

are very smooth, and thus have a tendency to slip by one another when twisted and subject to tension. An admixture of vegetable or animal fiber was therefore often necessary, but, while these facilitated the manufacturing operations, they impaired the fire resistance of the fabric, and special machinery and ingenious devices had to be invented to enable the successful spinning of a pure asbestos yarn. It is, however, now possible to make a single asbestos thread which, though weighing no more than 1 ounce per hundred yards, has a fair strength, and braided material can be made much more resistant to torsion and tension, while asbestos ropes, chiefly used by the fire department, can be strengthened either by interwoven wires or by having a wire-rope core.

HEALTH-INJURIOUS OCCUPATIONAL CONDITIONS.

On account of the rather limited extent of the asbestos industry in the United States, at least in the large centers of population, the industrial insurance mortality experience data are insufficient for definite conclusions. During the period 1907 to 1914 in the Prudential experience there were only 13 deaths, of which 3, or 23.1 per cent, were from pulmonary tuberculosis. At ages 25 to 44, there were 6 deaths, of which 3, or 50 per cent, were from this disease. Asbestos dust is not described in the extensive consideration of Dust Hazards, by Hayhurst, nor by W. Gilman Thompson in his treatise on The Occupational Diseases. In 1914 the production of asbestos in the United States was only 1,247 tons, or much less than in earlier years, indicating a very limited available source of supply. Most of the asbestos used in the United States is mined in Canada, and an excellent report on "Asbestos, its occurrence, exploitation, and use," has been published by the mines branch of the Department of the Interior of the Dominion of Canada (Ottawa, 1905), which contains a descriptive account of mining methods and of the dressing of asbestos by hand or by mechanical treatment, including the final crushing by means of rollers, fiberizers, beaters, cyclones, and pulverizers. All of these processes unquestionably involve a considerable dust hazard, but the hygienic aspects of the industry have not been reported upon. It may be said, in conclusion, that in the practice of American and Canadian life insurance companies asbestos workers are generally declined on account of the assumed health-injurious conditions of the industry.¹

It is regrettable that there should be no further information available regarding the asbestos industry in its various branches, including the utilization of by-products of manufacture, on account of the self-evident injuriousness of asbestos dust as a predisposing cause of pulmonary tuberculosis. The subject is not referred to by Kober

¹ For a descriptive account of the Canadian asbestos district, see Engineering and Mining Journal, New York, Apr. 30, 1910.

and Hanson in their recently published *Occupation and Vocational Hygiene*, nor by recent work on *Diseases of Occupation*. The development of industries using asbestos, from foreign sources, suggests the urgency of consideration than has heretofore been given; no references to asbestos in the Index Catalogue of the General's Library, which, however, brings the record down only to 1896. The discussion of asbestos in the report of the United States Geological Survey is devoted entirely to the technical aspects of the industry; during recent years has experienced a decline in that the production has diminished from 1,247 tons in 1911 to 1,247 tons in 1914. In contrast to this is a gradual increase in the quantity of the asbestos imported, chiefly from Canada. The asbestos is practically limited to the States of Arizona, Vermont, Georgia. Georgia has for years been one of the sources of asbestos in the United States, but no record as regards the possibly injurious mining and manufacturing of asbestos in the industry itself has been described, however, as regards asbestos, talc, and soapstone deposits of the Georgia Geological Survey, 1914.

EVIDENCE OF DUST EXPOSURE

The relation of asbestos dust to pulmonary tuberculosis has been reported upon at some length in the Annual Report of the Factories and Workshops for England and Wales. A detailed investigation was made by Dr. Collis, who

Following up information received from the factories it was found that five deaths of persons suffering from pulmonary tuberculosis occurred in five years among a staff of 100 at a factory where asbestos is woven. The most dangerous is the production of mattresses, which are composed of bags of short asbestos fiber, are placed on a table and beaten with a wooden flail, from which the dust is raised. Women who sew the mattresses into sections worked close to the man who beat the flail and inhaled the dust. The reorganization of the factory and the installation of localized exhaust draft was called for. A medical examination of the workers by the factories was instituted in the hope of detecting and preventing those showing early signs of respiratory disease. Asbestos dust those showing early signs of respiratory disease has only become an important factor in the last few years. Two other large asbestos factories were found which was found to have its own speciality dust prevention is required.