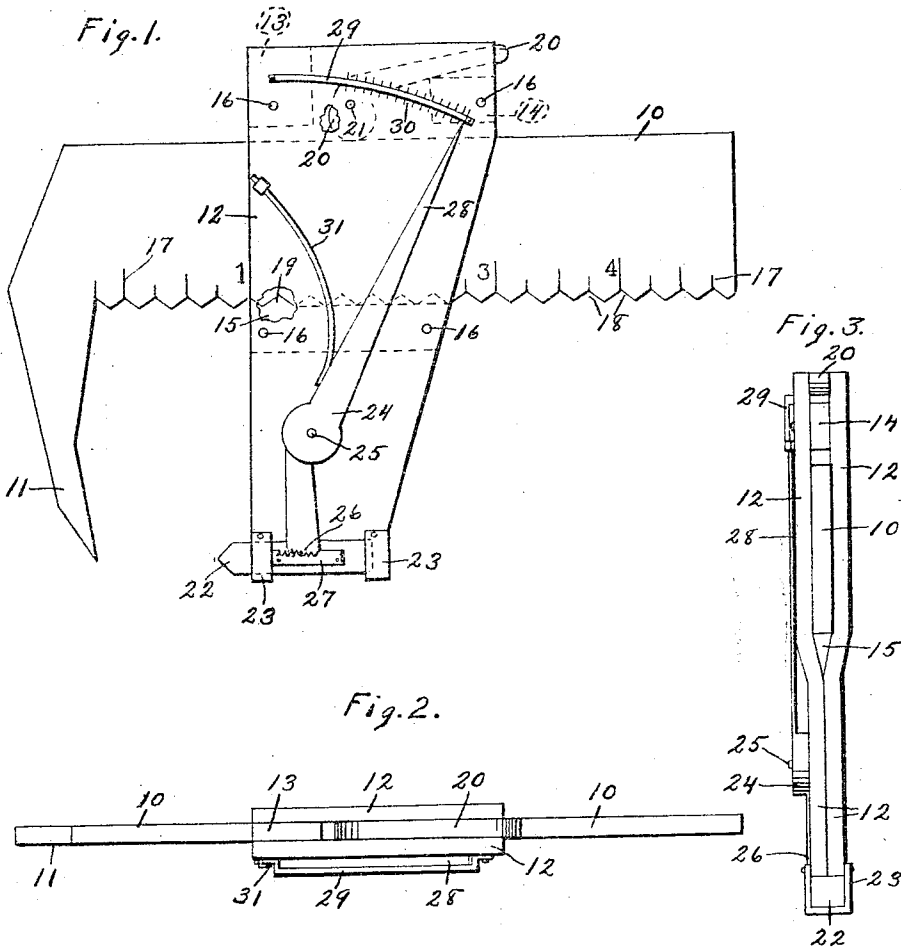


L. E. KIRCHNER.
CALIPERS.
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CALIPERS.

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To all whom it may concern:

Be it known that I, LOUIE E. KIRCHNER, a citizen of the United States, and resident of Jewell, Hamilton county, Iowa, have invented a new and useful Calipers, of which the following is a specification.

The object of this invention is to provide an improved construction for calipers.

A further object of this invention is to provide an improved construction for calipers in which a sliding member is mounted on a stationary member and adjustable relative to a fixed caliper arm and carries a pivoted arm adapted to be oscillated relative to said fixed arm.

A further object of this invention is to provide an improved construction for calipers in which a member is slidably mounted on a stationary member bearing a graduated scale and adjustable relative to a fixed caliper arm and carries a pivoted arm adapted to be oscillated relative to said fixed arm, said pivoted arm being extended beyond the pivot in the form of an indicator finger adapted to magnify the oscillation of said pivoted arm and indicate the same on a second graduated scale.

My invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in my claim and illustrated by the accompanying drawing, in which—

Figure 1 is an elevation of my improved calipers, portions being broken away to reveal interior construction. Fig. 2 is a plan of the same. Fig. 3 is an elevation at right angles to Fig. 1.

In the construction of the device as shown the numeral 10 designates a base bar or plate on one end of which is formed an integral, laterally projecting stationary caliper arm 11. A sliding member 12 is mounted on and slidable longitudinally of the bar 10, by which its position relative to the arm 11 is adjusted. The sliding member 12 preferably is composed of two parallel plates mounted on opposite sides of the bar 10, as shown in Figs. 2 and 3. Spacing blocks 13, 14 are mounted between the upper portions of the plates composing the sliding member 12, and a spacing block 15 is mounted between said plates on the opposite side of said bar, said plates being secured to each other by rivets 16 or other suitable securing members passing through said blocks. A graduated scale 17 is formed on the face of

the bar 10 adjacent the lower margin thereof, and said scale may be based on any suitable intervals of space, as quarter-inch subdivisions. The lower margin of the bar 10 is also formed with notches or serrations 18 corresponding to the subdivisions of the scale 17. Teeth 19 are formed on the upper margin of the spacing block 15 and correspond with and are adapted to engage the notches or serrations 18 of the bar. The distance between adjacent margins of the upper spacing blocks 13—14 and the lower spacing block 15 is enough greater than the width of the bar 10 to permit movement of the sliding member 12 transversely of said bar to the end of disengaging the teeth 19 from the notches 18, whereby said sliding member may be adjusted longitudinally of said bar. An eccentric latching lever 20 is pivoted on a bolt or rivet 21 passing through the plates of the sliding member 12 between the spacing blocks 13, 14, said lever being preferably located between said plates and projecting above the upper end thereof at inoperative position. The latching lever 20 is adapted to be moved to the position shown to force the sliding member 12 into such position that the teeth 19 are in engagement with some of the notches 18, to hold and maintain the sliding member in adjusted position. The free end of the lever 20 preferably is notched or scored to facilitate engagement by the finger of the operator.

A reciprocating or sliding caliper arm 22 is mounted in slide bearings 23 carried by the lower end of the sliding member 12 and is adapted for movement toward and away from the fixed caliper arm 11, and said sliding arm preferably is pointed at its end and is in the same horizontal plane as the end of said fixed arm. The sliding caliper arm 22 is adapted to cooperate with the point of the fixed caliper arm 11 in the measuring operation, in a common manner. An indicating lever 24 is pivoted on the sliding member 12 by a pin or rivet 25 and is adapted for oscillation in a plane parallel to the face of said member. A segmental toothed rack 26 is formed on the lower end of the lever 24 and is in mesh with and adapted to be operated by a toothed rack 27 formed on or fixed to the sliding caliper arm 22. The opposite end of the lever 24 is extended and attenuated to form an indicating finger 28, and such portion of the lever preferably is several times the length of the lower or rack-

bearing portion, preferably from four to eight times as long. The point of the finger 28 preferably travels beneath a keeper 29 mounted on the upper portion of the sliding member 12, and an arcuate graduated scale 30 is formed on said sliding member adjacent the orbit of travel of said point. The graduations of the scale 30 are based on minute subdivisions of space, here shown conventionally, to indicate, for example, one-thousandth part of an inch, but is not actually divided so minutely for the reason that the movement of the point of the indicating finger 28 is magnified relative to the movement of the opposite end of the lever 24, and consequently relative to the movement of the sliding caliper arm 22, because of the ratio of length of said finger and the opposite end of the lever. The scale 30 is therefore magnified or enlarged, relative to the actual travel of the sliding member 22, an amount equal to the proportion of length of the finger 28 relative to the rack-bearing arm of the lever 24, so that very fine or minute subdivisions of space traveled by said sliding caliper arm may be readily read on said scale 30. A spring 31 is mounted on the sliding member 12 and engages the indicator finger 28 and tends to hold said finger normally at zero on the scale 30. In such position the sliding caliper arm 22 preferably is at its extreme limit of movement toward the caliper arm 11 and projects a given distance, say one-quarter of an inch, beyond the inner margin of the sliding plate 12. The scale 17 is arranged in accordance with the normal amount of projection of the sliding caliper arm 22 so that its normal distance from the fixed caliper arm 11, dependent upon the position of the sliding plate 12 on the fixed bar 10, may be read on said scale 17 by the position of the inner margin of said sliding plate 12. That is, the distance from the point of the arm 11 to the point of the arm 12 is read on the scale 17 at the inner margin of the plate 12.

In use the sliding plate 12 is first adjusted longitudinally of the bar 10, the lever 20 having first been oscillated manually to unlatching position to permit such movement. The adjusted position of the sliding plate 12 on the bar 10 is determined roughly by the approximate diameter or thickness of the object to be measured by the instrument, being set preferably at the nearest quarter-inch (or other subdivision on the scale 17) to such diameter or thickness, or at some point somewhat less than such di-

ameter or thickness. The sliding plate is then set or latched in such position by movement of the latching lever 20 to the position shown, causing an engagement of the teeth 19 with notches 18 to prevent movement of the sliding plate on the bar. Then the sliding caliper arm 22 may be reciprocated in such manner that the instrument embraces the object to be measured, which is received between the points of the stationary arm 11 and said sliding arm. Through reciprocation of the sliding caliper arm 22 the lever 24 is oscillated, because of the meshing engagement of the rack 27 with the segmental rack 26 and the finger 28 is moved on the scale 30 and indicates the fractional difference, between that indicated on the scale 17 and the actual diameter or thickness of the object; or in other words the amount of reciprocation of the arm 22 is read, in magnified form, on the scale 30. The scale 17 is read by the position of the forward margin of the sliding plate 12 relative to the said scale, and is added to the reading of the scale 30 to secure the complete measurement sought. This provides a convenient and accurate means for obtaining the measurement of an object in small fractional subdivisions of space.

The free end of the latching lever 20 projects beyond and is adapted for movement through an arc wholly extraneous to the margins of the sliding plate 12, and may at all times and in all positions be under the control of a thumb of the operator.

I claim as my invention—

Calipers, comprising a bar formed with a stationary caliper arm, a member slidably mounted on said bar, said bar being formed with a relatively coarse graduated scale, means for locking said sliding member relative to said bar, a sliding caliper arm mounted for reciprocation in the outer end of said sliding member and adapted to cooperate with the stationary caliper arm, a relatively fine graduated scale being formed on the sliding member, a lever pivoted on said sliding member and having a long and a short arm integrally formed on opposite sides of its pivot, the long arm of said lever acting as an indicator finger and adapted to travel on the last named scale, the short arm of said lever being formed with a segmental toothed rack, and a toothed rack on said sliding arm engaging said segmental rack and adapted for oscillation of said lever.

LOUIE E. KIRCHNER.