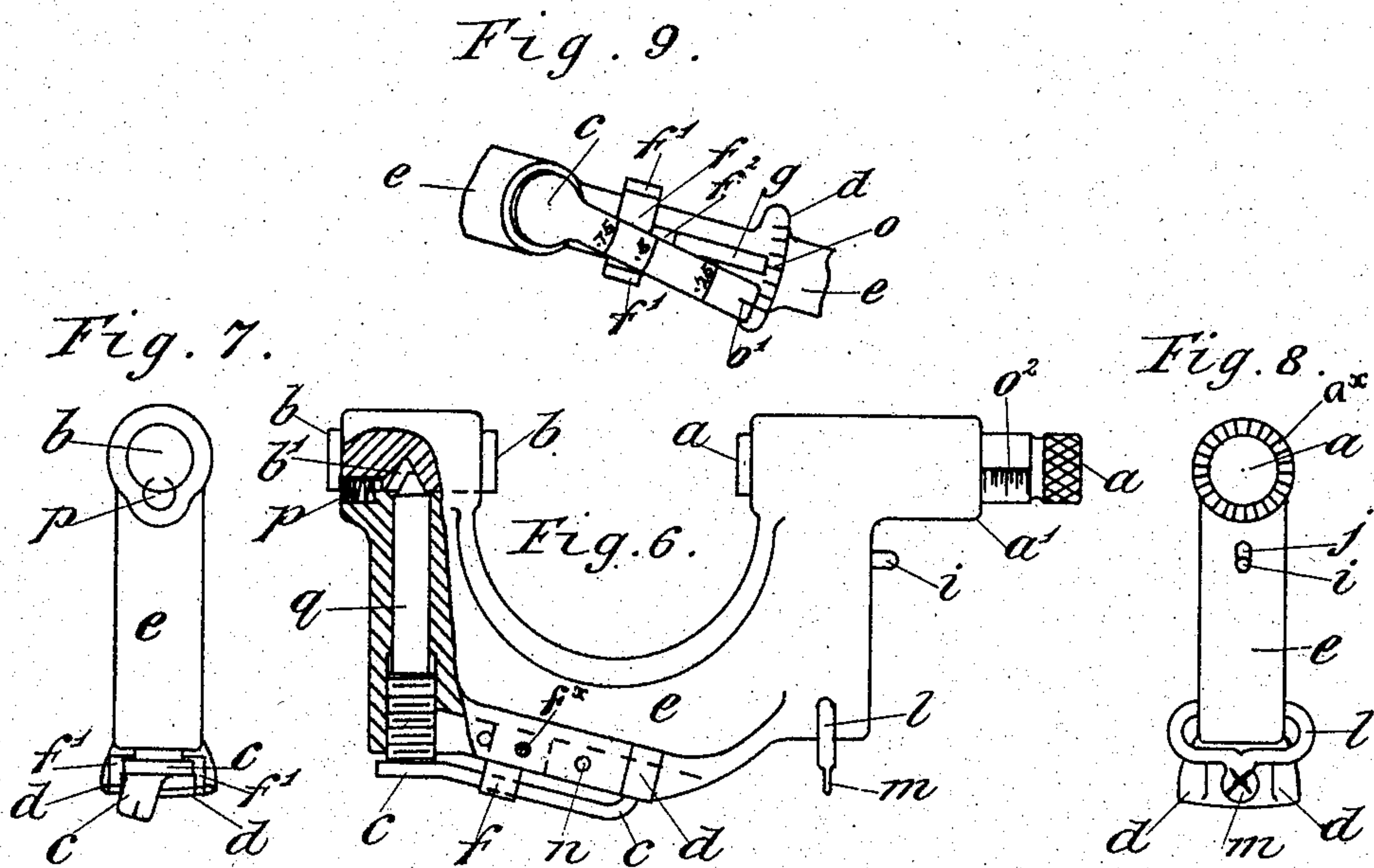
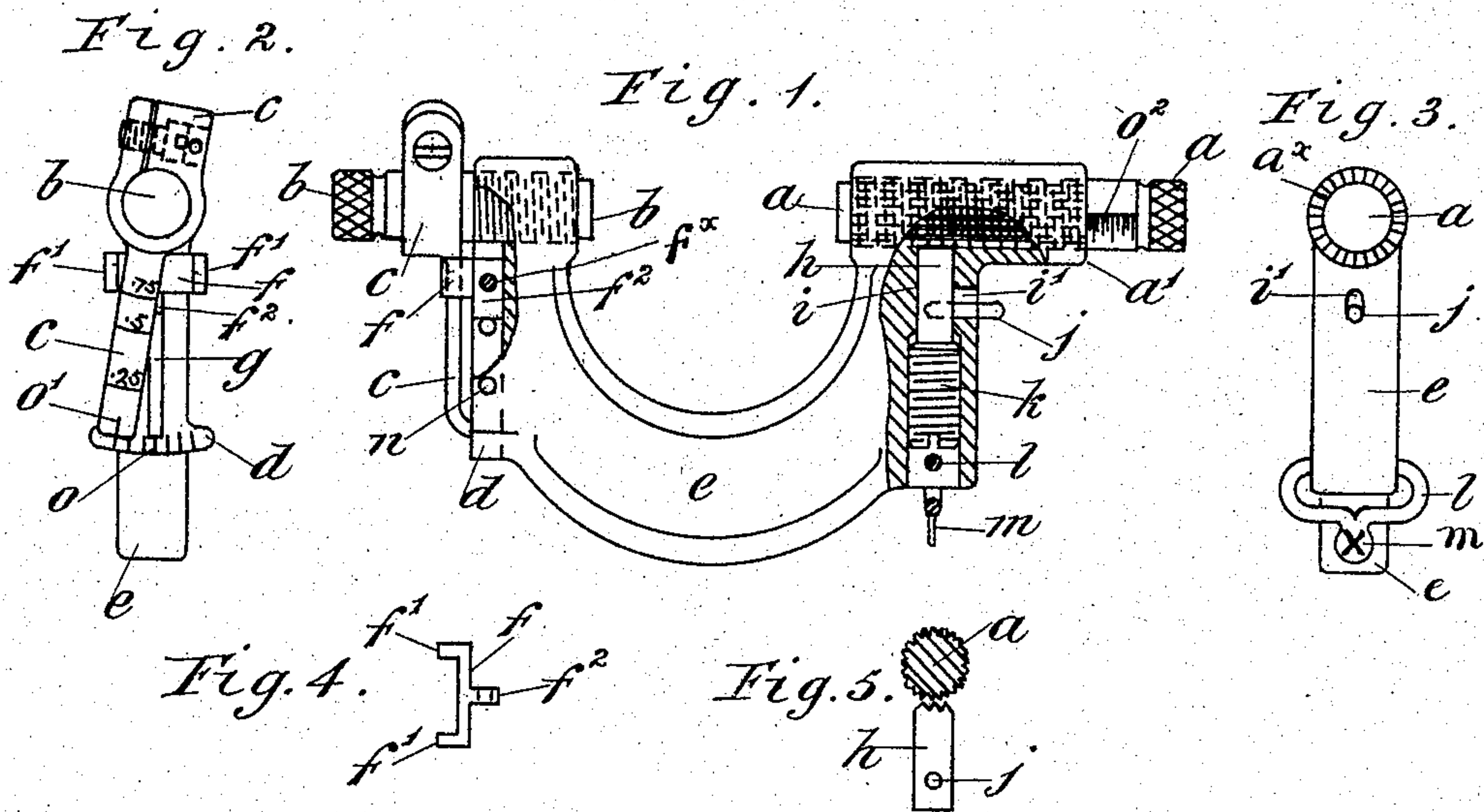


T. HUMPAGE.
ADJUSTABLE LIMIT OR OTHER GAGE.

APPLICATION FILED JULY 3, 1903.

2 SHEETS—SHEET 1.



Witnesses.

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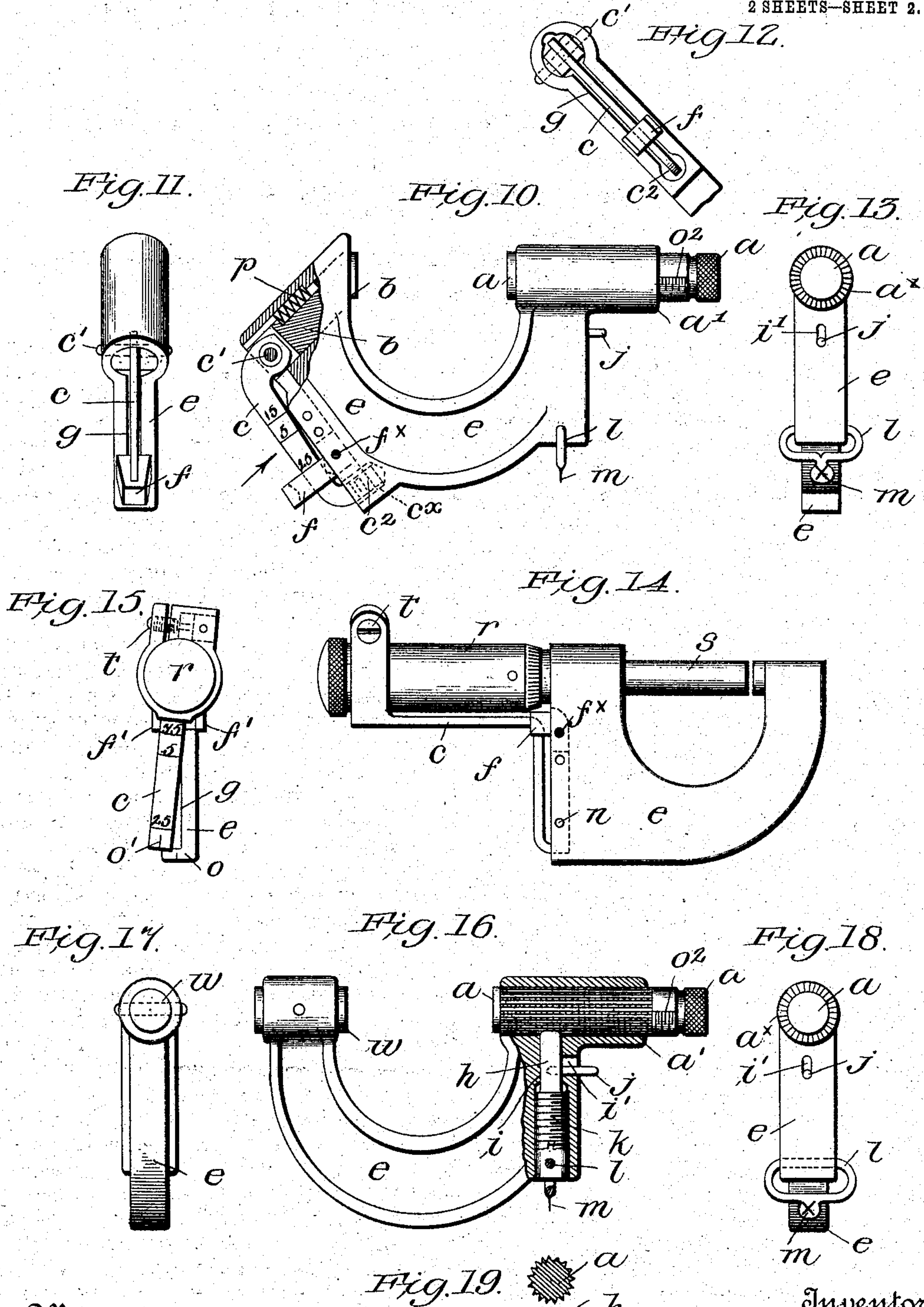
No. 781,524.

PATENTED JAN. 31, 1905.

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

THOMAS HUMPAGE, OF BRISTOL, ENGLAND.

ADJUSTABLE LIMIT OR OTHER GAGE.

SPECIFICATION forming part of Letters Patent No. 781,524, dated January 31, 1905.

Application filed July 8, 1903. Serial No. 164,155.

To all whom it may concern:

Be it known that I, THOMAS HUMPAGE, a subject of the King of Great Britain and Ireland, residing at the city of Bristol, England, have
 5 invented certain new and useful Improvements in Adjustable Limit or other Gages; and I do hereby declare the following to be a full; clear, and exact description of the invention, such as will enable others skilled in the
 10 art to which it appertains to make and use the same.

This invention relates to adjustable limit and other gages and the like.

Referring to the accompanying drawings,
 15 Figure 1 is a side elevation, partly sectional, of an adjustable limits-gage as made in accordance with this invention. Fig. 2 is an end view as seen from the anvil end. Fig. 3 is an end view at the outer end of the adjustment-spindle. Fig. 4 is a plan view of the
 20 adjustable sliding stop used in the instrument as hereinafter set forth. Fig. 5 is a vertical section through the adjustment-spindle. Fig. 6 is a view in side elevation, partially broken away; Figs. 7 and 8, end elevations
 25 at opposite ends of the support, and Fig. 9 a bottom plan fragmentary view of a modified construction. Fig. 10 is a view in side elevation, partially broken away, of another modified
 30 construction; Fig. 11, an end elevation of the anvil end of the support; Fig. 12, a face view looking in the direction of the arrow; and Fig. 13, an end elevation of the opposite
 35 end of support respectively of the modification illustrated in Fig. 10; Fig. 14, a view in side elevation of a micrometer-gage with the construction of limits-lever shown in Figs. 1
 40 and 2 applied thereto; Fig. 15, an end elevation of same; and Figs. 16, 17, 18, and 19 are views respectively similar to Figs. 1, 2, 3, and 5, showing the application of my improved locking arrangement for the adjustment-spindle as applied to a gage with a fixed
 45 anvil.

In the construction of the instrument illustrated in Figs. 1 to 5 both the adjustment-spindle a for adjusting to standard-bar lengths and the anvil b for setting to the limits of in-
 50 accuracy are screw-threaded. On the outer end of the anvil b is clamped a lever c , which

may conveniently be termed the "limits-lever." The limits-lever c , which is preferably graduated, as shown, extends to a quadrant d , formed on or attached to the frame e of the instrument. An adjustable sliding stop f , having lugs f' on each side of a central tongue f'' , determines the range of the limits-lever c laterally on either side of a zero line or mark o , Fig. 2, borne midway on the quadrant d . The extent of lateral range of the
 55 limits-lever c varies with the position of the slide f , the tongue f'' of which rides in a groove g , Fig. 2, in the instrument-frame e . The range of lateral movement of the limits-lever c decreases as the slide f is moved farther
 60 away from the anvil b . In using the gage the center line o' of the limits-lever c is brought to coincide with the zero-line o of the quadrant d . Adjustment is then made to a standard bar, which is of length nearest the dimension to be worked to. This adjustment is effected, as ordinarily, by turning the adjustment-spindle a , and the further adjustment from the standard-length bar to required dimension to be worked to is also made, as ordinarily, by turning the spindle a to the requisite extent, guidance in this respect being afforded by the zero-line o' on the spindle a and the graduations a'' on the outer face of the spindle-socket a' . The gage is under this invention fitted with means for locking the spindle a
 70 after adjustment aforesaid has been made. Also a sealing or supplementary locking device is provided and is so arranged as to necessitate fracture or unfastening of the said device before the spindle a can be unlocked. The sealing or supplementary locking device serves as a "telltale" in event of tampering after adjustment. These locking arrangements are hereinafter described. The adjustments above set forth having been made, the limits-lever c is next moved until its center line o' coincides at one side of the zero-line o of the quadrant d with the graduation on the quadrant which corresponds to the predetermined
 75 limit of end motion allowed in one direction to the anvil b . The anvil b is thus turned to the extent which gives the requisite degree of end movement in one direction. The graduations of the quadrant d relate on one side of
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 85
 90
 95
 100

the zero-line *o* of the quadrant to the limit of maximum. On the other side of the said zero-line *o* the graduations relate to the limit of minimum. Accordingly, the lever *c* being
 5 set for limit in one direction, the corresponding limit in the opposite direction is also thereby fixed. The limits having been fixed, the slide *f* at the anvil end of the instrument is next adjusted in the frame *e* to meet the
 10 lever *c*, moved to the limit graduation of the quadrant *d*, as aforesaid. If the lever *c* be graduated, as is the case in the example shown in the drawings, the graduation thereon corresponding to the limit graduations of the
 15 quadrant *d* will coincide with an assigned part of the slide *f*, as seen at Fig. 2, in which the graduation ".75" of the lever *c*, which agrees in value with the graduations on the quadrant *d* at which the center line *o'* of the
 20 lever stands, coincides with the inner corner of one of the lugs *f'* of the sliding stop *f*. The numerals on the graduation of the lever *c* express decimal-fractions of a thousandth part of an inch, and the reading signifies the
 25 extent of end movement of the anvil *b*. The unit is not necessarily a thousandth part of an inch. It is the unit adopted in the example instrument shown in the drawings. Obviously other units may be adopted. The slide *f* is
 30 next secured in place by a device hereinafter set forth—namely, a lead-wire—so that the limits-lever *c* cannot move at either side beyond the set limits, the slide *f* constituting a stop preventing further movement of the lever.
 35 The form of lock for locking the adjustment-spindle *a* after adjustment thereof consists of a bolt *h*, serrated or dentated at one end. The bolt *h* is contained within a socket *i*, provided in the frame *e* and at right angles to the spindle *a*.
 40 A pin *j*, fixed to the bolt *h*, extends outward to the exterior of the socket *i* through a slot *i'*. The socket *i* is screw-threaded toward its outer end to take a screw-threaded plug *k*. The adjustment-spindle *a* is grooved longitudinally
 45 on its screw-threaded peripheral surface, the grooves being at suitable distances apart. (See more particularly Fig. 5.) During adjustment of the spindle *a* the bolt *h* is drawn back. After adjustment of the spindle *a* the
 50 bolt *h* is, through the medium of the pin *j*, pushed into engagement with the spindle *a*, which is thereby locked. The plug *k* is then screwed up behind the bolt *h*, holding it up in the locking position. The supplementary
 55 lock above referred to is applied behind the plug *k* to prevent its unauthorized removal. The supplementary lock may vary, as any suitable locking means may be employed. The form, shown in the drawings for the purpose of illustration only, is that of a lead-wire
 60 *l*, which after having been passed through the frame *e* and socket *i* and behind the plug *k* has its ends pressed together and impressed with a device, as a seal *m*. The instrument
 65 having been adjusted, set, and locked is ready

for use without further regard or reference on the part of the user to either index. The device for locking the limits-slide *f* obviously may also be any suitable locking means; but for illustration I have shown the locking
 70 means as comprising simply a lead-wire *f''*, (shown in section for clearness,) passed through a hole provided in the tongue *f''*, holes *n* being made also in the frame *e* to take the wire. The lead-wire is passed through
 75 the frame *e* and through the tongue of the slide *f* when they coincide, which they do when the slide *f* is in a desired position, with its indicating-corner coinciding with the required graduation of the limits-lever *c*.
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At Figs. 6, 7, 8, and 9 is shown a modification. In these figures corresponding parts to those in Figs. 1 to 5, inclusive, are indicated by corresponding letters of reference. In this modification the anvil *b* is not screw-
 85 threaded. The adjustment-spindle *a* is, as in the arrangement described with reference to Figs. 1 to 5, inclusive, screw-threaded and grooved. The locking arrangement for locking the adjustment-spindle *a* is precisely similar.
 90 A spring *p*, carried in the frame *e*, tends constantly to force the anvil *b* outward—that is to say, away from the adjustment-spindle *a*—which latter is arranged and fitted as in the arrangement above described with
 95 reference to Figs. 1 to 5, inclusive. A conical cavity *b'* is provided in the anvil *b*, and this cavity *b'* receives the conical end of a spindle *q*, which is set at a right angle to the anvil *b* and which toward the other end is
 100 screw-threaded and has attached to it the limits-lever *c*, corresponding to the limits-lever in the arrangement first above described. The limits-lever is controlled by a similar sliding stop *f*, adapted to be locked to the
 105 frame *e* in a similar manner. End movement inwardly of the anvil *b* toward the adjustment-spindle *a* is obtained by moving the limits-lever *c* so as to cause the conical end of the spindle *q* to enter farther into the cavity
 110 *b'* in the anvil *b*, and so to force the anvil *b* forward to the extent required. A graduated quadrant *d* is provided on the frame *e*, as seen more particularly at Fig. 9, which represents an under side plan view, as seen
 115 from below. The graduations of the quadrant correspond to a certain degree of end movement of the anvil *b*.

At Figs. 10, 11, 12, and 13 is illustrated a further modification. In this modification the
 120 anvil *b* is angularly shaped and is disposed at an inclination in its socket in the frame. It is acted upon by a spring *p*, let into it and into the frame, the said spring *p* constantly tending to retire the anvil *b*. The limits-lever
 125 *c* has a fulcrum on the pin *e'*, fitted in the frame *e*. The inner face of the limits-lever *c* bears against the rear of the anvil *b*. End movement of the anvil *b* inwardly is obtained by tilting the lever *c* on its fulcrum *e'*, so as to
 130

force the anvil forward against the resistance of the spring p . The limits-lever c has a toe c^2 , which takes into a socket c^x in the frame e . The toe c^2 of the limits-lever c bears the graduations for the limits of inaccuracy, the disposition of the graduations o and the index or center line o' on the quadrant d and lever c , respectively, being the reverse of that heretofore described, inasmuch as the toe c^2 bears the graduations and coöperates with the end surface of the support adjacent the socket c^x , which in this construction subserves the index or center line o' . This answers to the quadrant employed in the arrangements previously described. The sliding stop f is modified to provide for the inward-and-outward or forward-and-backward movement of the lever c , as distinguished from the lateral or sidewise movement of the corresponding lever in the two arrangements first above described.

As applied to micrometer-gages, this invention combines therewith a limits-lever and stop for setting and for fixing the limits of inaccuracy, thus adapting a micrometer-gage to serve as an adjustable limit-gage. According to one arrangement, (illustrated at Figs. 14 and 15 of the drawings,) the limits-lever c is adapted to be clamped on the thimble r , by which adjustment to standard lengths is, as ordinarily, made through the spindle s . The limits-lever c has a range of adjustment sidewise between the lugs f' of the sliding stop f , by which, as in the arrangements above described, the limits of inaccuracy are fixed after the stop f has been adjusted and locked. While adjustment is being made to standard lengths the clamping-screw t of the limits-lever c is loosened, giving freedom for rotation of the thimble r . After adjustment to standard lengths has been made the limits-lever c is set with its zero-line o' coinciding with the zero-line o on the frame e . The clamping-screw t is next tightened up. The stop f is next adjusted to the determined limits of inaccuracy and is then locked. The instrument is then ready for use as an adjustable limits-gage.

Figs. 16 to 19, inclusive, illustrate an arrangement combining an adjustment-spindle a and locking devices, as shown at the adjustment-spindle ends in Figs. 1, 3, 6, and 8, with a fixed anvil w . Like letters of reference in Figs. 16 to 19, inclusive, indicate like parts in Figs. 1, 3, 6, and 8. The instrument as thus arranged is a gage which can be locked in variable positions, each of such positions giving a fixed gage.

What I claim is—

1. In devices of the character described, the combination with a substantially solid support, of a pair of opposed members suitably carried by said support, one of said members being bodily movable relatively to the other member, angularly-movable indicating means operatively associated and in direct contact

with said bodily-movable member, said angularly-movable means being at all times free to swing, and a stop adjustable along said indicating means for limiting the degree of swing of said angularly-movable means.

2. In devices of the character described, the combination with a support, of a pair of opposed members suitably carried by said support, one of said members being bodily movable relatively to the other member, angularly-movable means operatively associated with said bodily-movable member for limiting the latter's movement, a radially-adjustable stop mounted on said support for limiting the movement of said angularly-movable means, and means for locking said stop in its adjusted position.

3. In devices of the character described, the combination with a support, of a pair of opposed members suitably carried by said support, one of said members being bodily movable relatively to the other member, an indicating-lever operatively associated with said bodily-movable member for limiting its movement, and a stop adjustable longitudinally of said lever for limiting its swing.

4. In devices of the character described, the combination with a support, of a pair of opposed members suitably carried by said support, one of said members being bodily movable relatively to the other member, an indicating-lever operatively associated with said bodily-movable member for limiting its movement, a stop adjustable longitudinally of said lever for limiting its swing, and means for locking said stop in its adjusted position.

5. In devices of the character described, the combination with a suitable support, of a pair of opposed members carried by said support, one of said members being bodily movable relatively to the other member, an indicating-lever suspended from said bodily-movable member, and means for limiting the swing of said suspended lever, comprising an adjustable stop extending on each side in the path of movement of said lever.

6. In devices of the character described, the combination with a suitable support, of a pair of opposed members carried by said support, one of said members being rotatably mounted in its support and bodily movable toward and away from the other member by its rotation, an indicating-lever carried by said rotary member, and means for limiting the swing of said lever, comprising a stop adjustable along said lever.

7. In devices of the character described, the combination with a suitable support, of a pair of opposed members carried by said support one of said members being rotatably mounted in its support and bodily movable toward and away from the other member by its rotation, an indicating-lever carried by said rotary member, and means for limiting the swing of said lever, comprising a radially-adjustable

stop, and means for locking said stop in its adjusted position.

8. In devices of the character described, the combination with a support, of an adjustment-spindle carried by said support, a rotary anvil carried by said support and movable in its support toward and away from said adjustment-spindle by its rotary action, an indicating-lever suspended from said anvil member, and means for limiting the swing of said lever, comprising an adjustable stop extending on each side of said indicating-lever.

9. In devices of the character described, the combination with a suitable support, of an anvil member carried by said support, an adjustment-spindle rotatably mounted in said support and provided with a plurality of longitudinal serrations, and means for locking said adjustment-spindle, comprising a locking-pin provided at its upper end with a plurality of serrations adapted to engage the serrations on the adjustment-spindle, and means for holding

said locking-pin in engagement with said adjustment-spindle.

10. In devices of the character described, the combination with a suitable support, of an anvil member carried by said support, an adjustment-spindle screw-threaded on its outer surface mounted in said support and provided with a plurality of serrations extending longitudinally of its screw-threaded surface, and means for locking said adjustment-spindle comprising a locking-pin provided at its upper end with a plurality of serrations adapted to engage the serrations on the adjustment-spindle, and means for holding said locking-pin in engagement with said adjustment-spindle.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS HUMPAGE.

Witnesses:

BERNARD DE SOYRES,
WILLIAM HENRY TAYLOR.