List No. 134

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The Cambridge Measuring Microscope

for Workshop Use.

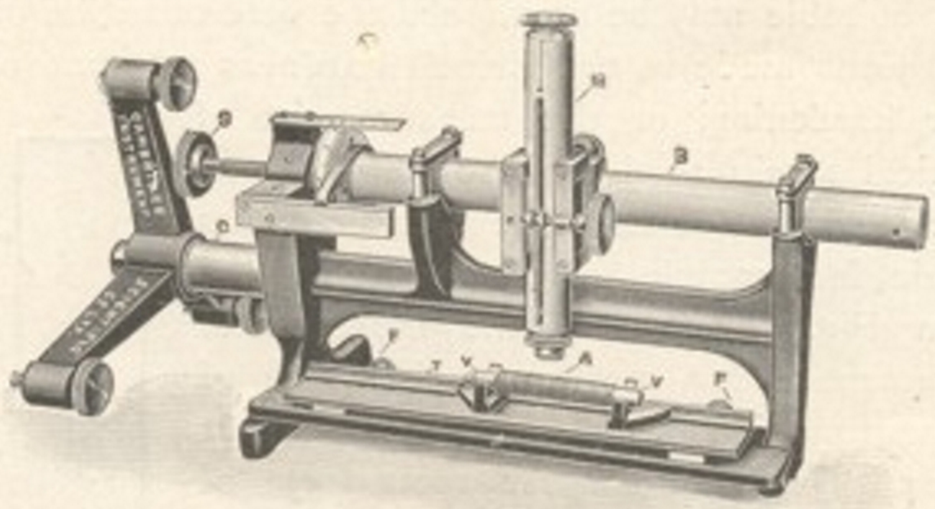

Fig. 1.

THE Reading Microscope illustrated and described in this leaflet is an instrument for the accurate measurement of small distances and will be found of the greatest use in the workshop for a large number of purposes. It can be used to measure lengths up to 40 mm. directly to 0·01 mm. or by estimation to 0·001 mm. Suggestions as to some of the purposes for which the instrument may be used are given below, and since, not improbably, it will be employed in the workshop by men with little or no previous experience of such work, details with regard to the methods of obtaining readings have been added.

Description. The instrument, as illustrated in Figs. 1 and 2, consists of a microscope clamped to a tube B, which is supported in a rigid frame and can be traversed by the screw and milled head S through a distance of 40 mm. The instrument can be used with the axis of the microscope either vertical, horizontal or inclined. Fig. 1 shows it with the microscope vertical, while Fig. 2 shows it being used with the microscope horizontal, in which position it is supported on a tripod base with levelling screws. For the majority of measurements the position shown in Fig. 1 will be found the most convenient. The microscope M, which can be clamped at any point on the tube B, is fitted with an achromatic objective and suitable eyepiece with cross lines. For the focussing of the microscope Lucas's Patent Slow Motion mechanism is used; this gives a smoother movement than the ordinary rack and pinion, and is entirely free from backlash.

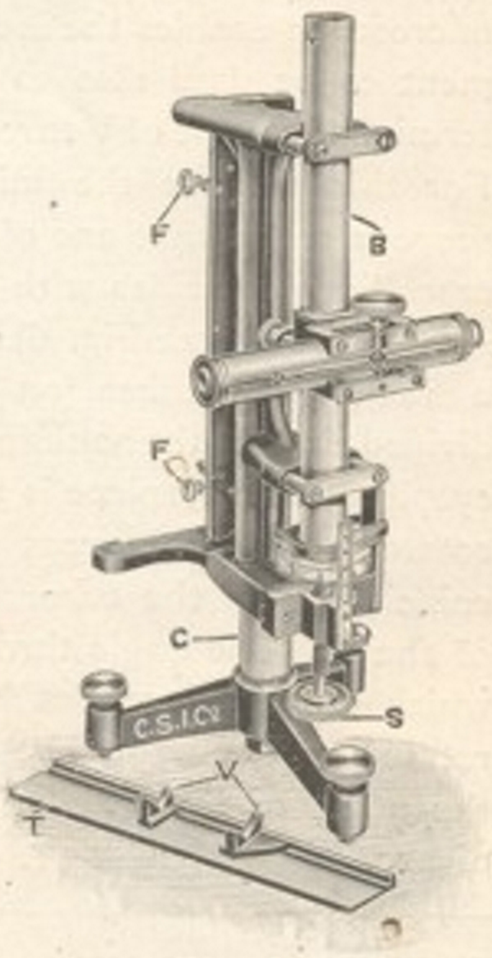

Fig. 2.

For supporting the object under examination a small sliding table T resting on geometric fittings is provided. This is fitted with aligning adjustments controlled by the screws F, F. Small V Blocks on geometric supports are also provided to take screws, cylinders, etc.

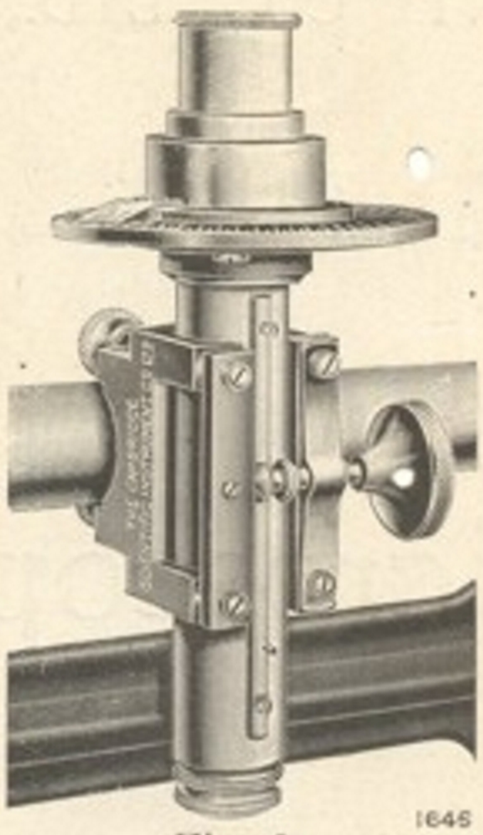

Fig. 3.

Methods of use. The instrument is used as follows. The object under examination is supported on the table T, and the microscope set so that the intersection of the cross lines coincides with one extremity of the length to be measured. The reading of the micrometer head is taken and the microscope is then moved by turning the milled head S until the other extremity of the length under examination coincides with the intersection of the cross lines. The difference of the readings on the micrometer head in the two positions gives directly the required length. Since the screw has a pitch of 1 mm. and the micrometer head is divided into 100 parts each approximately 1·7 mm. in length readings can be obtained directly to 0·01 mm. or by estimation to 0·001 mm. If required the instrument can be fitted instead with a screw enabling measurements to be made directly in inches and parts of an inch.

Among the many purposes for which this instrument is particularly suitable may be mentioned the determination of the diameter of indentations made in the Brinell hardness test and of the change in length of specimens of steel after hardening, or the measurement of test pieces after mechanical strain to determine yield points. It can also be used to advantage for accurate measurements otherwise difficult to obtain, for example, for measuring lengths such as those shown in Fig. 4. One of the most useful applications of the instrument is for measuring the pitch of small screws and also the variations in pitch from one part of the thread to another. For this purpose some form of reading microscope is essential, as errors in pitch cannot be measured by means of ordinary gauges. In determining pitch the screw is rested on the sliding blocks V, V (see Fig. 1, which shows a screw under examination). It is essential that the axis of the screw should be exactly parallel to the axis of the instrument, and this may be secured by adjusting the two screws F, F. The microscope is set so that the intersection of the cross lines coincides with the edge of one of the screw threads (see Fig. 5) and the reading of the micrometer head is taken. The traversing screw is then turned until the point of intersection coincides with the edge of the next turn of the thread, the pitch being then given by the difference of the two readings on the micrometer head. The addition of a goniometer eyepiece (see Fig. 3) to the microscope enables the instrument to be used also to determine the angle of V threads. For this purpose the microscope is set so that one of the cross lines coincides with one side of the V (see Fig. 6) and a reading is taken on the divided circle of the goniometer eyepiece. The eyepiece is then rotated until the cross line coincides with the other side of the V. The angle through which the eyepiece has been rotated, as shown by the difference between the two readings on the divided circle, gives directly the angle of the V. By means of the vernier shown this angle can be measured to 5 minutes of arc.

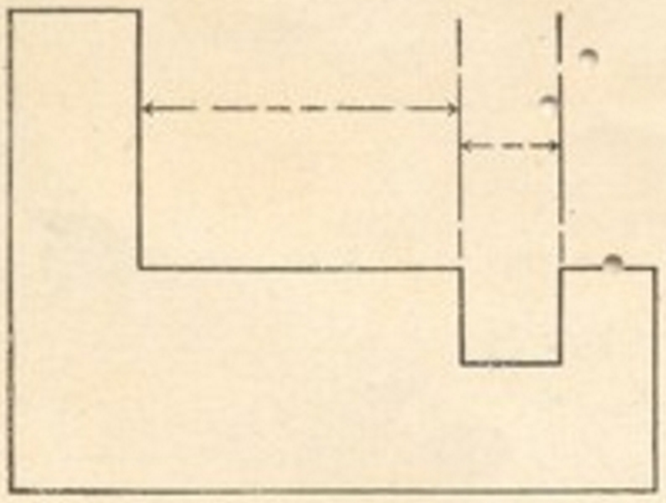

Fig. 4.

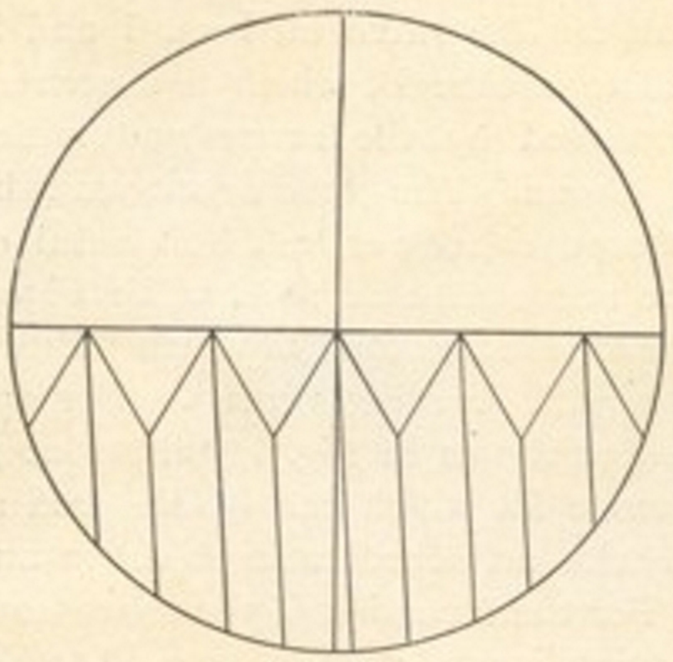

Fig. 5.

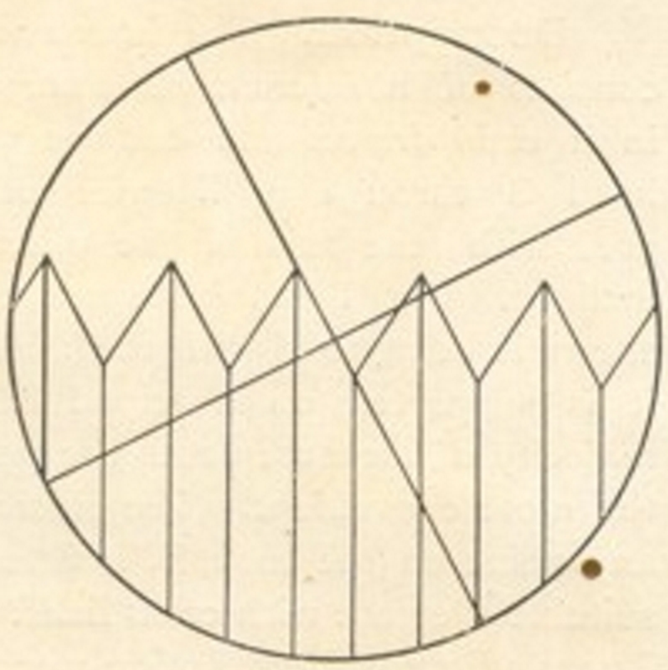

Fig. 6.