No. 805,480. PATENTED NOV. 28, 1905.

F. G. MARBACH.

MICROMETER.

APPLICATION FILED MAY 5. 1905.

Fig: 1.

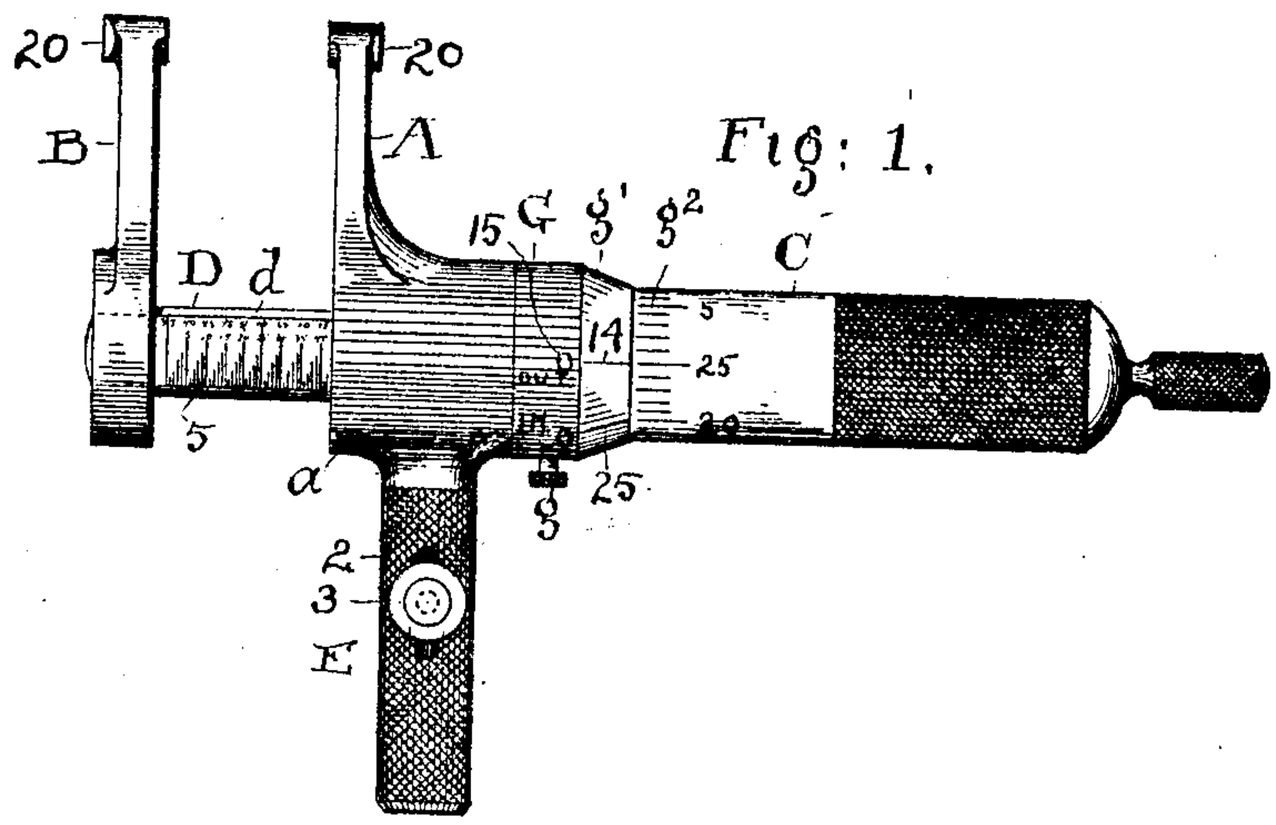


Fig: 3.

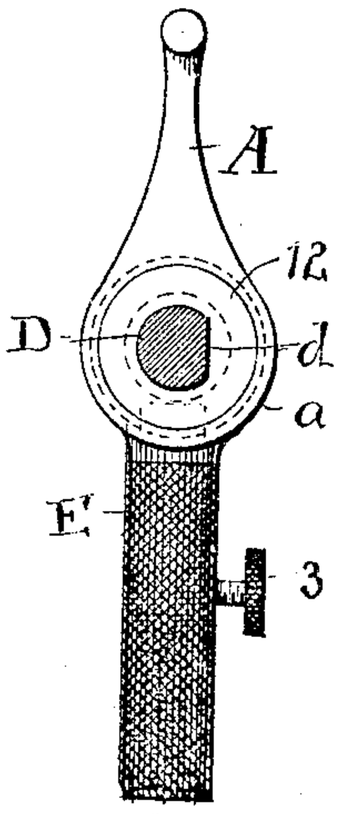


Fig: 2.

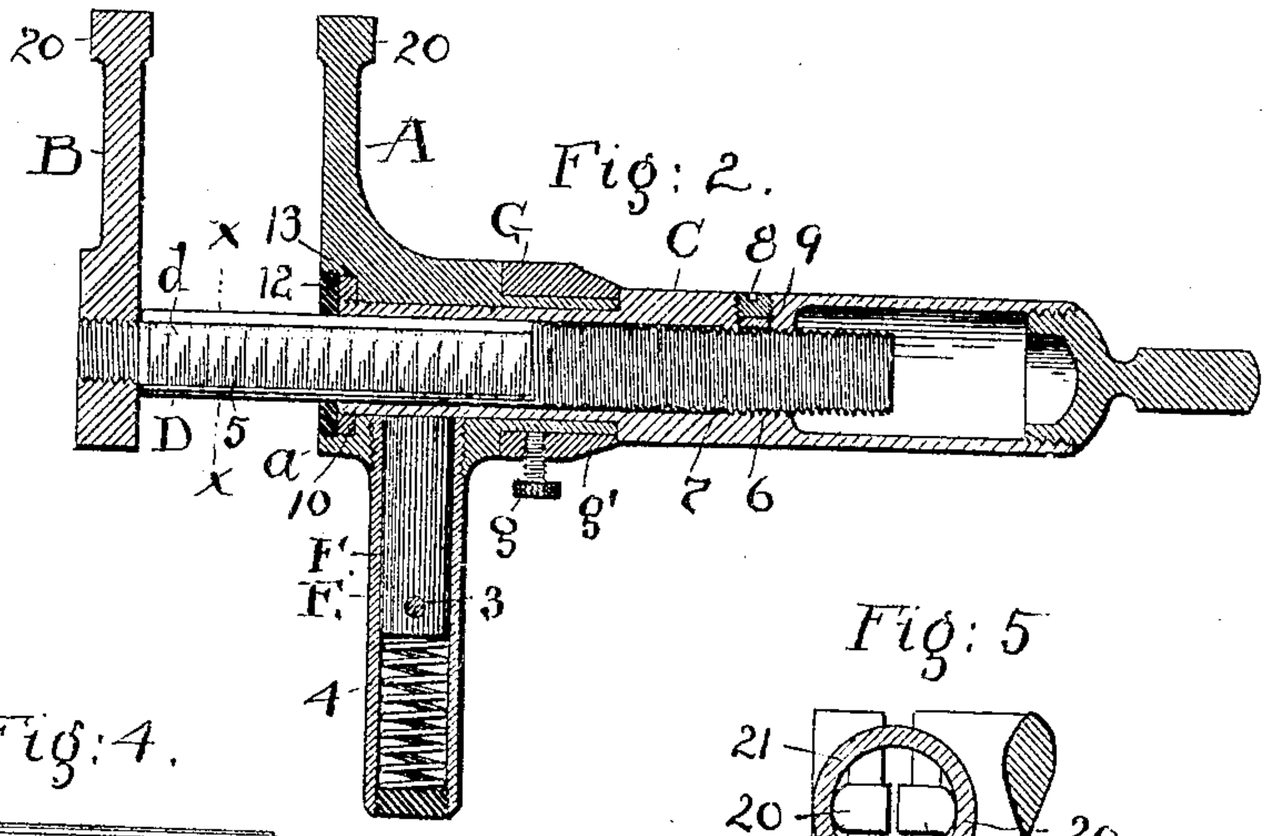


Fig: 5

Fig: 4.

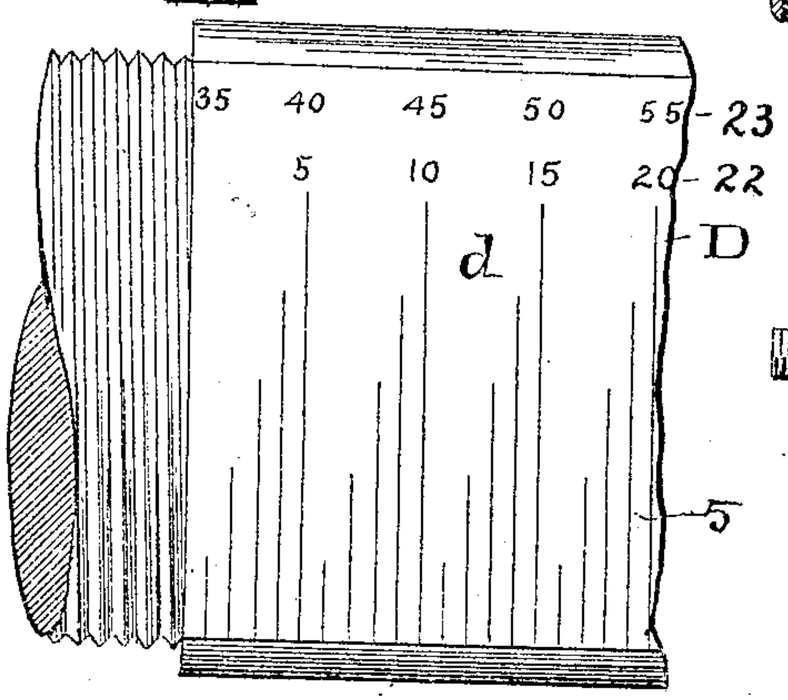
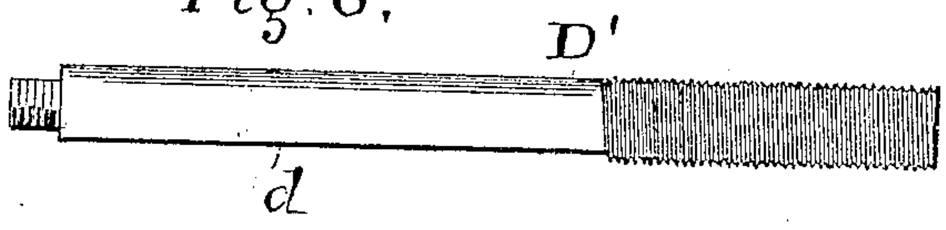


Fig: 6.



WITNESSES:

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MICROMETER.

No. 805,480. Specification of Letters Patent. Patented Nov. 28, 1905.

Application filed May 5, 1905. Serial No. 259,060.

To all whom it may concern:

Be it known that I, FRANK G. MARBACH, a citizen of the United States, residing at Medina, in the county of Medina and State of Ohio, have invented certain new and useful Improvements in Micrometers; and I do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in micrometers; and the invention consists in a micrometer constructed and adapted to operate substantially as shown and described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a plain side view of my new and improved micrometers, and Fig. 2 is a longitudinal central sectional view thereof. Fig. 3 is a cross-section on line *x x*, Fig. 2; and Fig. 4 is an elevation of a section of a graduated stem or rod which carries the outer jaw and has a flattened side for the scale or graduations, said view being several times larger than the corresponding view in Fig. 2, so as to clearly disclose its construction and advantage in use. Fig. 5 is a plan view of the jaws shown within a cross-section of a pipe. Fig. 6 is a detail view of an interchangeable graduated stem or rod.

As thus shown, the invention comprises sundry parts and features consisting of two opposed jaws A and B, a tubular body or barrel C, a graduated stem or rod D, upon the outer end of which the outer jaw B is removably secured, and a tube E, set into the hub *a* of the inner jaw A, at right angles to said hub and containing a bolt F, adapted to engage frictionally with the reduced extremity *c* of the said barrel and thus retard rotation. Said tube E has a longitudinal slot 2 between its ends, in which works a headed binding-screw 3, engaged in bolt F and adapted to lock the bolt when it has been set to a given position. A spring 4 behind bolt F in tube E exerts a constant pressure against the end of the said bolt and causes the bolt to serve a measure of its purpose in frictionally engaging the parts when screw 3 is released as well as always holding the bolt in working position.

The stem or rod D has a faced surface *d*, on which are a series of graduations 5 spaced in hundredths, as will hereinafter appear, and the inner end of this stem is screw-threaded and engaged in or by the internal thread 6 in barrel C. Ordinarily the thread between these parts is liable not to be as close as the effective working of the device requires, and I am enabled to bind the parts more or less tightly together by means of a threaded plug 8 and a disk or washer 9 beneath the same, adapted to be crowded down upon the threaded end 7, and thus frictionally interlock the said rod with the barrel more closely than the parts themselves will lock without some such means.

The inner jaw or jaw member A, having hub *a* sleeved over the reduced end of barrel C, is confined thereon by threaded ring-shaped nut 10, screwed onto the extremity of barrel C and occupying an annular recess 13 in hub *a* of the jaw A about the bore therein, and a washer-shaped nut 12 outside of ring 10 is threaded about its exterior and engaged in said recess 13 and flush on its outside with the outer facing of jaw A, as shown. This washer 12, furthermore, is provided with an opening or hole through its center conforming to the shape of the faced end or portion of rod D in cross-section, so as to prevent rotation of said rod in said washer without interfering with its longitudinal movement or adjustment therein. This serves to hold the two jaws A and B in right working position opposite each other and in alinement, or, in other words, prevents rotation one from the other, they being confined by the faced rod D on one part and the locked washer 12 in the other part. Operatively the ring 10 rotates with barrel C behind the washer-nut 12, thus making of said ring practically a head on the end *c* of the barrel and when the barrel is rotated affecting the position of outer jaw B.

A ring G is sleeved on hub *a* of the inner jaw and is rotatably adjustable thereon by means of a set-screw *g*. Said ring has a tapered portion *g'* extending down to the surface of barrel C, on which are numbered graduations g^2, running, say, up to twenty-five, and a zero-line 14 on the said ring G from starting-point 15 serves as a bearing from which to measure adjustments according to the movement desired for the jaws in respect to each other. Thus assuming that outer jaw B is to be carried in either direction a distance of one-thousandth part of an inch or other otherwise imperceptible distance the barrel C can be ro-

tated to get such adjustments by taking note of the graduations g^2 as compared with line 14. Obviously, if one complete rotation of barrel C be equivalent to a twenty-five-thousandths-part-of-an-inch movement of graduated rod D, the turning of said barrel from one of its twenty-five points g^2 to another on line 14 would be equivalent to only one-thousandth part of an inch. Thus the finest possible adjustment is obtained and with lines which are easily read. This applies also and particularly to the graduations 5 on the flat face d of the outer jaw-stem D. As shown, the said face is divided into one hundred equal spaces with cross-lines, which come so close together at their base that the first impression to the eye is one of blurring and confusion, and no line could be read with any degree of accuracy or certainty if all were alike or approximately alike in length. This is obvious by running the eye over the base of the said lines and excluding vision from the upper and only distinguishing portions thereof. Now in order that these hundredth graduations may be rendered unmistakeably distinguishable one from the other to the naked eye I have subdivided the entire column into groups of five spaces or hundredths each, and each group comprises five dividing-lines stepped successively from the shorter to the longer by a distance equal to, say, three times the distance or space between any two given lines. This lifting up of the end of a line singles out each line at its upper end from the other and shorter lines behind in the same group, which avoids confusion of vision and leaves the eye to concentrate sight on the space between the line sought and the next higher one, which latter also is out of the way by reason of being so much higher. The highest line is thus made to stand substantially five times the height of the shortest line.

My improved tool is adapted to measure both inside and outside surfaces, and in its smallest practical form I am enabled to measure an opening as small as three-eighths of an inch. To provide for measurement of so small an opening, and especially a circular opening, I round the outer projecting faces 20 of jaws A and B, respectively, as seen best in plan Fig. 5, wherein the jaws are shown as employed for measuring the inside of a pipe or tube 21. (Shown in cross-section.)

The graduations on bar D are also preferably numbered for both inside and outside readings to conform to the double use of the tool, and the lower row of figures 22, as seen in Fig. 4, is used for outside readings and the upper row of figures 23 is used for inside readings, because in the latter allowance must be made for the width of the jaws when closed together and at their smallest measuring capacity. Ring G is also provided with two zero-lines to provide for correct double reading and adjustment. Thus the second zero-line is designated by 25, and lines 14 and 25 are preferably placed about five lines apart as compared with the graduations on barrel C. This corresponds to about five-thousandths of an inch of movement and is a desirable provision, because as the barrel is turned in one direction for outside measurement and then in the other direction for inside measurement the lost motion which is always present in a screw connection can be allowed for whenever the change is made.

Screw-rod D is detachable from head or jaw B, and in Fig. 6 I show a longer rod D′, which can be substituted for the shorter one shown in Fig. 2 to enlarge the measuring capacity of the tool.

What I claim is—

1. In micrometers, an inner jaw having a hub with a tubular bore, a substantially tubular barrel having a reduced portion projected into said bore and a handle portion at the other end, said reduced portion of the barrel having a threaded extremity and a nut thereon confining the said jaw upon the barrel, an outer jaw having a stem mounted and threaded in said barrel, said stem provided with a flat graduated face lengthwise on its outer portion, and a nut engaged over said flattened graduated portion of the stem and threaded in the hub of the inner jaw, thereby helping to hold said jaws in right working relations.

2. A micrometer having a barrel provided with a handle at one end and an inner jaw rotatably mounted on the opposite end of said barrel, a spring-pressed bolt adapted to frictionally engage said jaw with said barrel, and an outer jaw having a threaded stem projected into said barrel and provided with a flat-faced side lengthwise, and means about said stem engaged with said inner jaw and constructed to lock said parts together against separate rotation.

3. In micrometers, a pair of jaws and a barrel having one end mounted in the inner of said jaws and the outer jaw provided with a threaded stem engaged in said barrel and having a flat graduated face, a nut about said stem over said flattened portion and screwed into the face of said inner jaw and constructed to lock said stem and said inner jaw together against separate rotation.

4. In micrometers, an inner and an outer jaw and a barrel carrying said jaws, said outer jaw having a stem projecting into said barrel through the inner jaw and provided with a flat graduated portion lengthwise, a washer engaged over said stem having a flat portion corresponding to the flat graduated portion thereon and screwed into the said inner jaw, and a collar threaded onto said barrel behind said nut in the inner jaw.

5. In micrometers, inner and outer jaws and a handled barrel carrying said jaws, the inner jaw having a hub sleeved over one end of said barrel and provided with an annular recess

on its outer side about the bore therein, a collar in said recess fixed on the end of said barrel and holding said parts operatively together, a graduated stem for the said outer jaw mounted in said barrel and a threaded washer sleeved over said stem and engaged in said recess outside said collar.

In testimony whereof I sign this specification in the presence of two witnesses.

FRANK G. MARBACH.

Witnesses:
N. H. McCLURE,
FRANK HEUTH.