(No Model.)

E. CLARK.

MICROMETER GAGE FOR WATCH MAKERS.

No. 331,116. Patented Nov. 24, 1885.

Fig. 1.

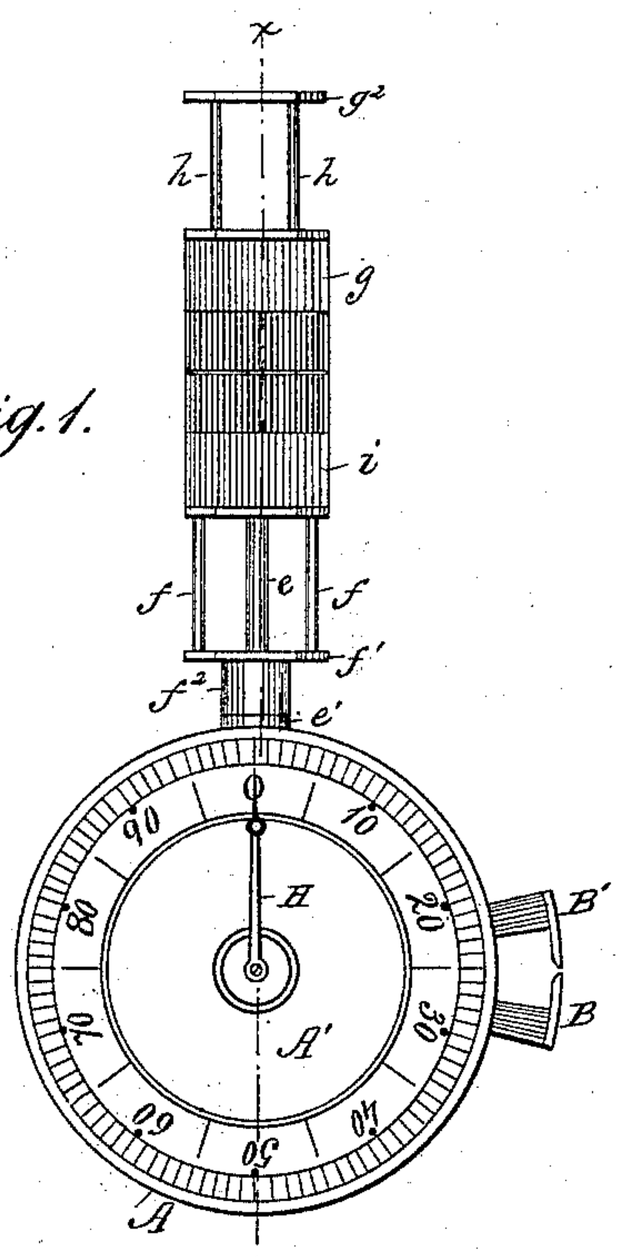


Fig. 2.

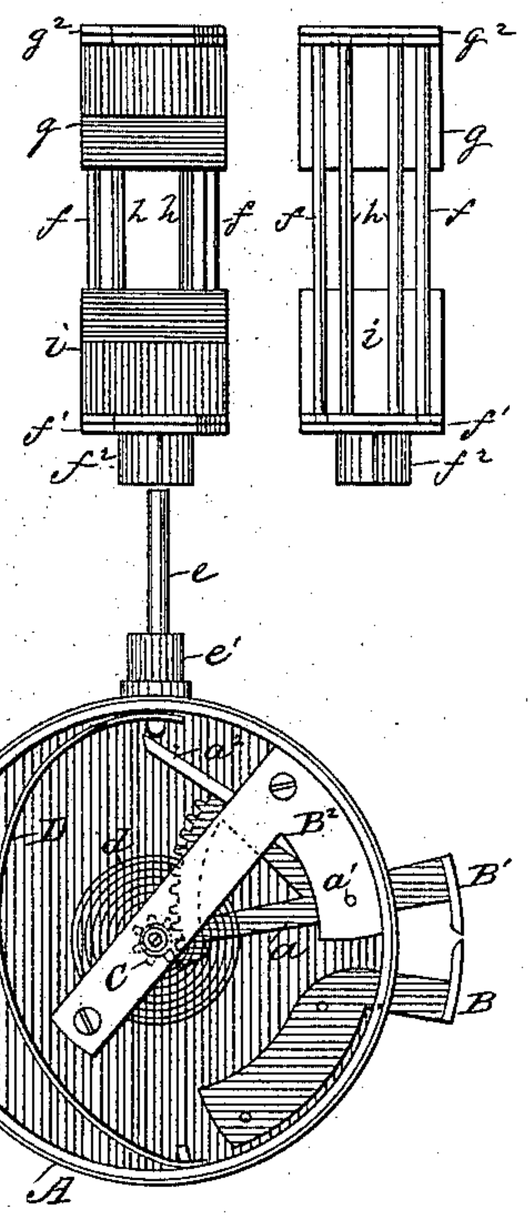
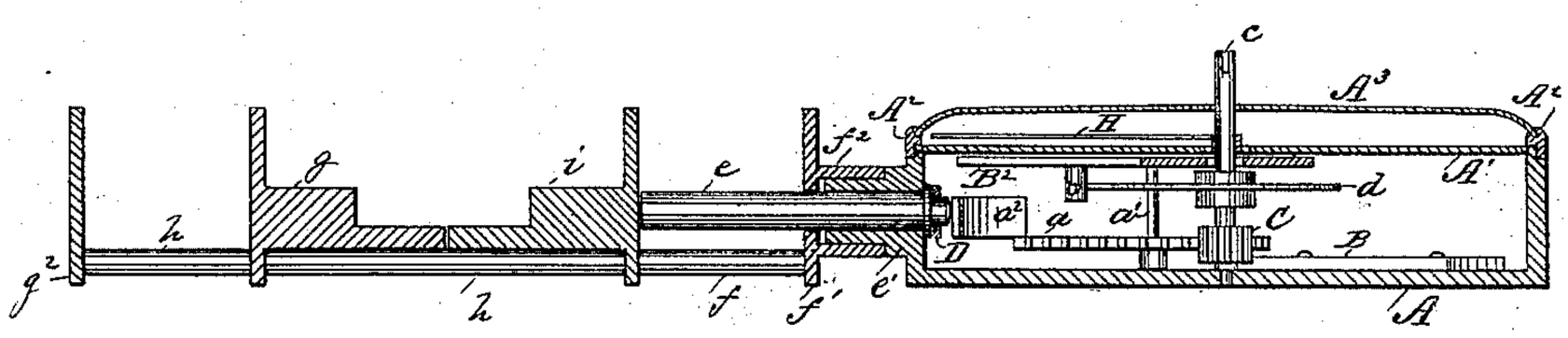


Fig. 3.



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MICROMETER-GAGE FOR WATCH-MAKERS.

SPECIFICATION forming part of Letters Patent No. 331,116, dated November 24, 1885.

Application filed April 23, 1884. Serial No. 129,010. (No model.)

To all whom it may concern:

Be it known that I, ELIJAH CLARK, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Micrometer-Gages, of which the following is a description.

Figure 1 is a face view of my improved micrometer-gage. Fig. 2 is a similar view with the dial-plate and hand removed, and with the step-block mechanism removed from stem *e* and illustrated in a front and back detached view. Fig. 3 is a longitudinal section through the line *x x* of Fig. 1 on a larger scale.

The object of my invention is to provide an improved comparative micrometer-gage for the use of watch-makers and others in measuring and comparing their work; and it consists in the peculiar construction and arrangement of parts, as hereinafter fully described.

In the drawings, A represent a circular case, of any suitable material, in the top of which and inclosed is a disk or dial, A′, divided and graduated to any number of degrees. The upper portion of this case is a cap, the ring A^2 of which is fitted with a glass, A^3, through which can be seen the graduated disk. Projecting beyond the rim of the case are two jaws, B and B′, one of which, B, is permanently fastened to the inside of the back of the case by rivet, screw, or otherwise. The other, B′, carries at its inner extremity a sector, *a*, of a toothed wheel, which sector works on an arbor, *a′*, with pivots moving freely in a circular hole through the back of the case, and a corresponding hole through a bridge or frame, B^2, fastened at a suitable distance from and parallel with the back of the case. This sector *a* also carries with it an arm, a^2, extending on one side beyond the teeth of the sector.

C is a pinion meshing in the teeth of the sector and moved by it, having one end of its shaft moving freely through a hole in the back of the case and the other end protruding through the bridge or frame and the graduated disk, and also through the glass. At this extremity a slot, *c*, Fig. 3, is made, so formed that the inner end of the coil of a hair-spring can be inserted and removed with facility in testing the tension of different hair-springs, as hereinafter described. Connected with the axis of the pinion is the inner end of a delicate hair-spring, *d*, the outer end of which is affixed to a post or stud on the bridge B^2.

D is a thin metallic spring of suitable length running around inside a portion of the rim of the case, with a hole or slot near each of its ends for the purpose of fastening, as follows: At one end by means of a pin or screw on the rim of the case, while at the other extremity the inner end of a push-pin, *e*, works freely in the hole or slot. The push-pin *e* works freely through a tube, *e′*, projecting beyond the outside of the rim of the case, the inner extremity of which pin has a head and shoulder, the former fitting into the hole or slot at the extremity of the metallic spring D, the latter (the shoulder) preventing the push-pin from being withdrawn through the tube *e′*. This push-pin and end of metallic spring rest upon the end of the arm a^2 projecting beyond the toothed sector, and by this pin moving rectilinearly through the tube the sector is moved laterally, which motion is communicated to the pinion C, whose shaft carries a rigid index-hand, H, above the graduated disk. It will thus be seen that when the push-pin is pressed in the motion is conveyed by means of the toothed sector to the pinion, and shows the relative amplified movement in degrees upon the graduated disk by the index-hand.

To the tube *e′*, projecting beyond the rim of the case on the outside, a set of gage step-blocks is detachably connected, of which the following is a description: There are two metal rods or wires, *f f*, of equal length running parallel to each other, to the ends of which rods or wires is permanently fastened a metal plate, *f′*, provided with a slitted spring-collet, f^2, for the purpose of attaching to the tube *e′* on the rim of the case. To the other extremity of these two parallel wires is attached a metal block, *g*, with one or more steps fastened to a back and base, through which back and base run two similar wires, *h h*, to the outer extremity of which is attached a plate, g^2, and to the inner end of which is attached a block, *i*, with one or more similar steps with back and base, through which run the two wires first designated, the two latter-named wires moving freely between the two former and parallel to them.

The mode of using the gage is as follows: By pressing the push-pin *e*, extending through

the tube *e'* in the rim of the case, (to which tube is attached the step-block devices,) the rectilinear motion of the pin *e* is communicated to the toothed sector, which has the effect of opening the movable jaw B', of which the sector is a part, and at the same time and with the same pressure the toothed sector communicates its motion by means of the pinion in an amplified degree to the index-hand on the graduated disk, the normal position of the index-hand being at zero. Upon releasing the pressure from the push-pin *e* it is carried back to its position by means of the metallic spring D, and is stopped by the shoulder on it near its extremity inside of the case. The coil hair-spring *d* around the axis of the pinion closes the movable jaw against the stationary one by releasing tension, thus carrying the pinion around, which motion is communicated to the toothed sector, and at the same time and by the same action the index-hand is carried to its normal position. It will thus be seen that anything inserted between the jaws B B' will have the effect of moving the index-hand to a degree-point on the graduated disk, and when withdrawn the index-hand flies back to the zero-point. The action of the step-block devices is thus explained. The pressure of the inner spring, D, keeps the push-pin *e* to its utmost outer extent, and thus keeps the faces of the steps *i* and *g* closed against each other. Pressure on the end g^2 of the instrument forces the block *i* and push-pin inwardly and separates the steps, and by such separation measurements of various sizes—such as diameter of pinions, size of wires, wheels, and widths of mainsprings—will be shown on the graduated disk in an amplified degree by simply placing such objects between the steps of the two blocks.

The mode of using the hair-spring gage is as follows: Insert the inner end of the coil of a hair-spring into the slot *c*, mentioned as being at the outer extremity of the shaft of the pinion, and when inserted press inwardly the ends of the rods *h h* with the forefinger of the left hand, (which forces in the pin *e*,) holding the thumb immediately opposite on the rim of the gage until the pin *e* is forced inwardly as far as it will go; then with a pair of tweezers grasp any place in the coil of the hair-spring and hold the point of the tweezers down to the glass over the graduated disk. Upon releasing the pressure of the forefinger of the left hand from the instrument the index-hand will fly back and remain stationary at the number of degrees of tension of the spring to be tested. Measurements of lengths of staffs and pinions from shoulder to ends can also be accomplished by detaching the split collet f^2 from tube *e'*, thus leaving the push-pin projecting beyond the rim of the case. Place the shoulder of the article to be measured on the head of the push-pin, the portion to be measured running parallel with the pin, and upon pressing the pin the length will be indicated by the index-hand when the end of the article to be measured touches the shoulder of the tube *e'*, through which the push-pin moves.

Having thus described my invention, what I claim as new is—

1. The combination of the case, the fixed jaw B, movable jaw B', having toothed sector *a*, the disconnected and rectilinearly-sliding pin *e*, adapted to bear against a part of the sector, the pinion C with center-shaft, a spring for closing the movable jaw, and an index-hand, as and for the purpose described.

2. The combination, with the dial-plate and index-hand, of the center-shaft having slot *c* at its outer end to receive a hair-spring, means for rotating the shaft in one direction by hand, and a spring for rotating it in the other direction, whereby the relative tensions of different hair-springs may be tested and compared, as set forth.

3. The combination, with the sector *a*, the dial and index-hand, and mechanism for adjusting the latter, of the push-pin *e*, spring D, and detachable gage-step blocks for pushing the pin *e* in by the separation of the blocks, as described.

4. The gage-step blocks *g* and *i*, combined with the parallel rods *h h* and *f f*, with plates upon the ends thereof, the split collet f^2, and the micrometer case and mechanism, substantially as described.

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