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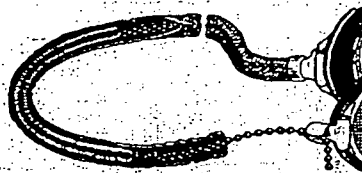
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DECEMBER, 1934 (1935)

INDUSTRIAL HEALTH

A Non-Technical Symposium for Physicians and Laymen

Medical Supervision of Workers Exposed to Dust

By W. J. McCONNELL, M.D.

Assistant Medical Director, Metropolitan Life Insurance Company

THE HAZARD resulting from certain dusty processes in industry has been given undue publicity within recent years, and the conflicting testimony of those who specialize in the litigation field has led many industrialists to consider claims of alleged disease resulting from dust exposure as a form of racket. Although many of these claims are vague and appear to be based upon a desire to get something for nothing, health impairment often follows prolonged exposure to certain dusts.

The harmfulness of dusts varies widely with the physical and chemical natures of each substance. Certain dusts are soluble or slightly soluble in the body fluids and their harmful effects are proportional to the toxicity of the compounds formed. Lead, mercury and arsenic are examples of poisonous dusts. Other dusts exert their harmful effects locally on the skin and mucous membranes and through irritation to the respiratory passages. Chronic acid and alkalies are examples. Attention has been called recently to the probably harmful effect of dusts from radio-active ores. A fourth group of dusts which are insoluble or very difficultly soluble in the body fluids may initiate harmful pathological lung conditions. These may be subdivided into non-fibrosis and fibrosis producing dusts. (By fibrosis is merely meant the replacement of the normal elastic lung tissue by an unyielding scar tissue.)

The organic dusts, mainly the vegetable fibers, such as cotton, jute, hemp, etc., are non-fibrosis producing dusts. The fibrosis producing dusts are limited, so far as we have evidence, to a few of the inorganic mineral dusts, such as free silica, crystalline silicon, quartz, and certain combined silicates. Of the fibro-

s producing dusts, those having a high percentage of free silica are the most important because exposure over a period of years distinctly predisposes the individual to tuberculosis.

It is seldom, however, that any one of these groups of dusts occurs singly in industry. Usually we are confronted with a variety of dusts in varying combinations, and until research investigation determines the effects of mixed dusts in measured combinations, it is difficult, if not impossible, to evaluate their degrees of harmfulness.

Diagnosing a Disease

The diagnosis of a disease induced by exposure to dust is entirely a medical problem, and is based upon a correlation of the patient's occupation, his symptoms, and physical examination. Laboratory and X-ray examinations must be included when indicated. The elimination or control of a dust hazard requires the assistance of the engineer, the chemist, and specialists in other sciences whose training enables them to contribute additional information. It is essential to determine the source of the harmful dust, its concentration within the breathing zone of workers, its chemical composition, and in most instances, the particle size measurements of the dust. With this information and a knowledge of the length of exposure, taking into consideration individual susceptibility and other physical defects of certain individuals, the extent of the dust hazard can be fairly well estimated.

Dust determinations indicate the locations where preventive measures must be applied. The effective method of prevention depends upon the circumstances giving rise to the hazard and may

include the segregation of the dust-producing operations, the hooding or enclosing of the operations with the application of adequate exhaust ventilation, increased general ventilation, the use of protective clothing and respirators, good housekeeping, and, most important of all perhaps, the consistent maintenance of all equipment for dust control.

The effectiveness of dust control measures in preventing diseases can be determined only by physical examination of the workers so exposed under competent medical supervision. The benefits which accrue to the employer and employee alike, as a result of the physical examination of all applicants for employment, as well as periodical examinations of those already engaged, would indicate very careful consideration by industry of a program for control of sickness. Such a procedure protects the employer from engaging an applicant already physically or mentally impaired for a condition either not associated with employment or contracted during a previous employment. The applicant's physical and mental condition is established and by keeping records of his subsequent illnesses and accidents, the question of responsibility for injuries and sicknesses incurred during employment need never arise.

The applicant is protected from engaging in work for which he is physically ill adapted. For example, an applicant with an arrested tuberculosis who seeks work in certain dusty occupations, if allowed to engage in such work might readily convert an inactive tuberculosis into an active one. The same applicant, if assigned to a position that involved no such exposure, might be expected to continue for years as a useful and productive workman.

Many of the younger individuals who seek employment have never before received a thorough physical examination and consequently are unaware of the defects from which they suffer. As a result of physical examinations, many defects are located which may be cor-

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PLANTIFF'S
EXHIBIT
5

rected before they have caused irreparable damage. Furthermore, incipient tuberculosis, unsuspected diseases of the heart, kidneys, and a host of other diseases of similar nature are discovered and the applicant referred for proper medical treatment which otherwise might have been postponed until too late.

Of even more importance than the initial physical examination of applicants is the periodic examination and care of old employees. Such a procedure serves to check the efficiency of preventive measures designed to prevent occupational diseases. It offers the most effective way of controlling the health of large groups of workers by discovering early not only occupational diseases, but many other conditions that go undiscovered until the worker is acutely ill or becomes disabled. If the various contagious conditions go unrecognized, others become infected.

The information obtained from physical examinations affords the medical supervisor the opportunity to make certain that employees are engaged in suitable work, to correct the effects of undue exposure to harmful environmental conditions, and generally to lessen all occupational hazards. As a public health measure, it is impossible to over-estimate the value of such periodic examinations in establishing among employees interest in sickness prevention.

For a long time the importance of accident prevention has been well recognized by industry. The very earliest attempts at industrial medicine consisted largely in the prevention and treatment of accidents occurring in the course of employment. By systematic work along educational lines and establishment of safety departments supervised by trained personnel the occurrence of serious injuries has been enormously reduced. The problem that confronts all industries today is how to bring about a like reduction in so-called occupational diseases.

Since actions for damages on account of diseases due to alleged negligence of the employer are being brought with increasing frequency in the civil courts, many bills have been introduced in state legislatures for the purpose of bringing certain occupational diseases under the compensation acts. At the present time considerable discussion as to the advisability of including the most important of the lung diseases caused by dusts, namely silicosis under the compensation law is heard. Despite the fact that silicosis is purely an occupational disease, none of the state workmen's compensation laws in the United States specify silicosis as a compensable occupational

disease, with the exception of Kentucky which passed an amendment, effective June 14, 1934, permitting employers in certain industries subject to the silica dust hazard to voluntarily place them-



seives under the workmen's compensation act with respect to silicosis.

Of the eleven states and three territories in which occupational disease is compensable, five have schedules of diseases which shall be covered and none of these lists silicosis, so that it is definitely not compensable in Illinois, Minnesota, New Jersey, New York, and Ohio. In six states and two territories and in the District of Columbia, there is more or less general coverage for occupational diseases, and silicosis may be held compensable under the laws of California, Connecticut, District of Columbia, Kentucky, Massachusetts, by mutual consent of employer and employees in Missouri, and in North Dakota and Wisconsin.

The governors of a few states have appointed commissions to study the methods for bringing diseases caused by certain dusts under the compensation act and for promoting preventive measures. Valuable reports have been issued by such commissions in Pennsylvania and Massachusetts, while New Jersey, Illinois and Wisconsin have studied the situation intensively.

The Massachusetts and Wisconsin commissions recommended regulations for preventive measures, since the disease is already a compensable one in the states. The Massachusetts commission's recommendations included

compulsory physical examinations on entrance to certain specified hazardous employments and periodic examinations throughout exposure, neither of which was carried through. The Industrial Commission of Wisconsin has developed and put into effect a code which attempts to define a harmful concentration of various injurious dusts and establishes a "safe limit" below which the atmosphere of workrooms must be maintained. The Pennsylvania Commission recommended a scheduled list of diseases and special provisions for the compensation of disabled workers with strong emphasis on a medical board of control such as exists in the British Empire.

These references serve to indicate the trend of present-day thought with respect to control and diagnostic measures. Control measures cover a wide scope of conditions to be standardized, which, besides physical examinations, include methods of determining the extent of hazards; equipment designed to protect the workers; and the elimination or control of contributing factors. These problems can be solved only by the combined experience of trained men in the various sciences. The diagnosis of the diseases resulting from exposure to industrial hazards and the extent of disability incurred obviously should be entrusted to medical men specially qualified for this work with facilities for adequate radiological examinations. Disputed cases should be referred to a board capable of coordinating the medical, radiological, and pathological examinations as well as the results of scientific investigations.

The set up of a proper program for medical control of workers exposed to dust depends upon the number of employees involved and individual plant conditions. A series of articles under the title of "The Medical Department Manual" by Dr. Hart E. Fisher, published in recent numbers of *Industrial Medicine*, gives a very comprehensive account of the organization, operation, and routine of a medical department.

Any number of instances of adequate medical supervision of workers might be listed, differing in certain respects, but all retaining the essential features of control measures. Briefly, these include:

1. Establishment of a medical department with adequate facilities and qualified medical personnel. A precise analysis of all operations in the plant should be made and the medical supervisor should list all possible health hazards and familiarize himself with their physiological effects. If necessary, he should conduct research studies to determine the harm-

(Please turn to page 63)

NATIONAL SAFETY NEWS

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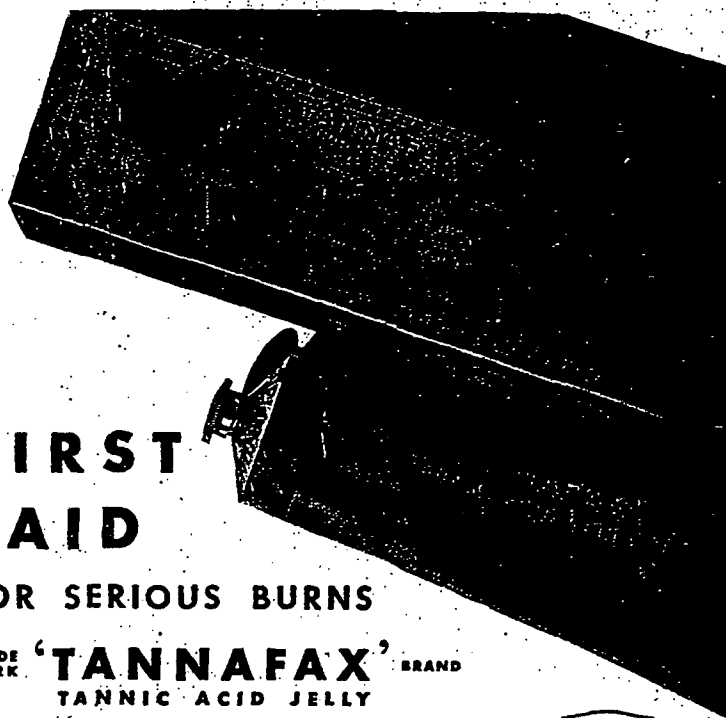
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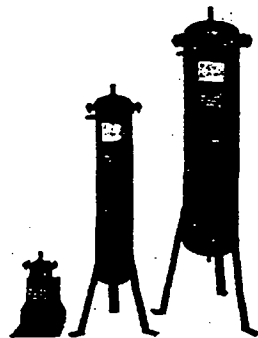
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BULLARD From Head to Foot

(Continued from page 18)



SILICOSIS

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hampered by air hose. The only available protection under these conditions is a respirator with a filtering medium of filter or tissue. Only those types which have been demonstrated to possess the necessary filtering medium to give sufficient protection against fine dusts should be selected.

From the foregoing general information it would seem that the major developments in industrial protective clothing relate to the protection of the respiratory organs. These developments have, no doubt, been given unusual impetus in recent years by occupational disease claims, especially concerning silicosis. New types of protective equipment against dust in industry are being developed, along with better procedures for the observation of such work and the enforced use of protective equipment.

In addition to new types of clothing and equipment, management and workers are cooperating with the manufacturers of safety equipment in developing the use of new materials and improved design. These include new composition materials for protective headgear and other devices to protect various parts of the body; air insulated protective suits for jobs involving extreme heat; air fountain respirators for dusty work where only marginal protection is necessary; increased use of special chrome-tanned leather for resistance to heat; development of special metal alloys for the mechanical parts of protective equipment; and improved design in eye protective devices.

From our contact with industrial concerns as well as the manufacturers of safety clothing and equipment, it would seem that there are no needs for protective clothing which are not being taken care of, to some degree at least. The development of safety clothing to its present degree of refinement has been possible because of cooperation by all persons concerned.

The safety engineer can keep informed of developments in his field by referring to the available publications on accident prevention work. On this point a consultant in protective devices recently said to us, "Unfortunately, it seems to me that industry has not taken advantage of these excellent publications. This point has been brought home very forcibly during some of the recent silicosis suits where employers have been caught at a decided disadvantage

when the plaintiff was able to prove, by referring to government publications dated twenty years back, wherein certain manufacturing operations were described as hazardous and means of combating these hazards suggested. We personally know that in most instances manufacturers were not aware of the existence of these publications."

Reference might be made here to the availability of practical information from such sources as U. S. Department of Labor, U. S. Public Health Service, U. S. Bureau of Mines, National Safety Council, state departments of labor, American Standards Association, insurance companies, and consulting organizations. The advancement of public and private means for the collection and dissemination of such information is, undoubtedly one of the trends of present day accident prevention work.

Trophies Awarded to Seventeen Ships

SAFETY trophies have been awarded to 17 ships operated by Lykes Bros.—Ripley Steamship Company for having completed the allotted number of



voyages during 1933 without a disabling injury to any member of the crew.

The body of the flag, shown in the accompanying illustration, is green with a six-inch white border and the miniature white house flag with a blue diamond and white letter "L" is shown in the body of the flag at the left side.

When flown at the mast head the combination of colors makes the pennant most attractive, and the men of these vessels feel considerable pride in displaying this trophy in American and foreign ports.

NATIONAL SAFETY NEWS

Industrial Health

(Continued from page 36)

ful effects of new substances introduced into plant processes. In cooperation with other departments he should investigate the extent of the hazards and devise measures of control.

2. Routine examination of applicants. Procedure should include a detailed history of the applicant's previous illnesses and accidents classified under (a) diseases of childhood, (b) general infectious diseases, (c) respiratory diseases, (d) venereal diseases, (e) accidents and resulting physical defects. A detailed history of previous occupations is very important. Merely stating the type of industry has slight value. The exact duties performed in each occupation and the probable length of exposure to hazardous substances should be noted.

If the applicant has been or will be exposed to dust which induces lung diseases, an X-ray picture of the chest is important. This part of the examination may be referred to an expert roentgenologist as its value depends upon the type of pictures taken and the experience of the reader who interprets them. The examining physician also may need additional information obtained by laboratory analysis of blood, sputum and urine.

3. Rating and placement of applicants. In cooperation with the personnel department the applicant should be rated and placed, not only on training and past experience but also on physical and mental ability. The record of his examination should be the confidential property of the medical department.

4. Periodical physical examinations. The frequency of periodical physical examinations must depend upon individual circumstances as determined by the supervising physician. Where examinations are made for the first time, employees should be given ample explanation of their benefits and assurance that their jobs are secure.

5. Provision for the disabled. Employees who develop disabilities during employment should be reassigned to occupations which will not aggravate the disability, or they should be provided for in other ways.

Many concrete examples might be cited of results obtained through dust control measures and competent supervision of workers. One which strikingly illustrates the value of such measures is the experience of the South African gold mines. During the years 1918-20 the production rate for silicosis for those who had 10 years underground service amounted to about 10 per cent. During the years 1920-23 the production rate for those who had 10 years of service dropped to 5 per cent and during the year 1931-32 the rate dropped to a fraction over 1 per cent. The highest rate during the 1920-23 period amounted to a little over 7 per cent with 16 years' service and in the period 1931-32 the highest rate was about 4½ per cent after 18 years of service. This experience can be duplicated wherever preventive measures are effectively applied.

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