determined are not all exactly equal to each other. In order to get an invariable interval we take the average of all the solar days, and call the day thus obtained a *mean solar day*. Dividing this into 86,400 equal parts we obtain a mean solar *second*. This is the quantity which is "ticked off" by our watches and clocks. It is used universally as the fundamental unit of time.

10. Measurement of Length. A dry-goods merchant unrolls his cloth, and, placing it alongside his yard-stick, measures off the quantity ordered by the customer. Now the yard-stick is intended to be an accurate copy of the standard yard kept at the capital of the country, and this latter we know is an accurate copy of the original preserved in London, England. In order to ensure the accuracy of the merchant's yard-stick a government official periodically inspects it, comparing it with a standard yard which he carries with him.

11. More Accurate Measurements. Suppose next we wish to find accurately the diameter of a ball or of a cylinder. We may use a calliper such as that shown in Fig. 6. The jaws are

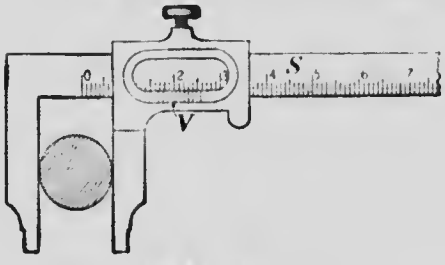

Fig. 6.—Calliper.

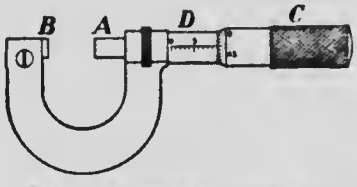

Fig. 7.—Micrometer wire gauge.

pushed up until they just touch the object, and the diameter is read from the gradnations on the instrument.

For a small ball or a wire the most convenient instrument is a screw gauge, one of which is illustrated in Fig. 7. *A* is the end of a screw which works in a nut inside of *D*. The screw can be moved back and forth by turning the cap *C* to which it is attached, and which slips over *D*. Upon *D* is a