No. 841,271. PATENTED JAN. 15, 1907.

J. RAU.

MICROMETER.

APPLICATION FILED APR. 5, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

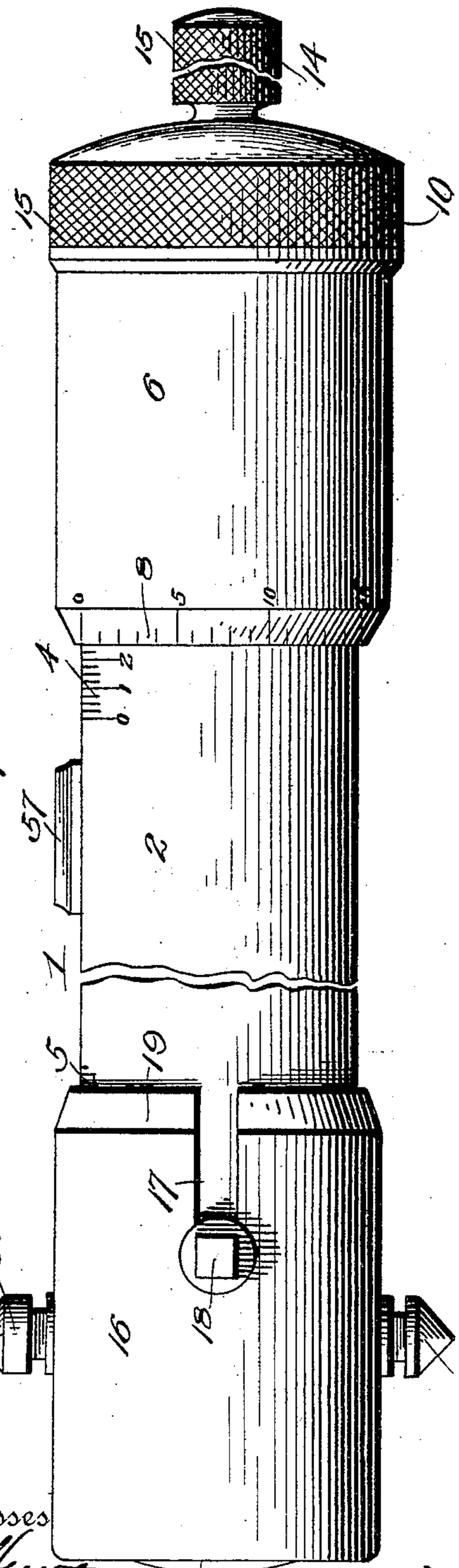


Fig. 9.

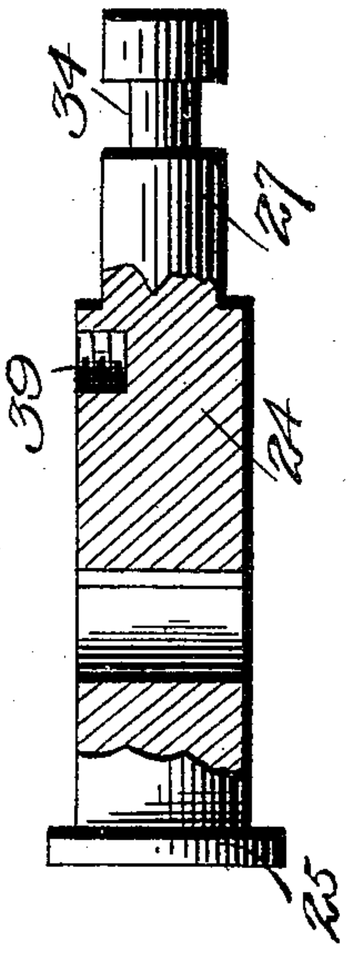
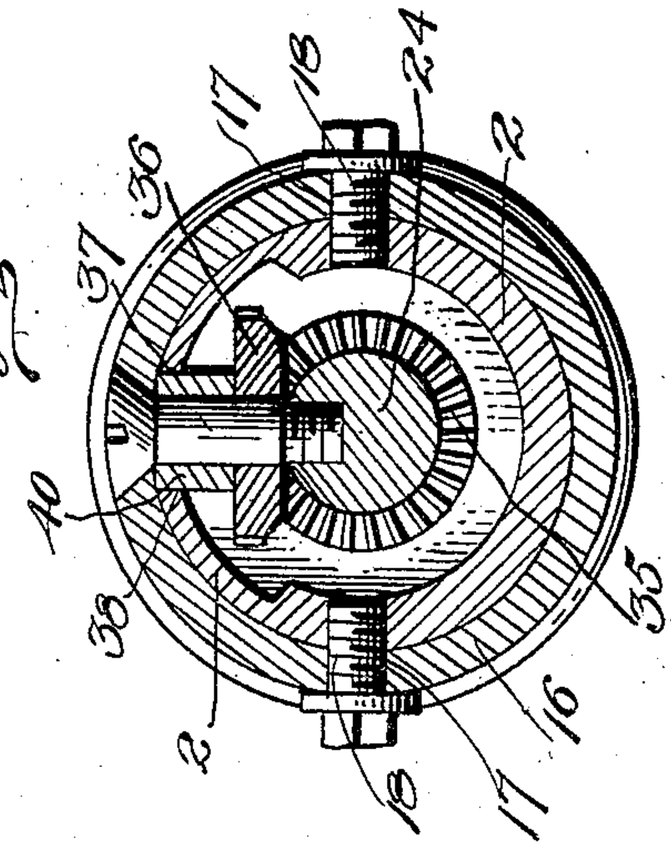


Fig. 5.



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3 SHEETS—SHEET 2.

Fig. 2.

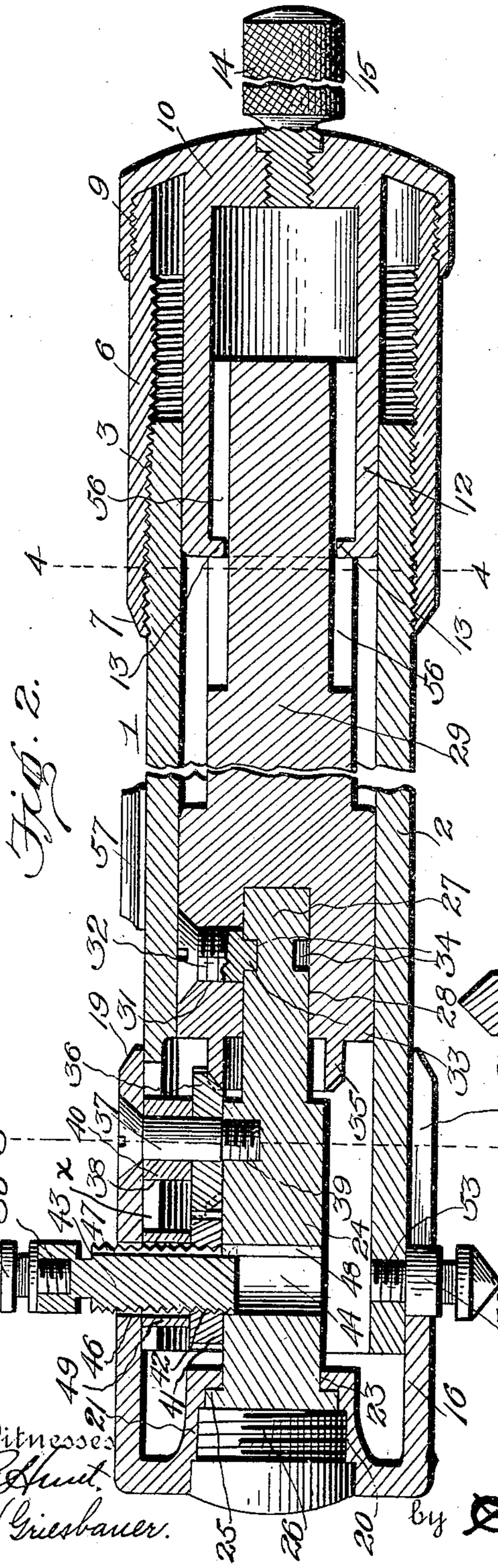


Fig. 4.

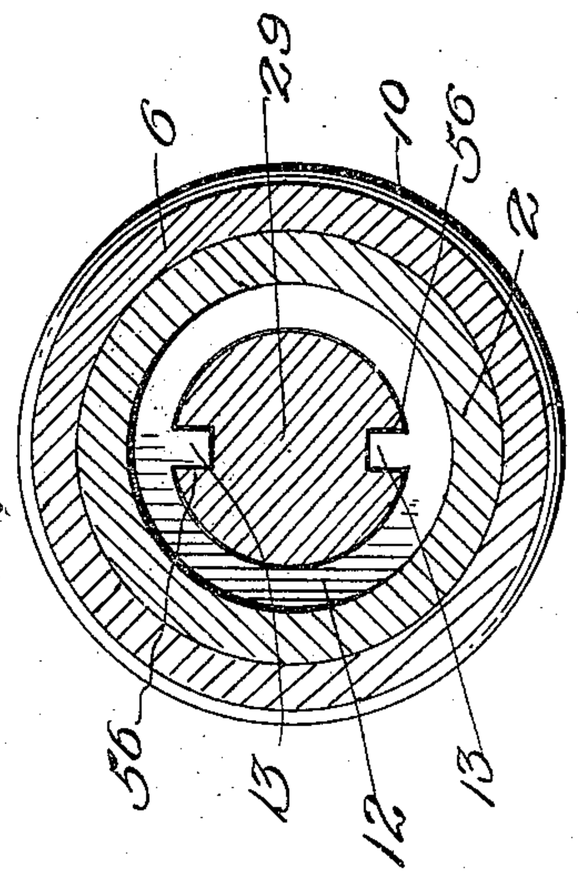
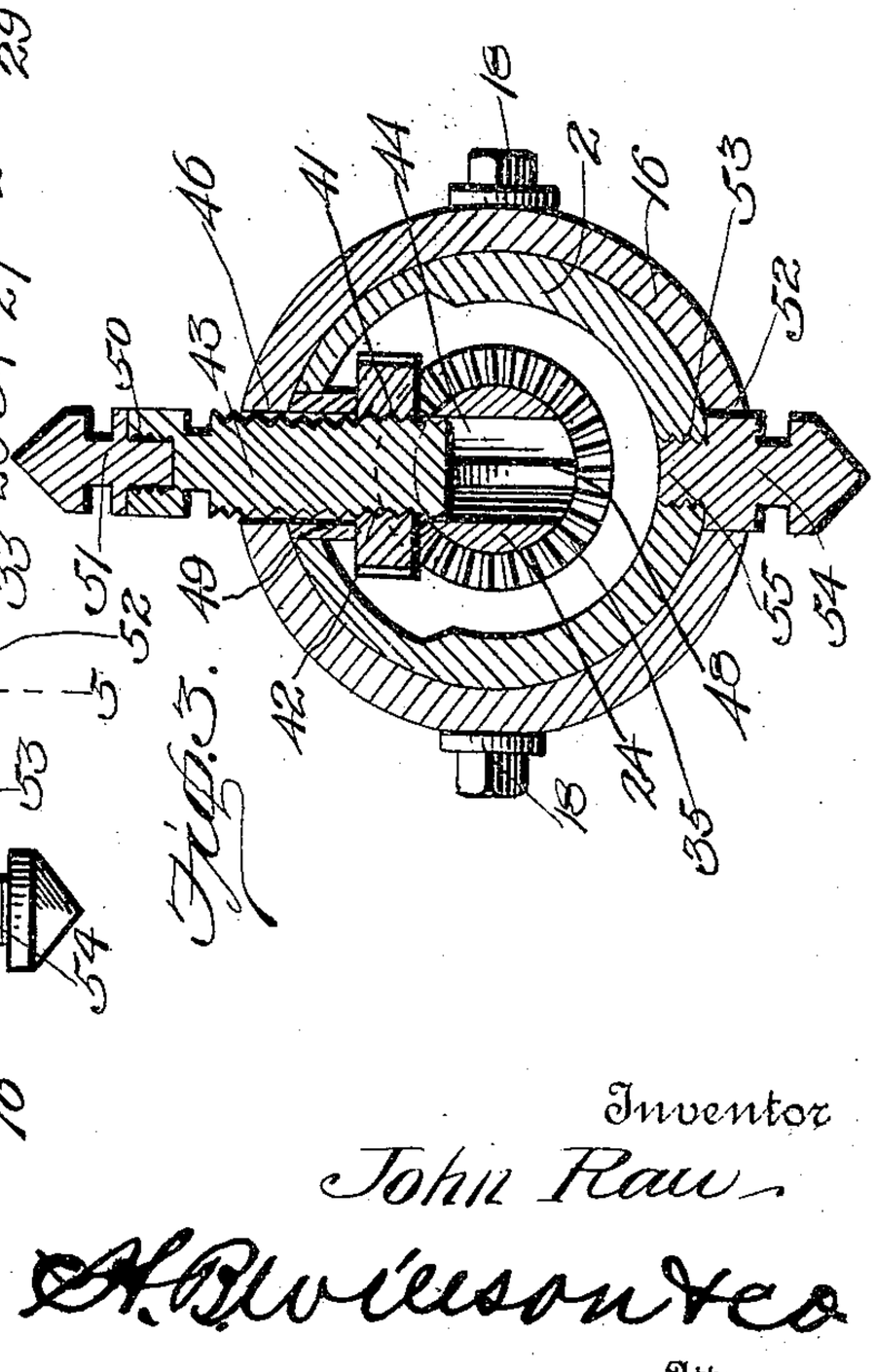


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 6.

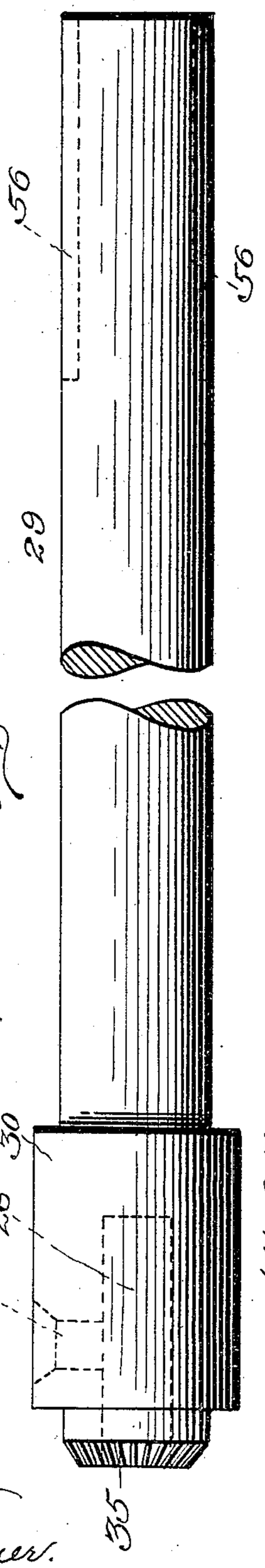


Fig. 10.

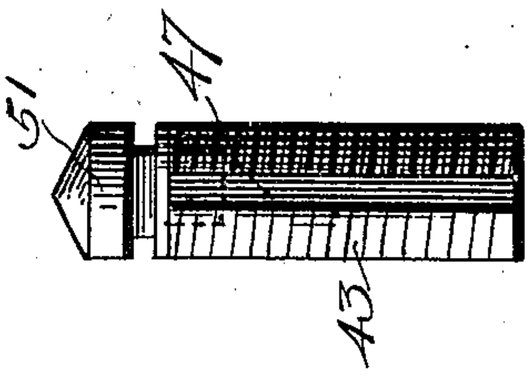


Fig. 8.

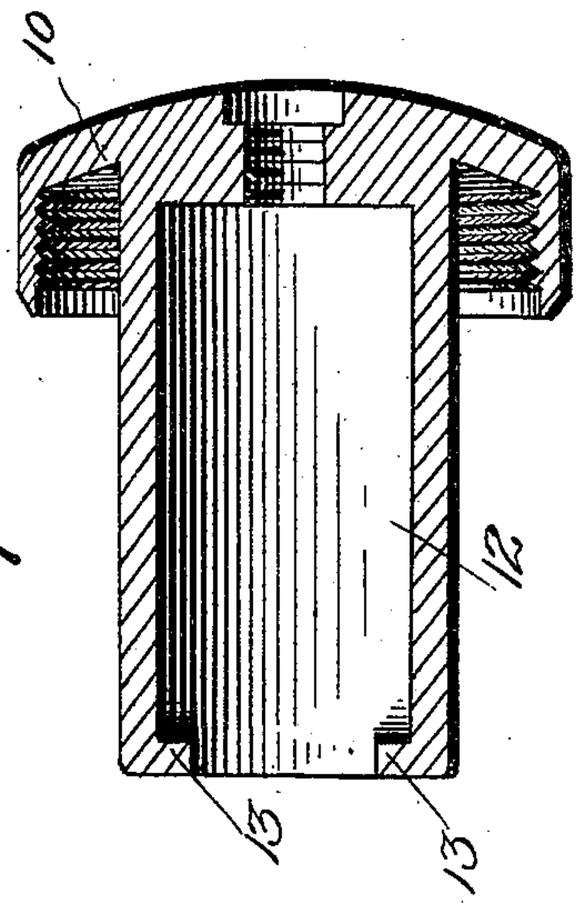
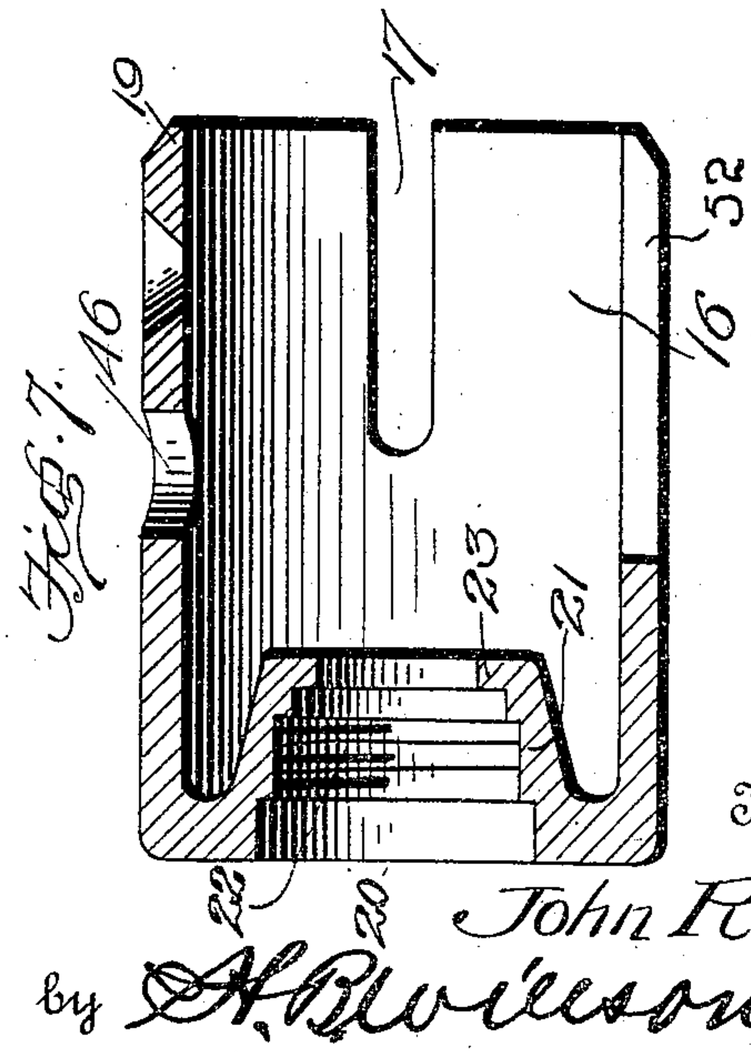


Fig. 7.



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UNITED STATES PATENT OFFICE.

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MICROMETER.

No. 841,271. Specification of Letters Patent. Patented Jan. 15, 1907.

Application filed April 5, 1906. Serial No. 310,170.

To all whom it may concern:

Be it known that I, JOHN RAU, a citizen of the United States, residing at Easton, in the county of Northampton and State of Pennsylvania, have invented certain new and useful Improvements in Micrometers; and I do 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.

This invention relates to improvements in micrometers.

The object of the invention is to provide an inside micrometer for measuring various forms of internal threads, such as internal United States standard threads, V-threads, acme threads, square threads, and bastard threads, in connection with straight, taper, and eccentric work.

A further object is to provide a micrometer of this character by which all varieties of inside or internal measurements may be taken, means being provided whereby the measuring-points from the micrometer may be quickly and accurately adjusted and means whereby the measurements will be accurately indicated simultaneously with the finding of the same.

With the above and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts, as will be hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side view of a micrometer constructed in accordance with the invention. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is a cross-sectional view taken on a line with the measuring-points of the micrometer. Fig. 4 is a similar view taken on the line 4 4 of Fig. 2. Fig. 5 is a similar view on the line 5 5 of Fig. 2. Fig. 6 is a detail side view of the operating-shaft removed from the tool. Fig. 7 is a detail longitudinal sectional view of the casing on the outer end of the tool. Fig. 8 is a similar view of the operating-cap. Fig. 9 is a side view, partly in section, of the bearing-pin removed from the tool; and Fig. 10 is a detail view of the adjustable point-holding post and point, showing the longitudinal groove therein.

Referring more particularly to the drawings, 1 denotes the micrometer, which consists of an outer tubular cylindrical body portion 2, provided on one end with a series of exterior screw-threads 3, at the inner end of which, on one side of the cylinder 2, is arranged an indicating-scale 4 and near the opposite end of the cylinder is arranged an indicating-scale 5. On the threaded outer end of the cylinder 2 is screwed an operating-barrel 6, said barrel being provided on its inner end with a beveled edge 7, on which is inscribed a scale 8. The outer end of the barrel is exteriorly threaded, as at 9, to receive the interiorly-threaded cap 10. Said cap has projecting therefrom and integrally formed therewith a concentrically-arranged socket 12, said socket being provided adjacent to its inner open end with oppositely-disposed inwardly-projecting lugs 13. In the outer end of the cap is adapted to be screwed a handle 14, said handle and the outer cylindrical surface of the cap being serrated or roughened, as shown at 15, by means of which the cap and the barrel 6 connected thereto may be readily revolved.

On the outer end of the tubular cylinder 2 is adjustably mounted a casing 16, said casing being provided at diametrically opposite points with slots or recesses 17, which extend inwardly a suitable distance from the inner edge of the casing, as shown. Through the slots 17 and into the adjacent wall of the cylinder 2 are screwed clamping-bolts 18, by means of which the casing is adjustably secured upon the outer end of the cylinder. The inner edge of the casing is beveled, as shown at 19, and is adapted to coact with the scale 5 on the cylinder 2 in taking measurements of eccentric work. The outer end of the casing 16 is provided with a centrally-disposed opening 20, around which is formed an inwardly-projecting annular flange 21. Said flange is provided for a portion of its distance with interior threads 22 and at its inner end is provided with an inwardly-projecting flange 23. Arranged in the casing 16 is a concentrically-disposed pin 24, on the outer end of which is formed an annular head 25, adapted to be seated in the inner end of the flange 21 and bears against the flange 23, formed on the latter. The pin 24 is securely held in place in the flange 21 by means of a threaded plug 26, which is screwed into the threaded portion of the flange 21 and against the head 25 of the pin 24, as shown. The inner end of the pin 24 is provided with a reduced shank 27, adapted to project into a recess or socket 28, formed in the inner end

of an operating-shaft 29, revolubly mounted in the cylinder 2.

The shaft 29 is provided on its outer end with an enlarged head 30, in which is formed the recess 28 to receive the inner end of the pin 24, as described. In one side of the head 30 is formed a threaded hole 31, in which is adapted to be passed a screw 32, on the inner end of which is formed a lug 33, adapted to engage an annular groove 34, formed in the reduced shank 27 of the pin 24, as shown. Formed on the outer end of the head 30 is a beveled gear 35, which is adapted to mesh with a gear 36, mounted upon a bearing-pin 37, which is inserted through an aperture in the casing 16 and an aperture 38 in the cylinder 2. The inner end of the bearing-pin 37 is threaded and adapted to be screwed into engagement with a threaded hole 39, formed in the pin 24. Around the pin 37 in the aperture 38 is arranged a washer 40, by means of which the gear 36 is held in place.

Meshing with the gear 36 is a beveled gear 41, provided with an interiorly-threaded passage 42, with which is engaged a threaded post 43. Said post 43 is adapted to work through a transversely-disposed hole 44, formed in the pin 24, and through an opening 46, formed in the cylinder 2, and the aperture 38 in the casing 16. The post 43 has formed in one side a longitudinally-disposed keyway 47, which is adapted to engage a key 48, formed on the wall of the hole 44, whereby said post is held against rotary movement, but is permitted to slide freely inwardly or outwardly through the holes 38 and 46 of the cylinder 2 and casing 16. Around the post 43 in the aperture 38 is loosely arranged a sleeve or washer 49, by means of which the gear 41 is held in place.

In the outer end of the post 43 is formed a threaded recess 50, in which is adapted to be screwed a measuring-point 51. In the casing 16, diametrically opposite to the post 43 and point 51, is formed a slot 52, which extends through the inner end of the casing, as shown, the inner end of said slot being in line with a threaded aperture 53, formed in the adjacent wall of the cylinder 2. Through the slot 52 is adapted to be inserted a fixed measuring-point 54, having on its inner end a threaded shank 55, adapted to be screwed into the threaded aperture 53 of the cylinder 2, as shown. At diametrically opposite points in the shaft 29, near the outer end of the same, is formed longitudinally-disposed grooves or channels 56, with which are adapted to be engaged the lugs 13, which project inwardly from the inner end of the socket 12, by means of which said shaft is slidably connected to the cap 10 and barrel 8, as will be understood, whereby when said cap and barrel are turned upon the cylinder 2 the shaft 29 will also be revolved, thereby causing the gear 35 on the outer end thereof to turn the gear 36 on the pin 37, said gear being in mesh with the gear 41 to operate the same in one direction or the other, whereby, owing to the threaded engagement of said gear with the post 43, the latter will be caused to move inwardly or outwardly, as will be understood. The post 43 and the measuring-points 51 and 54 are provided with squared recessed portions, with which is adapted to be engaged a suitable wrench, by means of which said parts may be screwed into or out of place. On one side of the cylinder 2 is secured a suitable spirit-level 57, by means of which the position of the tool may be determined.

In using the micrometer for straight taper work the barrel 6 is turned to "zero" of the scale 4, after which the outer end of the micrometer is placed into the bore to be measured, so that the fixed point 54 rests upon the lowest surface of the bore. The outer end of the tool is now elevated until the level 57 indicates that it is in a horizontal position. The barrel 6 and the cap 10 are now revolved to the left, which movement will actuate the shaft 29, which in turn will operate the gears 35, 36, and 41 in the proper direction to screw the post 43 outwardly until the point 51 thereon lightly engages the highest surface of the bore. The movement of the barrel 6 being thus adjusted, the point 51 will cause the scale 8 to indicate in thousands parts of an inch the true diameter of the bore being measured on the graduation-scale 4.

In measuring inside or internal work of a kind where a straight line drawn from point of 51 to point of 54 would not be at right angles with a straight line drawn through the center of cylinder 2—as, for example, in the measurement of threads of all kinds—part 51 would be adjusted accordingly. This is done by loosening screws 18 and drawing the casing 16 and the parts connected thereto, of which 51 is one, outward the desired distance. This distance is measured and indicated on the graduation 5, placed on the outer end of cylinder 2. This done the screws 18 are again tightened and the measuring process proceeded with, as hereinbefore described. In measuring various kinds of work the points 51 and 54 are necessarily changed to correspond with the class of work with which they are to be used. In measuring bores having diameters beyond the reach of the point 51 said point is removed from the post 43 and replaced by a longer point, as will be understood. In measuring United States standard threads or V-threads the points 51 and 54 are ground at an angle of sixty degrees.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention as defined by the appended claims.

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

1. In a micrometer of the character described, the combination with a tubular body portion, of a fixed measuring-point arranged in one end and projecting radially therefrom, an oppositely-disposed, radially-projecting, adjustable measuring-point, an operating-shaft arranged in said tubular body portion, means to turn said shaft, and means actuated by turning thereof to move said adjustable point inwardly or outwardly, substantially as described.

2. In a micrometer of the character described, the combination with a tubular body portion, of a fixed measuring-point arranged in one end and projecting radially therefrom, an oppositely-disposed, radially-projecting, adjustable measuring-point, a revoluble operating-shaft arranged in said tubular body portion, a train of gears actuated by the turning of said shaft, and means operated by said gears to move said adjustable point inwardly or outwardly, substantially as described.

3. In a micrometer of the character described, the combination with a cylindrical tubular body portion, of a revoluble operating-shaft arranged therein, means arranged on one end of said body portion to turn said shaft, a casing arranged on the outer end of said tubular body, a bearing-pin secured in said casing and the adjacent end of said shaft, a fixed measuring-point arranged in one side of said casing, a threaded adjusting-post having on its outer end a removable measuring-point, a beveled gear threaded on said post, an idle gear to engage the gear on said post and a gear on said operating-shaft to engage said idle gear, substantially as described.

4. In a micrometer of the character described, the combination with a cylindrical tubular body portion, of a revoluble operating-shaft arranged therein, means to turn said shaft, a bevel-gear formed on the outer end of the same, a casing adjustably mounted on the outer end of said tubular body, an apertured bearing-pin secured in said casing and the outer end of said shaft, a threaded, measuring-point-adjusting post slidably mounted in the aperture of said bearing-pin, an internally-threaded gear arranged on said post, an idle gear connecting the gear on said post and on said operating-shaft, means to hold said gears in working position on said bearing-pin, a keyway formed in said post to engage a key in the aperture of said bearing-pin, and a fixed measuring-point secured in said casing, diametrically opposite to said adjustable post and pin, substantially as described.

5. In a micrometer of the character described, the combination with a cylindrical tubular body portion, of a revoluble operating-shaft arranged therein, screw-threads formed on the inner end of said tubular body, an internally-threaded adjusting-barrel adapted to be screwed inwardly and outwardly on said tubular body, a cap secured to the outer end of said barrel, a socket formed on said cap and projecting into said barrel to receive the outer end of said shaft, lugs formed on the outer end of said socket to engage grooves formed in the inserted end of the shaft, a fixed measuring-point, an oppositely-disposed, adjustable measuring-point, and means actuated by the turning of said operating-shaft to project and retract said adjustable measuring-point, substantially as described.

6. In a micrometer of the character described, the combination with a cylindrical tubular body portion, of a revolubly-mounted operating-shaft arranged therein, means to turn said shaft, a bevel-gear formed on the outer end of the same, a casing adjustably mounted on the outer end of said tubular body, set-screws to hold said casing in its adjusted positions, a threaded socket formed on the outer end of said casing, a bearing-pin having a head arranged in said socket, a plug adapted to be screwed into said socket to secure said pin, a reduced inner end formed on the latter to engage a recess in the outer end of said operating-shaft, a removably-secured measuring-point, a threaded measuring-point post slidably mounted in an aperture in said bearing-pin, a removable measuring-point arranged in said post, an internally-threaded operating-gear mounted on said post, an idle gear connecting said operating-gear with the gear on said operating-shaft, and a level arranged on the tubular body of the micrometer, substantially as described.

7. In a micrometer of the character described, the combination with a cylindrical tubular body portion having an exteriorly-threaded inner end, of a revoluble, operating-shaft arranged in said tubular body, an operating and indicating barrel and cap having a screw-threaded engagement with the threaded end of said tubular body, means to connect said cap and barrel to said operating-shaft to turn the same, a fixed measuring-point, and an adjustable measuring-point arranged on the outer end of said tubular body, and means actuated by said shaft to move said adjustable measuring-point, substantially as described.

8. In a micrometer of the character described, the combination with a cylindrical tubular body portion having an exteriorly-threaded inner end, of a revoluble, operating-

shaft arranged in said tubular body, an indicating barrel and cap adapted to be screwed onto the threaded end of said tubular body, a socket formed in said cap, said socket having a sliding engagement with the inner walls of said tubular body and adapted to receive the inner end of said shaft, inwardly-projecting lugs formed on the inner wall of said socket to engage longitudinally-disposed grooves or channels in the end of said shaft, whereby the latter is turned when said barrel is screwed in one direction or the other on said tubular body, a fixed measuring-point and an adjustable measuring-point arranged on the outer end of said tubular body, and means actuated by said shaft to move said adjustable measuring-point, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN RAU.

Witnesses:
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CHAS. B. BRUNNER.