of the lungs caused by the inhalation of asbestos dust, has already been described both in its clinical and roentgenographic manifestations by investigators in other countries, but to date no studies have been reported in the United States. Cement dust, which contains about 22 per cent combined silica, has been studied, and the effects of the inhalation by workers has been discussed here. In March, 1933, Dreessen, of the United States Public Health Service, reported the results of a study conducted among tremolite talc and slate workers. The slate dust to which these workers were exposed consisted mainly of silicates, there being less than 3 per cent of quartz in the dust. The talc was a hydrous calcium-magnesium silicate, being 45 per cent talc and 45 per cent tremolite, with no quartz present. The results of the study seemed to indicate a relationship between the amount of dust inhaled and the effect of this dust on the lungs of workers.

Statistical Studies. Recently, Lanza and Vane estimated that there are some 500,000 workers engaged in the mining, quarrying and manufacturing industries in this country in which an exposure to silica dust to a harmful degree is entailed. Their analysis of mortality experience of twelve life insurance companies for the period 1915-1926 showed that the actual mortality from respiratory tuberculosis among the silica exposed persons was about three times that of a non-silica dust group. If one considers their data for certain occupations in metal mines and granite and sandstone quarries, occupations known to be exposed to high concentrations of hazardous dusts, then the comparison is more striking, since the actual deaths among these workers was found to be ten times that of the expected deaths. More detailed statistics on occupational mortality as reported by the Registrar-General of England and Wales (1921-1923), and summarized by Britten, show the high rate of 1,886 per 100,000 for tin and copper miners, while the rate for "all occupied and retired males" was only 150. Other occupations with silica exposure showed an excess.

From the evidence just presented concerning the injurious effects produced by the inhalation of certain dusts, it is apparent that a knowledge of the properties of a given dust which determine its capacity to produce pulmonary pathology is essential. Numerous investigations of the industrial dust problem indicate that these properties are the chemical and mineralogical composition of the dust, its concentration in the industrial atmosphere, and its particle size.

In an earlier portion of this discussion evidence was presented which indicated that a close relation existed between morbidity and mortality rates from various respiratory diseases and the exposure to certain dusts in industry. In the study of the dust hazard in the granite cutting industry, it was definitely proved that there is a direct relation between the magnitude of the dust exposure and sickness and death resulting from tuberculosis. It is quite evident, as a result of these studies, that the remedy of the dust evil lies in the effective removal or suppression of the dust to concentration considered safe. However, no set rules may be established for the mechanical protection to be instituted in an attempt to control industrial dust. Specific conditions encountered in a plant will determine the type of protection to be employed.

The protection of workers against certain dusts known to be toxic may at times be accomplished by the substitution of a non-toxic material for the toxic one. One example of such a procedure is the possible use of a metallic or other type of artificial abrasive for sand in the sandblasting process in those operations in which it is not essential to use sand, a substance high in quartz content. Again, the mechanical enclosure of the dust-creating process also serves to protect the worker. An excellent illustration of this type of protection is afforded by the modern sandblast barrel used in the cleaning of small objects. Sometimes it is possible to protect the worker by the substitution of wet for dry processes, as wet drilling instead of dry. In one instance, in the granite cutting study previously mentioned, an operator using a diamond point tool worked the stone wet; the resulting dust amounted to 22 million particles per cubic foot. The same operator was then requested to work the stone dry; as a result, the amount of dust reached the high figure of 45 million particles per cubic foot. In the weaving of asbestos cloth it has been possible to reduce the amount of dust in the air by wet weaving to one-fourth of the amount present when the process is conducted by dry methods. Another example of this procedure in allaying dust is the use of a spray of water

in keyner and jack-hammer drilling in hard rock, although the new type of Kelly dust trap is now finding much favor for this kind of work.

The Kelly trap consists of a metal chamber designed to enclose the drill steel at the rock surface. No attempt is made to secure a mechanical seal with the rock or between the trap and the drill steel. The dust is removed by an air stream and is carried into an exhaust system connected to the trap. Escape of dust particles through openings between the uneven rock surfaces and the trap is prevented by the air seal produced by the inflowing air. Tests made on this trap under actual working conditions show that the dust concentration at the worker's breathing zone may be kept down to less than 10 million particles per cubic foot with a 60 cubic foot per minute rate of air flow through the hood. This trap is a step forward in the program of dust removal; however, in underground work, such as in mines and subways, there is still the need to solve the problem of compact dust disposal equipment.

In certain cases, such as in the sandblasting of large castings in sandblast rooms, the practical safeguard to the worker is to provide him with a mask or helmet of the positive air pressure type. In the sandblast investigation previously mentioned, it was found that when from 5 to 6 cubic feet of practically dust-free air per minute are supplied to the helmet, the worker receives ideal protection. However, one must always bear in mind that the ultimate criterion of protection should be the dust determination of the air within the helmet during blasting and not the quantity of the air supply itself.

In most dusty processes, however, the most effective means of dust elimination are by the use of properly designed exhaust ventilation systems. Since in many instances it is difficult, costly, and at times an unnecessary procedure to remove all the dust in the vicinity of a worker, we need first to determine the minimum amount of a certain dust which the worker can apparently tolerate with impunity. Such information can be made available by the type of studies carried out by the Public Health Service. For example, in the granite study already referred to, it dust at the breathing level of about 10 million particles per cubic foot (35 per cent free silica).

Studies of dust removal devices used in granite cutting plants at the time this work was conducted showed that a linear velocity of 1,500 feet per minute as measured by an anemometer at the face of the dust-removal hood, would keep the dust at the breathing level to an amount less than 10 million particles per cubic foot.

A word should be said concerning personal respiratory protection against dusts. It has already been shown that in the use of positive pressure respiratory devices in sandblasting, it is important to have a well-designed device supplied with about 6 cubic feet of dust-free air per minute to give full protection to the worker. With reference to respirators of the filter type, there is still much to be accomplished in the design of an efficient and comfortable mask for continuous use. Of great value are standard methods for the testing of the efficiency of respiratory protection devices. Drinker advocates testing a device against the particular dust which the respirator is to encounter, these tests to be made both in the laboratory and under actual industrial conditions. He further suggested that some impartial agency should conduct such tests and certify the devices for industrial use, the work being done on a cost basis. The U. S. Bureau of Mines has prepared such a schedule for testing and approving respirators.

I wish to stress the importance of good housekeeping in the effort to combat the dust hazard. Good housekeeping should not only imply the removal of accumulated dust about a workroom but should also embrace efficient maintenance of dust removal devices and respiratory protective equipment. Systematic inspection of all dust suppression equipment should be an axiomatic principle in every dusty industry rather than the casual attention which it now receives in many instances.

Report of the Nominating Committee

The chairman called for the report of the Nominating Committee at this point, and new officers for the section to serve during the ensuing year were nominated and elected as follows: