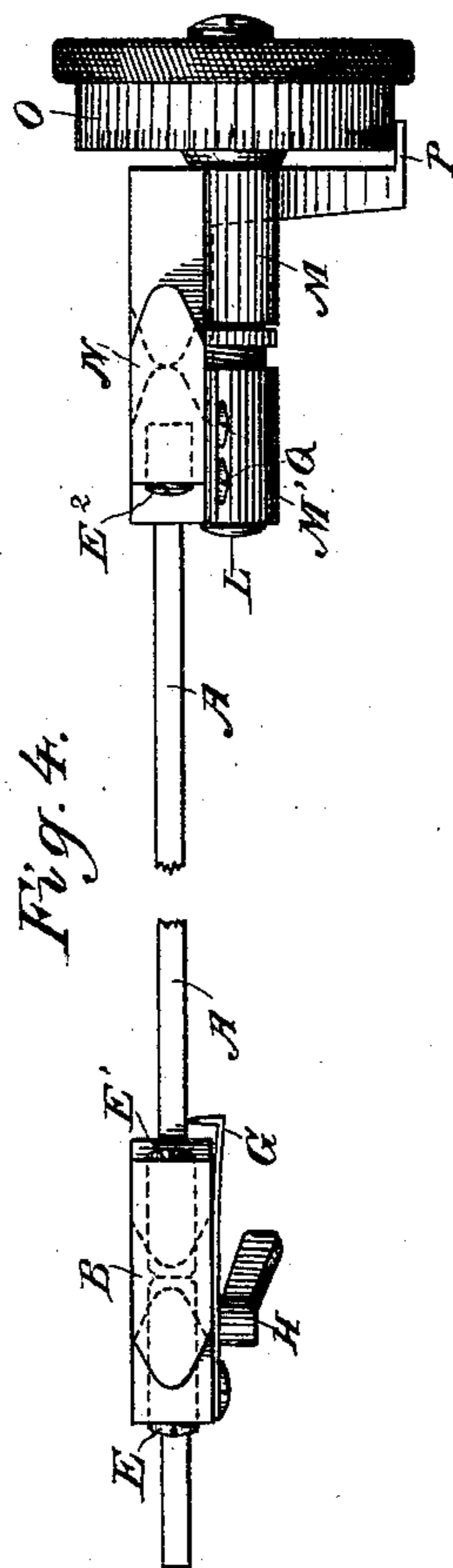
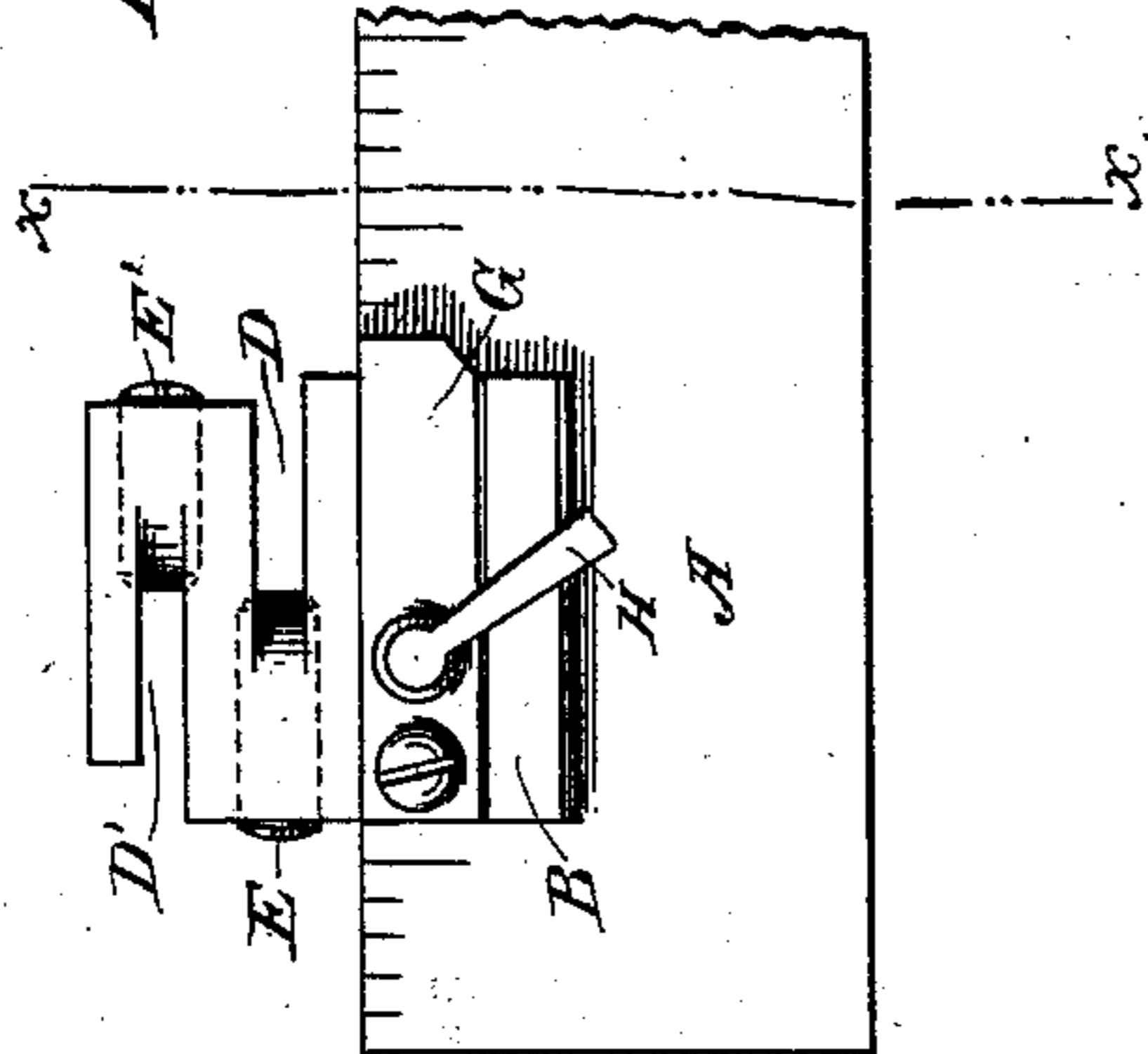
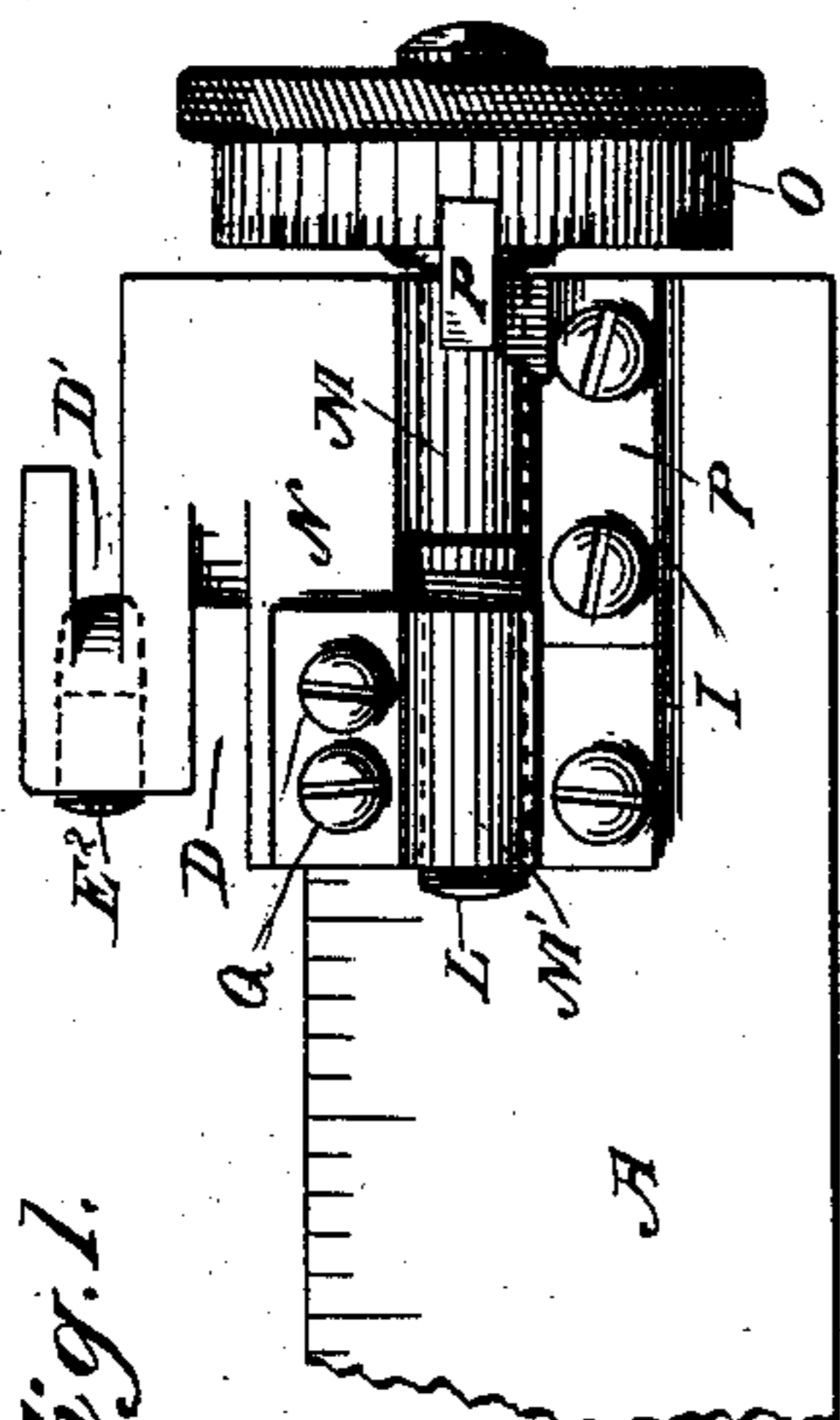
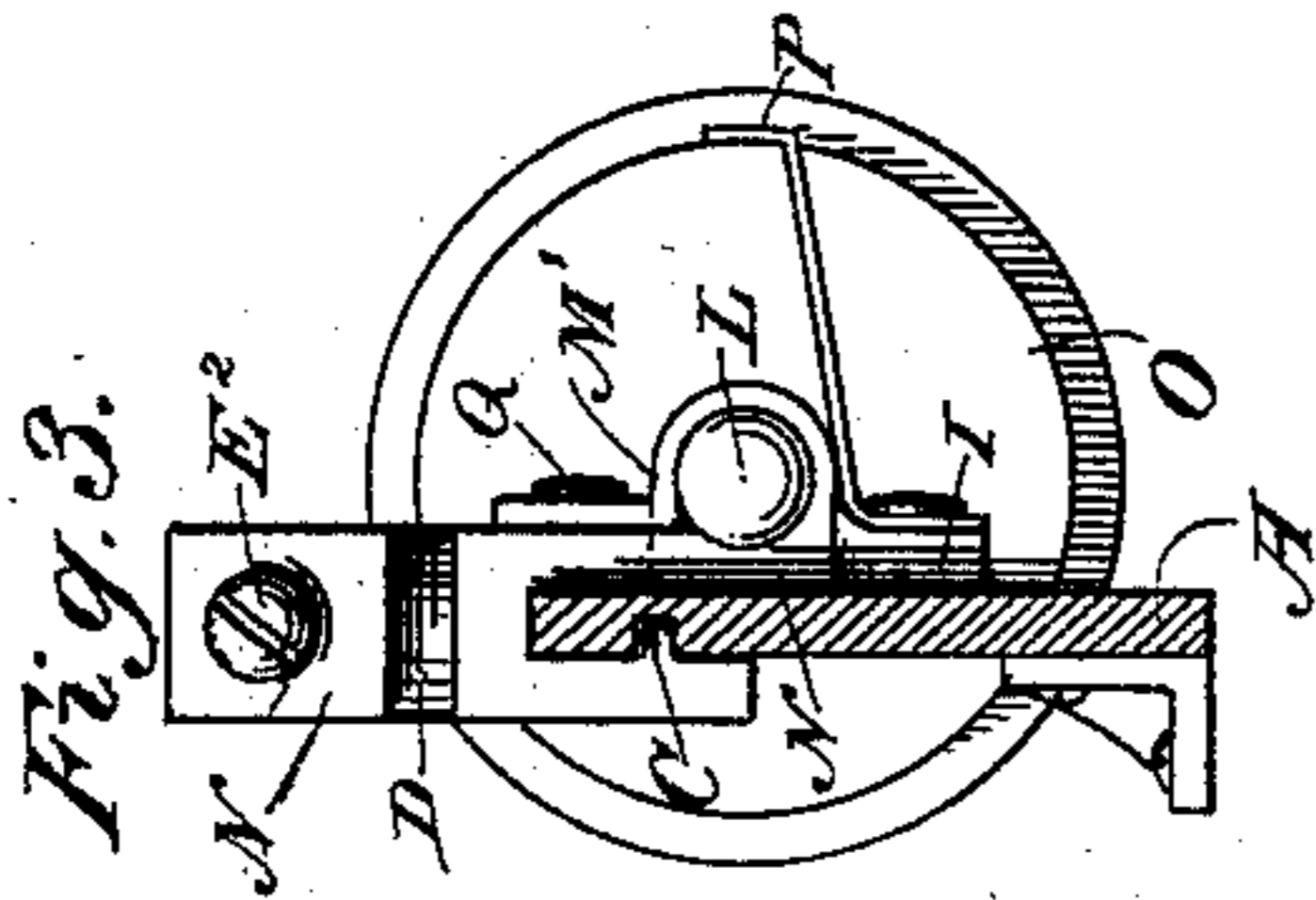


(No Model.)

J. D. BISHOP.
MICROMETER CALIPERS.

No. 389,734.

Patented Sept. 18, 1888.



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UNITED STATES PATENT OFFICE.

JAMES D. BISHOP, OF SAN FRANCISCO, CALIFORNIA.

MICROMETER-CALIPERS.

SPECIFICATION forming part of Letters Patent No. 389,734, dated September 18, 1888.

Application filed April 2, 1888. Serial No. 269,337. (No model.)

To all whom it may concern:

Be it known that I, JAMES D. BISHOP, of the city and county of San Francisco, State of California, have invented an Improvement in
5 Micro-Caliper Tools; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to certain improvements in devices for delicate measurements; and its
10 object is to enable calipers for mechanical use to be adjusted with absolute precision to the smallest variations of measurement.

It consists of a standard steel or metal rule divided to any desired scale, with a movable
15 attachment sliding upon the scale, with grooves and set-screws facing right and left, the faces of the grooves being in the same vertical plane, and a spring-piece bent at right angles with
20 the sliding piece, to which it is attached, so that its edge may sink into any of the divisions of the rule and hold it in place. To the opposite end of the rule is fixed another metal piece, having a movable portion with grooves corresponding to those on the first-named piece, and
25 a micrometer or vernier screw, by which it may be advanced or receded.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a side elevation of the rule broken
30 in the middle and showing the attachments. Fig. 2 is a sectional view of the same on the line $x x$ of Fig. 1, looking toward the left end of the rule. Fig. 3 is a transverse section looking toward the right end. Fig. 4 is a plan view.

35 A is a standard steel or metal rule divided to any desired scale, on the edge of which slides the movable attachment B. A groove, C, is cut in one side of the rule parallel with its edge, and a tongue or feather from the piece
40 B extends into this groove or channel, so that the piece B may slide backward and forward upon the edge of the rule, but cannot move vertically or be taken off therefrom on account of the feather or projection which extends into
45 the slot. On the upper part, above the edge of the rule, are two deep slots or grooves, D D', facing horizontally to the right and left in opposite directions, and having the bottoms of the grooves in the same vertical plane. Adjusting screws E E' extend through the piece
50 B, so that their points lie within the grooves, as shown in Fig. 1, and they serve to adjust

for any wear, so as to keep the bottoms of the grooves in exactly the same plane at all times.

Upon one side of the sliding piece B is a
55 metal spring-piece, G, one end of which is attached to the piece B, and the other end, extending beyond the piece, is bent at right angles and brought to a thin edge, which rests upon
60 the face of the rule, so as to drop into any one of the graduated divisions cut on the rule; and by means of a thumb-screw, H, the edge of the spring may be clamped in any depression or division of the rule which may be desired, the
65 movable piece B being firmly held at the same time. By releasing the thumb-screw the spring lifts out of the division, and the piece B may then be shifted at will to any other point. On the opposite end of the rule is fixed a metal
70 piece, I. A screw-sleeve, M, is fixed to the metal piece I, and the screw L, extending parallel with the face of the rule, turns in this sleeve. The screw has a head, forming a micrometer or vernier, which may be divided to
75 any degree of minuteness—as, for instance, the screw may have twenty threads to the inch and the head may have fifty divisions—so that a movement round its axis through the space of one division of the head will advance the screw
80 one one-thousandth of an inch. Any other subdivisions may be made in like manner, as will be obvious. This screw L turns in a split screw-sleeve, M', fixed to a sliding piece, N, the construction of which is similar to that of the piece
85 B, and it is made to advance or recede, as desired, by the movement of the micrometer-head O, and its movements are measured from a line cut on an independent point, P, fixed to the stationary piece I. The upper part of the
90 movable portion N, which extends above the edge of the rule, has grooves D and D' upon opposite sides, these grooves corresponding in position to the similar grooves D D' upon the part B, before described.

This tool is used as follows: Suppose it is de-
95 sired to set inside calipers for boring a cylinder exactly eight inches. The micrometer-head is set to zero and the movable piece B is set free by loosening the spring G, so that it may slide along the scale until the spring falls into
100 the notch representing the eight-inch division of the rule. The screw H is then turned so as to clamp the movable head B at that point. The calipers are then brought to fit between

the inner face of the groove D' of the part B and the inner face of the groove D' on the part N, which gives the exact size.

The ends of the screws or the bottom of the 5 grooves are slightly rounded in section, so as to permit of the more accurate use of the calipers upon them. If it is desired to turn a plunger to fit closely in the eight-inch cylinder, and it is estimated that the diameter must be 10 three-thousandths of an inch less than that of the cylinder, the micrometer screw is moved through three divisions, and the head-piece N will consequently be moved forward three-thousandths of an inch. The calipers for out- 15 side measurement of the plunger are then brought to fit exactly in the grooves D of the parts N and B in the same manner as has been described for adjusting the inside calipers, and this will give a diameter of eight inches less 20 three-thousandths of an inch.

The micrometer-screw sleeve may be kept tight at all times by tightening up the screws Q, and the wear in the grooves D and D' of the part B, and also of the part N, if desired, may 25 be compensated by advancing the screws E, E', and E'', as before described.

The tool, as above described, is mounted for

support on legs, or, preferably, is fastened to one face of a piece of angle-iron running its whole length, the other face being perforated 30 to receive screws for fixing the whole to a bed or table.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is— 35

1. The rule A, with the sliding piece B, having the grooves or channels D D', and the holding-spring and locking-screw, by which it is secured at any point upon the rule, in combination with the fixed piece at one end of the 40 rule, the piece N, provided with grooves D and D', and the micrometer-screw, by which this piece is advanced and receded, substantially as and for the purpose herein described.

2. The rule A, with the adjustable slides or 45 pieces B and N, having grooves or channels D D', in combination with the compensating-screws E E', substantially as herein described.

In witness whereof I have hereunto set my hand.

JAMES D. BISHOP.

Witnesses:

S. H. NOURSE,

H. C. LEE.