R. L. BINNEY.

MICROMETER.

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1,195,330. Patented Aug. 22, 1916.

Fig. 1.

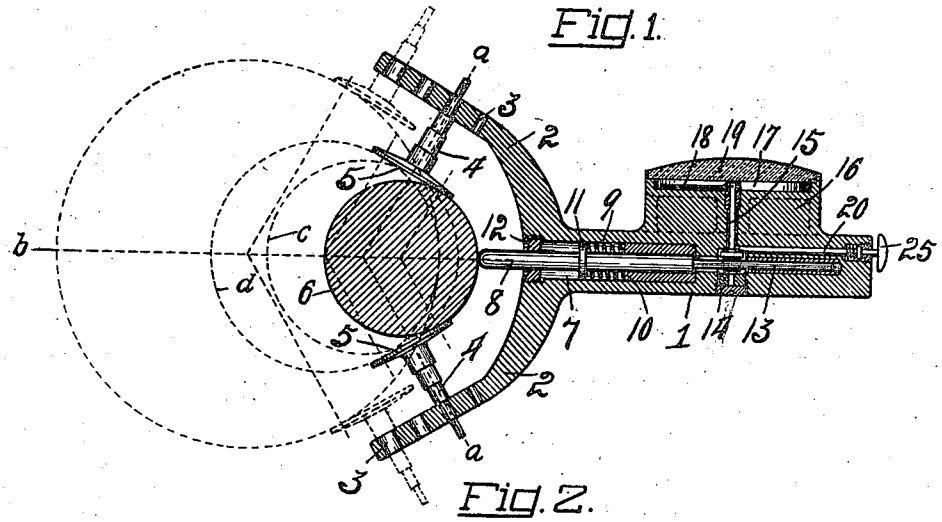


Fig. 2.

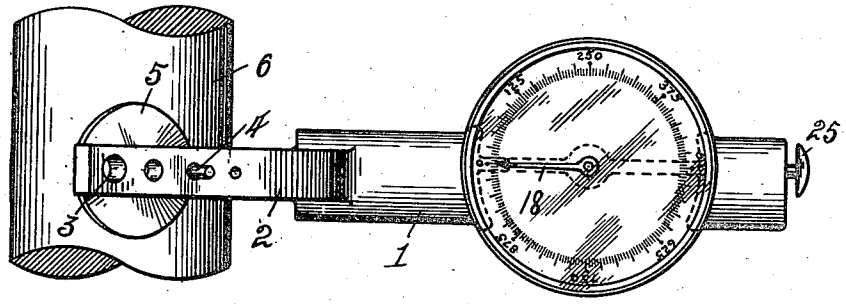


Fig. 3.

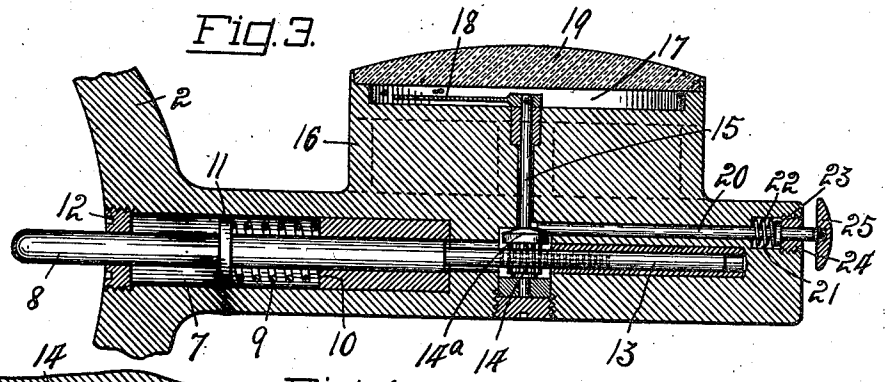
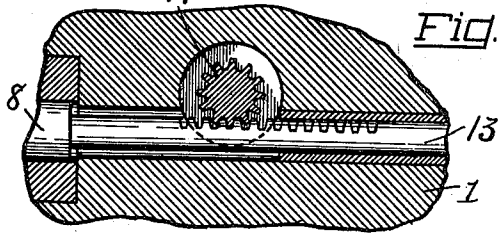


Fig. 4.



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MICROMETER.

1,195,330. Specification of Letters Patent. Patented Aug. 22, 1916.

Application filed June 26, 1915. Serial No. 36,497.

To all whom it may concern:

Be it known that I, RALPH L. BINNEY, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Micrometer; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to devices for determining the diameters of circular parts, and has for its object the provision of an improved device of this character which is simple and efficient in its construction and easily and quickly operable to accurately determine the diameter of circular parts.

The invention is fully described in the following specification, and while, in its broader aspect, it is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the following specification, in which,—

Figure 1 is a central longitudinal section of a device embodying the invention with a work piece in operative position therein. Fig. 2 is an enlarged top plan view thereof. Fig. 3 is an enlarged section of the device similar to Fig. 1 with parts broken away, and Fig. 4 is an enlarged sectional detail of a portion of the invention.

Referring to the drawings, 1 designates the body or holder member of my tool, said member being of bar-like or elongated form in the present instance, and having the two arms 2, 2 projecting in opposite directions from one end thereof with the outer portions of such arms preferably extending in diverging planes. Each arm 2 has a series of holes 3, in the present instance, four in number, provided therethrough in equidistantly spaced relation longitudinally thereof, and each hole of one set is positioned for a line coaxial therewith to intersect the coaxial line of a corresponding hole of the other set at a point on a line bisecting the fork formed by the arms 2, 2, as indicated by the lines *a* and *b* in Fig. 1.

The holes 3 in each arm, are preferably of different sizes to respectively receive different sized portions of a stepped stem 4 carrying a work coacting part 5 at its inner end. The smaller outer end step of the stem is intended to fit into the inner or smaller hole of a set, the next step in the second hole of a set, and so on as indicated by the drawing. The rod, pipe, or other work piece 6, the diameter of which is to be measured, is inserted between the parts 5, 5 as shown.

The body portion 1 of the tool is provided at its inner end with a socket 7 in which the inner end of a plunger 8 is mounted for limited reciprocatory movements. A coiled compression spring 9 encircles the plunger within the socket 7 and has one end thrust against a shoulder 10 in the socket and its opposite end thrust against a collar 11 on the plunger and tends to normally hold the plunger at the limit of its outward movement with said collar in contact with a plug 12, which partially closes the outer end of the socket and through which the outer end of the plunger projects. The plunger 8 alines with the line of bisection of the fork 2, 2 with which the point of intersection of the coaxial line of corresponding openings in the fork arms coincide, as indicated by reference to Fig. 1. It is thus evident that a work piece 6, when inserted between the contact parts 5, 5, will coact with the outer end of the plunger 8 and force it inward a greater or less extent against the tension of the spring 9, depending on the size of the work piece.

The plunger 8 is provided at its inner end with a lengthwise projecting stem or bar 13 which extends into a restricted end portion of the socket 7 and is provided with rack-teeth on one side thereof which mesh with the teeth of a pinion 14 that is carried by a shaft 15. This shaft is suitably journaled in the body 1 transversely of the stem or rack bar 13 at one side thereof and has one end projecting through an enlargement 16 formed on one side of the part 1 and into a circular space 17 without the outer end portion of said enlargement. An index finger 18 is fixed to the shaft 15 within the space 17 and registers at its free end with an annular micrometer graduation scale which is formed on the base wall of the space 17 in concentric relation to the shaft 15. A lens or other transparent part 19 closes the outer end of the space 17. With the tool illustrated a movement of the plunger 8 suffi-

cient to impart a complete revolution to the index finger 18 indicates a diametrical measurement of one inch.

A brake-rod 20 extends into the outer end of the body 1 lengthwise thereof and has its inner end terminating adjacent to the conically formed end 14^a of the pinion 14. The outer end of the socket 21 in which the brake-bar 20 is disposed is enlarged and contains a coiled compression spring 22, which encircles the brake-bar and acts against a shoulder thereon to normally retain the brake-bar at the outward limit of its movement, which limit is determined by the coaction of a collar 23 on the brake-bar with a plug 24 in the outer end of the socket. The outer end of the brake-bar projects through and without the plug 24, and is provided with a head or enlargement 25. An inward movement of the brake-bar 20 against the tension of the spring 22 forces its inner end into braking contact with the conical surface of the pinion 14 and locks the shaft 15 against turning until the brake-bar has been released, thus enabling the adjustment of the index finger 18 to be maintained so that a reading can be effected after the tool has been removed from engagement with the work piece, the diameter of which is being determined.

The operation of my improved micrometer is as follows: For the purpose of illustration it will be considered that the present tool is adapted for determining the diameter of work ranging in size from one to five inches. Such being the case, if work from one to two inches in diameter is to be measured, the stems of the work coacting parts 5 are placed in engagement with the inner holes of the two sets. If work varying from two to three inches in diameter is to be measured the stems of the contact parts are inserted into the next holes in order in the fork, as indicated in Fig. 1, the extent of movement of the stems into the respective holes being limited by the stepped formation of the stems. The work contacting parts having been placed in proper position in the fork or holder, said parts are forced over the work until both move into contact therewith, thereby causing the work to coact with the projected end of the plunger 8 and force it inward an extent depending upon the size of the work. The inward forcing of the plunger 8 imparts a revolutionary movement to the index finger 18, and the point on the scale at which the index finger stops will indicate a fraction of an inch proportional to an entire revolution of the finger, as each complete revolution indicates a full inch. In Figs. 1 and 2 the work piece being measured is two inches in diameter and the index finger 18 stands at zero point on the scale. If a two and one-half inch work piece is placed between the contact parts 5, 5 the work piece will assume the position indicated by the circular dotted lines *c* and the plunger 8 will be moved inward a sufficient distance to impart a half revolution to the index finger 18. The operator, knowing that the work piece is between two and three inches in diameter will understand from a reading of the micrometer scale that the work piece is two and one-half inches in diameter. If a three inch work piece is to be measured the stems of the contact parts 5 are placed in engagement with the third set of holes 3 and the work piece assumes the position indicated by the dotted line *d* in Fig. 1. It is thus evident that the diameter of any work piece ranging from one to five inches in diameter can be quickly and accurately determined by the tool illustrated by merely adjusting the contact parts relative to the holder 1—2 as the size of the work may require.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the parts, as it is capable of numerous modifications without departing from the spirit of the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is,—

1. In a tool of the class described a forked holder, work contacting parts adjustably carried by the fork arms of said holder and having work coacting surfaces disposed in intersecting planes which diverge outwardly with respect to the fork crotch, said surfaces serving to limit the movement of a work piece therebetween, and means operated by contact of the work therewith when placed between said contacting parts whereby to indicate the diameter of the work.

2. In a tool of the class described, a forked body, work contacting parts carried by the fork arms of said body for adjustment lengthwise thereof and in position to permit a limited insertion of a work piece therebetween and means operable to indicate the diameter of the work piece when inserted a maximum extent between said parts.

3. In a tool of the class described, a body having one end forked with each arm of the fork provided with an opening, the axial line of which intersects with the axial line of the opening in the other arm at a point falling on a line bisecting the fork, work contacting parts removably inserted in said openings and having their faces disposed in intersecting planes which are at right angles to the axes of the respective openings, and means carried by said body and operable to indicate the diameter of a work piece when inserted a maximum extent between said contact parts.

4. In a tool of the class described, a holder having a circular set of graduations, and having one end forked, a shaft journaled in

the holder in concentric relation to said graduations, an index finger carried by the shaft and registering with said graduations, a plunger mounted for yielding movements in one direction by said holder and projecting into the crotch of said fork, said plunger and shaft having rack and pinion parts whereby a longitudinal movement of the plunger imparts rotation to said shaft, and work contacting parts removably carried by the forked end of said holder, one at each side of the line of movement of said plunger, said contacting parts serving to limit the movement of a work piece within the crotch of the holder.

5. In a tool of the class described, a holder having a forked end with each arm of the fork provided with a series of openings spaced lengthwise thereof, which openings vary in size, a contact part for each arm having a stem for insertion at varying depths within different openings of the series, one of said contact parts being provided for each arm and coöperating with the other contact part to limit the insertion of a work piece within the fork of said holder, and means with which a work piece has contact when inserted between said contact parts and operable by such contact to indicate the diameter of the work piece.

6. In a tool of the class described, a forked holder provided in each arm of its fork with a plurality of openings spaced longitudinally of the arm and varying in size, a contact part for each arm, said contact parts having stepped stems for insertion at varying depths within the different sized openings within said arms, said contact parts cooperating to limit the extent of insertion of a work piece within the holder fork, and means operable to indicate the diameter of a work piece when inserted between said contact parts.

7. In a tool of the class described, a forked holder, means rotatably carried by said holder and operable to indicate the diameter of a work piece inserted a predetermined extent within the fork of said holder, and means operable to lock said rotatable indicator means in any position to which it may be moved relative to the holder.

8. In a tool of the class described, a forked holder, work contacting parts adjustably carried by the forked end of said holder and serving to limit the insertion of a work piece within the fork of the holder, means having a rotatable part and automatically operable to indicate the diameter of a work piece when inserted the maximum extent between said contact parts, and means for co-acting with said rotatable part to lock said indicator means in any position to which it may be moved relative to the holder.

In testimony whereof, I have hereunto signed my name to this specification.

RALPH L. BINNEY.