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>1877. SAYERS, R. R. The effects of silica dust upon the lungs. Part II. *Amer. Jour. Pub. Health* 17(4): 348–351. 3 fig. 1927.—Review.

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Hebron, Beersheba, Acre and Gaza are provided with masonry destructors of a standard type, that give satisfactory service when properly utilized.

Street sweeping machines and watering carts of a modern automobile pattern are utilized in the cities of Jerusalem, Haifa and Tel Aviv.

Street orderly hand carts with portable containers are utilized in the town of Haifa and will be duly provided in the other areas.

Village areas are being slowly improved and cleanliness is noticeably apparent in contrast to pre-war days.

CONCLUSION

It can thus been seen that in the short period of eight years, since the entry of the British into Palestine, excellent progress has been made in the various activities of public health.

In spite of the many difficulties, previously referred to, as regards the complicated political, religious, economic and social problems, in overcoming the rooted prejudices of ages, the Department of Health is succeeding in placing Palestine upon a sure footing of modern hygienic and sanitary science.

A healthy and increasing population will eventually cause Palestine to become a focal health center for the Near East, and the Holy Land may yet be known, not only as the source of religious ideals, but also become a factor in spreading in that part of the world, the "Gospel of Good Health."

THE EFFECTS OF SILICA DUST UPON THE LUNGS *

PART II †

R. R. SAYERS, M.D.

Surgeon, U. S. Public Health Service; Chief Surgeon, U. S. Bureau of Mines, Washington, D. C.

TWO FACTORS, the weight of the dust and the number of particles, are usually considered in determining the extent of the hazard of breathing silica dust in air. Many instruments have been devised for making these determinations, among which are the Palmer apparatus, electric dust collector by Philip Drinker, the Owen dust counter, the Read water-spray dust collector, the Kotze hydrokonimeter, the sugar tube, the impinger, and the konimeter. The sugar tube method is used almost exclusively for weight determination in mining in South Africa. In the United States it has also been used for dust counts and in mineralogical determinations. Sugar tubes range from ¾ to 2½ inches in diameter. The Bureau of Mines Type B is made of molded glass 2⅜ inches inside diameter. One hundred grams of sugar are used. This must pass through a 14-mesh but not a 65-mesh screen.

During the past three years the impinger, developed by Greenburg and Smith, has been used in air-dust investigations in the mines of the United States. In this instrument, as the air is drawn through a liquid—alcohol or distilled water—it impinges on a smooth surface. (Illustration of impinger Fig. I, and konimeter Figs. II and III.) A half inch tube, gradually reduced at the tip from 0.5 to 0.11 inch is inserted through a hole in a rubber stopper which fits a 500 c.c.

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wide-mouthed bottle containing 100 c.c. of liquid. A circular impinging plate is attached by three legs 5 millimeters from the end of the tip of the tube.

The impinger has the advantage in that the errors due to impurities in the material are low and unimportant so that low concentrations of dust may be determined with comparative accuracy. Laboratory analyses may be made more rapidly. The disadvantage of this method is that some dusts are soluble in water or affected by water; other liquids, of course, can be used as indicated.

By the use of the Kotze konimeter, a rapid determination of a number of particles of dust may be made. By this instrument, a small quantity of air is forced at high velocity upon a greased slide Spots of dust adhering to slide are examined under the microscope. The size and number of particles may thus be estimated. At least two modifications have been made of this instrument, one in Australia and one in South Africa, in which a microscope is attached. This allows of making examination and count of dust immediately after sampling.

A tentative standard of dustiness of air in mines has been set at 5 milligrams per cubic meter of air, or 300 particles per cubic centimeter.[20] In the latest reports from South Africa, the samples averaged 1.1 milligrams per cubic meter of air.[21]

METHODS FOR THE PREVENTION OF SILICOSIS

In preventing silicosis, it is obvious that men will be protected (1) if no dust is formed, (2) if when formed the dust is prevented from getting into the air, (3) if once in the air the dust is removed from the air, and (4) if the dusty air is rapidly replaced by clean air.

Wet methods of operating have been recommended since 1713 when a British patent was granted for grinding flint by wet methods.[22] Wet methods have been found to be of special value in the mining industry. In this industry water should be used to wet down the sides of the working place. It should be used in drilling from the time the hole is started, as collaring the hole at the start of drilling may be an important source of dust. The full bore of the hose should be used in



FIG. I—Impinger.

supplying water to the collar. Drills with outside water jets cause somewhat less dust than dry drills. Axial-feed water drills of the Leyner type and wet-head axial-feed water stopers have been introduced into the hard rock mines of many countries. A typical Leyner drill allows some air to pass down the axial drill with the water to the bottom of the hole. This air and water mixture as it comes from the drill hole has been found to contain rock dust. Rock dust, of course, is just as dangerous to breathe when wet as when dry.

Experiments carried out in South Africa have shown that sludging with water alone could be effective, provided the hole in the steel is large enough and the water

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pressure sufficiently high. On the basis of these to avoid the air-blow system of sludging as in the Leyner drill, the "long piston drill" has been developed in which water alone is used.

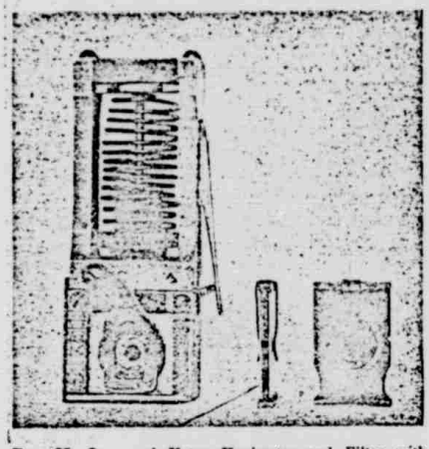


FIG. II—Improved Kotze Konimeter and Filter with Low Power Microscope.

For some years wet grinding of tools has been considered to be the best and is used in many of the edge-tool factories together with exhaust systems. A number of methods have been devised to prevent the dust from entering the air when formed. Winslow and Greenburg[23] found in an ax factory that air with wet grinding contained far more dust particles than with dry grinding (15,800,000 and 154,500 respectively, or about 100 to 1, per one-fourth unit standard particles per cubic foot) where a similar exhaust system was used.

DEVICES USED IN MINING INDUSTRY

In the mining industry devices have been developed to prevent the dust from getting into the air. In Australia the Clifton Dust Collector was developed and for a time appeared to be successful. However, it proved too cumbersome and is not now in use. More recently Professor P. S. Hay,[24] of the University of Sheffield, England, described a method of trapping dust which he thinks will greatly improve the working conditions in stone drifts and increase the comfort of men employed as well as prove to be a great step in the elimination of miners' phthisis. Professor Hay's apparatus uses a rubber dish like that used on the Australian collector. However, instead of using water he filters the dust out by passing it through closely woven flannel or chamois skins contained in a bag. Exhaust air from the drill is used to draw the dusty air into the filter. Before any final statement can be made in regard to the apparatus, careful studies will need to be made. In the opinion of many mining men any such apparatus will not be practicable in most metal mines.

As indicated from many statements in the above, wet methods alone and methods of preventing the dust from entering the air have not been able to keep the air free

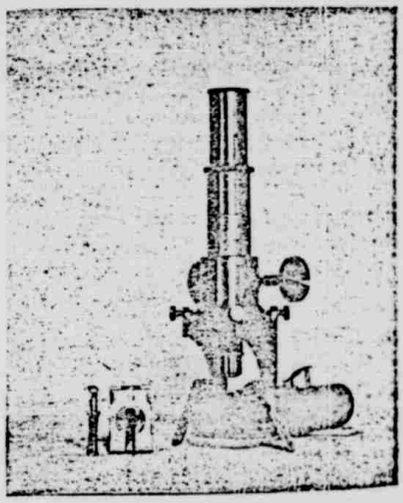


FIG. III—Kotze Konimeter.

from dust. Ventilation is probably as important, if not more important, as a preventive measure. Mechanical ventilation in mining and many other industries must be used. Sufficient air, taken from a clean source, must be supplied to replace the dusty air at frequent enough inter-

vals. In this way the silicosis incidence can be greatly decreased. In mining the general ventilation by the large surface fan must be controlled by special air shafts and doors to carry the clean air up to the working face. Auxiliary fans in some cases are necessary.

While all mechanical means for eliminating dust materially lessen the amount of dust in the air and at the same time lessen silicosis and tuberculosis among miners, they do not eliminate these diseases. As stated early in the paper, respiratory diseases predispose to silicosis.

IMPORTANCE OF PHYSICAL EXAMINATION

Physical examination of all workers is required by law in some industries prior to employment in Australia, South Africa and Great Britain. In Great Britain and South Africa, periodical examination after employment is also required. The initial examination is made to determine whether the applicant has any disease, especially of a respiratory nature, which would make him susceptible to silicosis or tuberculosis. Persons suffering with silicosis should not be employed where they will have to breathe dust, especially silica dust; if they are, they should not be employed underground at all in the mining industry. Men having silicosis are very susceptible to tuberculosis. It is therefore, of greatest importance that they come in contact as little as possible with people having tuberculosis. Tuberculosis progresses much more rapidly when an individual is exposed to silica dust. At the periodical examination silicosis can usually be recognized at a very early stage. Any man found with silicosis should be notified in order that he may seek other employment, if he so desires. Any man found having tuberculosis should not be allowed to return to work in a dusty trade for his own protection and as a protection to those with whom he is associated. In some countries compensation has been provided for those having either silicosis or tuberculosis or both.

Physical examination is believed to be a very important preventive measure for silicosis as well as for tuberculosis. It must be remembered, however, that no one measure will be successful in preventing silicosis in these trades. All measures—physical examination of employes, good ventilation, and wet methods at least in some industries—must be made continuously effective.

REFERENCES

20. Miners' Phthisis Prevention Committee. Union of South Africa. *General Report*, Mar. 15, 1916, p. 22. Final Report, 1919, p. 17.

21. Miners' Phthisis Medical Bureau. Union of South Africa. *Report upon the Work for 12 Months Ending July 31, 1924*, 1926, p. 6.

22. Collis, E. L. Industrial Pneumonoconioses With Special Reference to Dust Phthisis. Milroy Lectures. 1915, 42 pp.

23. Winslow, C.-E. A., and Greenburg, L. A Study of the Dust Hazard in the Wet and Dry Grinding Shops of an Ax Factory. Pub. Health Rep., 35, 41: 2393–2401 (Oct. 8), 1920.

24. Hay, P. S. A Method of Trapping the Dust Produced by Pneumatic Rock Drills. *Safety in Mines Research Board Paper No. 23, Mines Department*, London, 1926.

25. Warren, P. H. Mechanical Methods of Allaying Dust. *Proc. Australasian Inst. Min. and Met., New series*, 42, 1921, 87 pp.

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