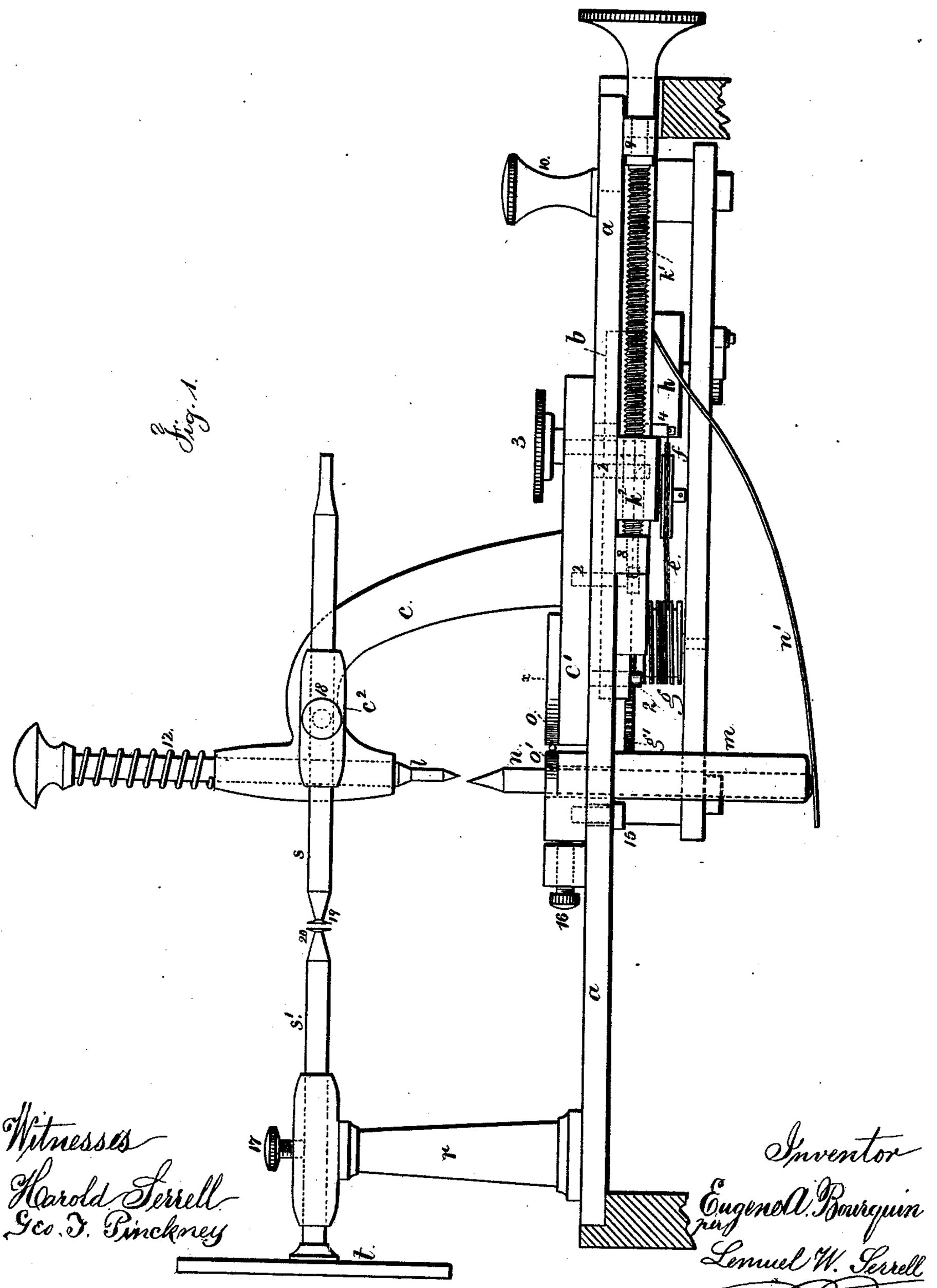
4 Sheets—Sheet 1.

E. A. BOURQUIN.

Micrometer-Gage.

No. 215,041. Patented May 6, 1879.

Fig. 1.



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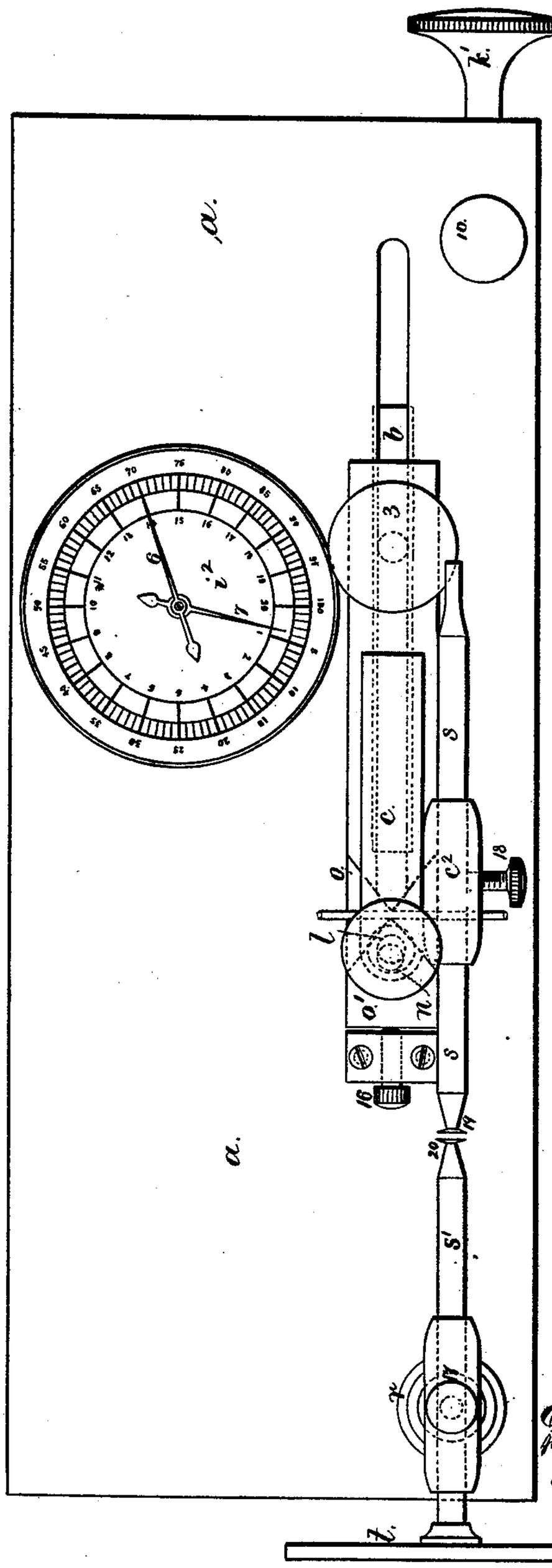

Fig. 2.

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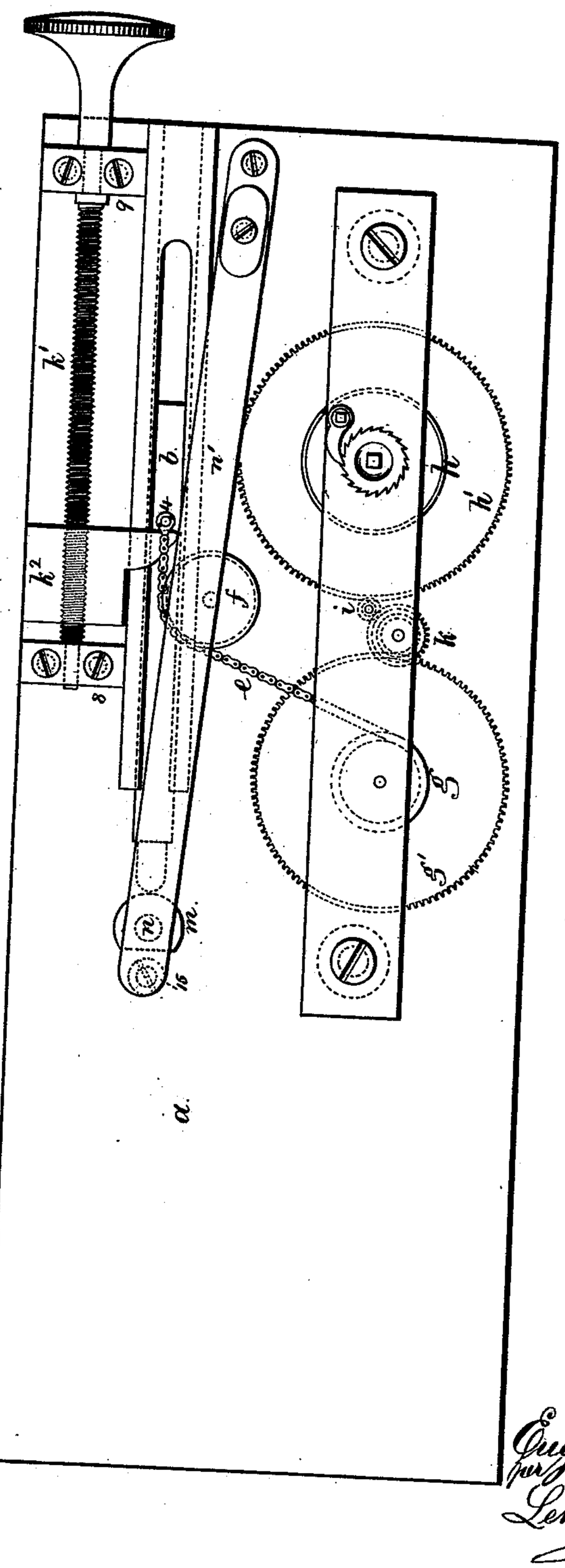

Fig. 3.

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Fig. 4.

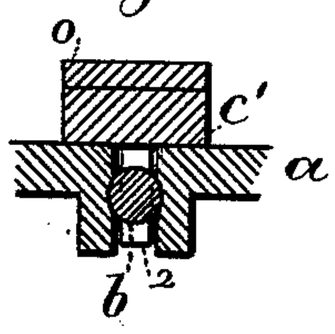

Fig. 5.

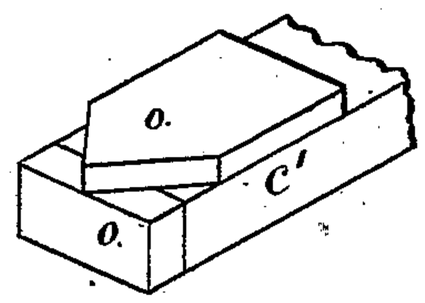

Fig. 6.

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UNITED STATES PATENT OFFICE.

EUGENE A. BOURQUIN, OF NEW YORK, N. Y.

IMPROVEMENT IN MICROMETER-GAGES.

Specification forming part of Letters Patent No. **215,041**, dated May 6, 1879; application filed March 22, 1879.

To all whom it may concern:

Be it known that I, EUGENE A. BOURQUIN, of the city and State of New York, have invented an Improvement in Micrometers, of which the following is a specification.

I denominate my device the "Universal Micrometer," as it is adapted to the varying uses of watch-makers, machinists, and others; and by it the diameter of a wire, arbor, pinion-wheel, or similar article can be measured; the distance from one center or pivot to another measured, the width of gear-teeth and the intermediate spaces, the thickness of a watch glass or case, or the convexity of the same, or the thickness of a lens or similar article can be determined; gearing can be mounted, and the distance between centers measured; and the micrometer becomes a very delicate depthing-tool, and the distance can be marked by the micrometer on a plate as well as being denoted in figures.

In the drawings, Figure 1 is a side elevation. Fig. 2 is a plan. Fig. 3 is an inverted plan, and Fig. 4 is a section at the line *x x*. Fig. 5 is a perspective view of the face of the micrometer gage-bar, and Fig. 6 is a plan view of the depthing-tool applied in this micrometer.

The bed *a* is slotted longitudinally, and the sides of the slot are recessed, so as to receive the parallel circular guide-bar *b*, as shown in the section, Fig. 4. This recessing is effected by boring a longitudinal hole, either before or after cutting the slot.

The sliding standard *c* rises above the gage-bar c^1, that is connected with the guide-bar *b* by screws or pins 2 2, and there is a clamping-screw, 3, passing through *c'* into the bar *b*, so that the gage-bar *c'* can be clamped to the bed at any place to which it may be drawn or moved back. There is a stud, 4, projecting down from this slide c^1, and passing through the guide-bar *b*, to which a chain, *e*, similar to a watch-fusee chain, is attached, and it passes around a guide-roller, *f*, and the other end is fastened to a barrel, *g*.

The spring-barrel *h* and gear-wheel *h'* are of any suitable construction, and the gear-wheel *h'* drives the pinion *i* and the arbor that carries the hand 6 of the dial i^2, and said pinion *i* also gears to the intermediate *k*, one wheel of which gears into the teeth of the wheel *g'* upon the barrel *g*.

The spring in the barrel *h* tends to draw upon the chain, and acting through the wheel of the hand always keeps the teeth of the wheels in contact in one direction, and prevents any false movement of the hand in consequence of looseness in the teeth. Beneath the dial there is gearing that drives the hand 7, so that for every revolution of the hand 6 the hand 7 will make a partial revolution.

The dial represented is adapted to one revolution of the hand 7 to twenty revolutions of the hand 6, and the movement of the micrometer is represented as about two inches; hence the divisions of the dial by the hand 6 indicate each one-thousandth of an inch.

The micrometer-screw k^1 is fixed in position between the bearing-blocks 8 and 9, and it moves the nut k^2, that has an arm at one side that acts against the stud 4, and serves to draw the micrometer gage-bar backwardly; but it does not apply any pressure to the article being measured. The spring in the spring-barrel always applies the pressure of the parts that measure upon the device that is being measured, so that the pressure is uniform.

The micrometer gage-bar c^1 and standard *c* can be drawn back by hand, the stud 10 serving as a stationary grasping-piece for the fingers or thumb, while the other part of the hand acts upon the standard *c*.

I will now describe the measuring-surfaces and devices that are employed in this micrometer.

There is a vertical hole through the head of the standard *c*, adapted to receiving a pointed arbor, *l*, that is raised by a spring, 12.

At the under side of the bed *a* is a post, *m*, with a vertical hole in it that is exactly in line with the hole in the head of the standard *c*, and in this is the centering-arbor *n*. A spring, *n'*, keeps this arbor elevated, but allows it to be depressed.

At the end of the gage-bar c^1 is a hardened steel face-piece, *o*, the bottom portion of which is square, and the upper part is beveled at the sides to form a **V**, as seen in the perspective view, Fig. 5. The point of the **V** is exactly in line with the other portion of the face of the piece *o*.

A similar face-piece, o', is fastened upon the bed a by the screw 15, and it is adjustable endwise by the screw 16. This is done so that the face of o' can be brought up to touch o when the center or pointed arbor l is exactly over the center or arbor n.

It will now be evident that any article, such as an arbor, a wheel, a pinion, or any other article to be measured externally, can be placed between the faces of o and o', and measured with the greatest accuracy, and at the same time the distances between the centering-arbors l and n will be indicated by the micrometer dial with equal accuracy, and hence that measurements can be taken between one hole and another on a watch-plate, or marks can be made by the centering-arbors upon any plate to conform to a predetermined measure by the micrometer-dial, or many other measures or marks made that will be apparent to watchmakers or mechanics.

Upon the plate a there is a fixed standard, r, and in this is a hole that is horizontal, and exactly in line with a hole in the projection c^2 at the side of the standard c, and there are clamping-screws 17 and 18, by which the gage-rods s s' can be clamped. One end of s is is pointed; the other has feather-edged disk 19. One end of s' has a similar feather-edged disk, 20, at one end and a large disk, t, at the other end.

Under all circumstances, when the micrometer has been adjusted, the hands are at zero (0) when the faces of o and o' touch; hence, if s is clamped and s' moved up until the end touches s, and s' is also clamped, the micrometer-dial will indicate the distance between s and s' when they are drawn apart; hence the thickness of a watch glass or case can be measured between 19 and 20, or the convexity of a watch glass, case, or lens, or other article can be measured between 19 and t, or the thickness of a gear-tooth can be measured between the feather-edges of 19 and 20, or the width of a space, by first measuring the width of one tooth, then of two teeth and the intervening space, and subtracting the width of the two teeth.

In adapting this instrument to the depthing of teeth, I employ the frames v v', which have central studs 23 and 24, and the heads 25 and 26 have holes through them, that are adapted to receive the centers w and w' of the depthing-tools. The parts are to be applied as shown in Fig. 6, with the stud 23 introduced into the hole in standard r, and the stud 24 is introduced into the hole in the part c^2, and the standard c is moved up until the faces of the micrometer touch each other. Then the frames v v' are moved until the holes in 25 and 26 are exactly in line. The standard c is then drawn back and the depthing-tool centers are introduced into their respective heads, and the pinion and wheels to be depthed are supported in the manner usual in depthing-tools, and the standard c is allowed to move by the action of the micrometer-screws until the teeth work into each other in the proper manner.

The dial shows the exact distance between the arbors. This can be noted down for a standard between wheels and pinions of a certain size; or else the watch-plate can be applied upon the micrometer with the center n in the hole already made, and then the position for the next center can be marked by the point l.

The jaws on the frame v' are movable, and can be set in and out and clamped. This allows of the jaws being brought near enough together to pass in between the frames v and placing the parts in line before introducing the wheels and pinions y and y'. After the adjustment has been made, these jaws may be moved away from each other again.

By these features of improvement the micrometer is adapted to the various uses of watch-makers, machinists, and others.

In some instances I find it best to place the mainspring in the chain-barrel g, so as to apply the power directly to the chain and the micrometer-slide to close the same upon the article to be measured. In this case a weaker spring will be applied in the spring-barrel h, so as to keep the gear-teeth of the hands firmly together in one direction, and prevent looseness or play to the hands.

I claim as my invention—

1. The combination, with the micrometer-slide and indicating-dial, of the chain e, pulley f, chain-barrel, and mainspring, substantially as set forth.

2. The combination, with the micrometer-slide, of the cylindrical guide-bar b, moving within a longitudinal circular hole in the bed a, and connected with the slide c^1 and standard c, substantially as set forth.

3. In a micrometer, the measuring-faces, made with a portion flat and the other portion V-shaped, and having the end of the V on the line of the flat faces, substantially as set forth.

4. In a micrometer, the combination, with an indicating-dial, of centering-points, moving toward each other from opposite directions, and adapted to measuring and marking, substantially as set forth.

5. The centering-point n, sliding in the portion of the bed, and acted upon by the spring n', in combination with the micrometer-slide c^1, standard c, centering-point l, and indicating-dial, substantially as set forth.

6. The combination, with the micrometer, of the gage-rods s s' and disk t, substantially as set forth.

7. The combination, with the micrometer, of the depthing-tools, substantially as set forth.

Signed by me this 18th day of March, A. D. 1879.

EUGENE A. BOURQUIN.

Witnesses:

WILLIAM G. MOTT,

GEO. T. PINCKNEY.