

duced when processing mill fiber. The three types can be readily noted.

Because of the non-uniformity of this type of dust, average particle size was determined in two dimensions, one at right angles to the other. Measurements were made of the longest diameters, which were termed longitudinal diameters, and a second set of measurements were made at right angles to the first, which were termed transverse diameters.

**Method of Collection**—Samples for the determination of particle size were collected by the use of the electric precipitator (30). This method yielded samples that were satisfactory for direct micro-projection and measurement. No intermediate steps for preparing the sample were necessary.

The precipitator employed was designed on the principle of the Cottrell precipitator. The air was drawn through the precipitating tube by a small rotary fan driven by a motor, the rate of flow being measured by a flowmeter. The rate of sampling was one cubic foot (28.3 liters) per minute. The precipitating tube was made of Pyrex glass with an inside diameter of 2.4 cm. A number 1 microscope cover slip, 22 by 70 mm. in size was placed in the precipitating tube directly beneath the central electrode. The dust in the air was deposited electrically on this cover slip. When a representative sample had been precipitated, the cover glass was removed and mounted dry on a microscope slide. A total of sixteen samples was collected at various operations, all being taken in the breathing zone of the workers.

**Measurement**—A micro-projection apparatus with the microscope arranged in a horizontal position was used. Apochromatic objectives, 8 mm. and 2 mm., and a 10x compensating eyepiece were employed. This system practically eliminated color fringes, gave a flat field, furnished maximum light intensity, and permitted the measurement of the long fibers.

The images were projected on a ground-glass screen at a predetermined distance from the microscope. This screen was ruled in centimeter squares to facilitate measuring. A transparent rule was used, and the size of the projected images recorded in millimeters. Accurate focusing on each individual particle before measuring was accomplished by a remote control attached to the fine adjustment of the microscope by a mechanical sleeve.

Predetermined magnifications of 2000 and 10,000 were used, depending on the objective. Measurements were made according to the method suggested by H. L. Green (56). Using the 8 mm. objective (magnification 2000) the longest diameters of two hundred particles were measured, all lengths less than ten millimeters (five microns) being neglected. The number of fields examined was also recorded. An equal number of particles was measured using the 2 mm. objective (magnification 10,000), and all particles fifty millimeters (five microns) and over were disregarded. Again the number of fields examined was recorded. These measurements were used to calculate the average longitudinal diameter of the sample. The method of calculation is shown in Table III. For the calculation of the average transverse diameter the same procedure was