in collaboration with University of Cincinnati,(Dr. Kehoe),and physical examination surveys of industrial groups in collaboration with the Heart Council of Greater Cincinnati. The reports on these studies of physical defects in the industrial population are known as the Life Conservation Studies.

DEVELOPMENTS IN THE HISTORY OF INDUSTRIAL HYGIENE

1920 - 1933

I

Publications

Brezina, E. (Vienna), International Review of Industrial Diseases based on Factory Inspection Reports of the "Kulturländer" - 1920-1929

No. 24 and No. 36 of the Shriften aus dem „Gesamtgebiet der Gewerbehygiene von der Deutschen Gesellschaft für Gewerbehyginee, Frankfurt-am-Main, published in Berlin, 1929; 1931. (The reports briefly summarized are chiefly from England, Germany, Austria, Belgium, and Holland, and Switzerland, with a few from France; evidently the United States, Italy and Soviet Russia do not qualify.)

* Vernon, H.M. (London) Industrial Fatigue and Efficiency - 1921

Oppenheim, M., Rille, J. E., and Ullman, K. (Leipzig)
Diseases of the Skin Due to Occupation or Profession, 3 vols. - 1922

* Clark, W. Irving, Jr. (New York City)
Health Service in Industry - 1922

International Labour Office Bibliography of Industrial Hygiene, issued quarterly since 1923 (Geneva)

Hope, E. W. (Health Officer, Liverpool), Hanna, W., and Stallybrass, C.O., Industrial Hygiene and Medicine, London, 1923.

* White, R. Prosser (London)
Occupational Affections of the Skin, 1923 (completely revised and enlarged 1928; the one outstanding text-book on this subject in English.)

Florence, P. Sargent (New York)
Economics of Fatigue and Unrest and the Efficiency of Labor, 1924.

* Clark, Janet H. (Johns Hopkins University)
Lighting and the Public Health, Baltimore, 1924.

Hamilton, Alice (New York City)

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II

Associations, Congresses, Bureaus

Women's Bureau established in United States Department of Labor, 1920. This Bureau has studied the health and welfare of women in industry and has issued a number of bulletins of which several deal with women in hazardous occupations. Mary Anderson, Director

* In Australia in 1921, a Division of Industrial Hygiene was established in the Commonwealth Department of Health. Dr. A. J. Lanza was sent from the Rockefeller Foundation in New York City to help organize this work. Dr. D. G. Robertson was the first director. The method of carrying out the cooperation of this new Government department with the various states is to call a yearly conference of the governors and consult with them on industrial hygiene problems in their respective territories. Numerous studies and reports have been issued on morbidity in occupations, industrial poisons, skin diseases women in industry, and health legislation.

* An Industrial Hygiene Section was formed under the direction of Dr. L. Caroz in the International Labour Office at Geneva. This Bureau has done important work in coordinating the knowledge on industrial diseases which is accumulated in the various countries, 1919-1933.

An Industrial Health Bureau established by the Metropolitan Life Insurance Company in 1924 to study the health of industrial employees insured under the Group insurance plan. A series of publications on industr hygiene has been issued covering first aid rooms, physical examinati industrial dental service, industrial eye clinics and air conditions Dr. Wade Wright was the first director; present director, Dr. W. J. McConnell.

The International Association for the Study and Improvement of Human Relations in Industry held a summer school on the elimination of unnecessary fatigue at Baveno, Italy in 1927. Prominent students of this subject were present from Europe and the United States.

In 1928, the British Home Office opened an Industrial Museum and Exhibit on industrial health and safety, in London.

A Permanent Industrial Hygiene Museum was also established at Dresden, Germany in 1930.

** The most important congress held in this decade from the viewpoint of industrial hygiene was the International Conference on Silicosis held under the auspices of the International Labour Office at Johannesburg, South Africa, in 1930. Representatives were present from Australia, Canada Germany, Great Britain, South Africa, Italy, The Netherlands, and the United States. Reports were presented on the status of knowledge of silicosis in these respective countries and these reports have been published in book form (Series F, No. 13, International Labour Office Geneva, 1930).

* The Committee on the Cost of Medical Care, Washington, D.C., organized in 1927 made a 5-year study of all types of medical service from the economic standpoint. In 1932 and 1933, the final reports were issued. Twenty eight detailed statistical reports were issued by this Committee in t course of its investigations, of which 4 dealt with industrial medical services.

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Investigations and Statistics

In 1920, the Cleveland Hospital and Health Committee made a survey of hospital and health work in Cleveland, including industrial medical service. A similar study was made in Syracuse in 1923 and an industrial healt survey of Nashville, Tenn. in 1926.

* An Investigation and Report on Economic Waste in Industry, arising from lowere health conditions, sickness, and accident among the working populati under Dr. Eugene Lyman Fisk, Medical Director of the Life Extension Institute, for the Committee on Elimination of Waste in Industry of the Federated Engineering Societies, New York, 1921.

An investigation and clinical study of mercury poisoning among fur cutters and felt hat workers in Danbury, Conn., was conducted by Dr. Wade Wright of Harvard, 1922.

* An investigation and clinical study of granite cutters at Barre, Vt., was made by Dr. D. C. Jarvis of Barre, Vt., in 1922. This study was later taken up and expanded into a survey covering many years work by the United States Public Health Service. Complete report in Bulletin No 1929.

The British Medical Research Council published an Investigation and Report on Miners' Nystagmus, 1922-1923.

Study of silicosis in Ontario Gold Miners was made by Elliott in 1924. As a result of this and other studies, the Ontario Workmen's Compensation law was amended in 1926 with added special provisions for silicosis in mining.

The United States Bureau of Mines continued its studies in the Tri-State mine fields during this decade (see above).

* An investigation was conducted by Harvard Medical School, Drs. Castle and Drink and by Dr. Harrison S. Martland, Essex County, N. J. Medical Examiner. into the cases of radium necrosis among watch dial painters in a radi watch dial factory in New Jersey in 1924-1925. This catastrophe caus the lingering death of 18 or 20 women workers. Some of those affecte are still living. Others who investigated this hazard were Dr. F. S. Flinn of Columbia University and Dr. F. L. Hoffman of Newark, N.J. The United States Bureau of Labor Statistics published a summary of the whole question in 1929 as did Dr. Martland in 1931.

The British Medical Research Council published a report of an Investigation on Statistics of Cancer in Different Trades and Professions in 1926. In the United States, Dr. Frederick L. Hoffman and others have studied the same subject.

* The Final Report of the Committee Investigating Benzol Poisoning for the Chemica and Rubber Section of the National Safety Council was issued in 1926; National Safety Council Report on Spray Painting, 1927.

The Pennsylvania State Department of Labor also published an extensive survey on Spray Painting Hazards in 1926, while the New York State Department of Labor studied lead poisoning and carbon monoxide poisoning in New York industries, reporting in 1928, and silicosis among rock drillers and excavators in 1929 and chrome poisoning in 1931.

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Hayhurst, Kindel, and others reported on an investigation of silicosis in the sandstone quarries of Ohio, 1929.

The British Home Office issued reports by Departmental Committees appointed to study:

- Dust Inhalation in Grinding of Metals and Cleaning of Castings, 1923
- Silicosis in Potteries, 1926 and 1928
- Humidity in Cotton Cloth Factories, 1928
- Health of Miners in the Coal fields of South Wales, 1929
- Silicosis in the Sandstone Industry, 1929
- Medical Arrangements for the Diagnosis of Silicosis under compensation act, 1929
- Effects of Inhalation of Asbestos Dust, 1930
- Dust in Cotton Card Rooms, 1932

The British Department of Mines' Enquiry into the Occurrence of Disease of the Lungs from Dust Inhalation in the Slate Industry in Wales was made in 1930.

An extended study of silicosis in the industries of Germany was compiled from various investigations by Drs. Teleky and Lochtkemper in Germany and published in Arch. f. Gewerbepath. und Gewerbehyg., 1932

Pulmonary asbestosis was investigated in German plants by Kruger and Saupe - Arch. f. Gewerbepath. and Gewerbehyg., 1931

* The Wisconsin Industrial Commission made an extensive study of silicosis in foundries in that State with the co-operation of the manufacture and the Metropolitan Life Insurance Company's Industrial Hygiene Laboratory. As a result a safety code has been adopted and a clinic established by the compensation insurance carrier group f the control of this situation.

Silicosis in Vermont Slate and Granite Workers was studied by E. J. Rogers, Director of Vermont Sanitorium at Pittsford, 1933.

A study of workers in cryolite dust was carried out by Dr. S. V. Gudjonsson, Department of Occupational Hygiene and Industry Inspection, Copenhagen, Denmark, 1933.

Silicosis among workers in diatomaceous earth was studied by Dr. R. T. Legge of the University of California, 1933.

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Legislation
(Labor)

* The American Standard Code for Lighting of Factories, Mills and Work Places was developed by the Illuminating Engineering Society and the Americ Standards Committee in 1921. It was adopted in the form of regulations by a number of the States. It was completely revised in 1930.

* The International Convention on Compensation for Occupational Diseases was drafted at Geneva by the League of Nations, 1925. The principles set forth in this convention were later ratified by the great majority of countries in the League membership.

The British Workmen's Compensation Act was amended to provide for schemes for silicosis and asbestosis, and all the existing silicosis schemes were revised and new measures planned for medical certification, 1931 Factory regulations were also revised in some cases and new ones adde

In Canada in 1930 and 1931, Quebec and Saskatchewan adopted workmen's compensation laws for occupational disease compensation similar to that of Ontario including provisions for silicosis.

In the United States, during this decade, compensation for occupational diseases was extended to a total of 11 States, the United States, Distri of Columbia, and three territories, some by blanket coverage laws and some by scheduled list.

In 1933, owing to a sudden rise in damage suits brought in civil courts for silicosis, a flood of bills for the compensation of silicosis are being presented in the legislatures. Under about half the acts coverin occupational disease, it is now compensable presumably, but it does not appear in any of the scheduled lists. Such bills have been draft in New York, Pennsylvania, Illinois, New Jersey, West Virigin, Michig New Hampshire, Minnesota, and South Carolina. So far none has passed (June-1933)

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V

Industrial Clinics and Departments of Medical Education

In New York City, the Vanderbilt Clinic opened an occupational disease clinic in 1925. F. G. Pedley, first director.

McGill University in Montreal organized a Department of Industrial Hygiene and established an industrial clinic in 1926. Several industrial surveys and studies have been made under its direction.

* The Picher Clinic for miners at Picher, Oklahoma, was established in 1927. It was operated jointly by the United States Bureau of Mines, the Metropolitan Life Insurance Company, and the Tri-State Mine Operators. The purpose was to control silicosis and other diseases through physical examination of the miners. A report on this work was issued by the United States Bureau of Mines in 1933.

The Industrial Hygiene Institute at Paris was transferred in 1933 to a new foundation at the Paris School of Medicine. It will provide training for doctors in industrial hygiene, pathology, toxicology, and clinica work.