Sept. 4, 1923. 1,466,664

H. A. LOWE

TEST INDICATOR

Filed Feb. 17, 1919

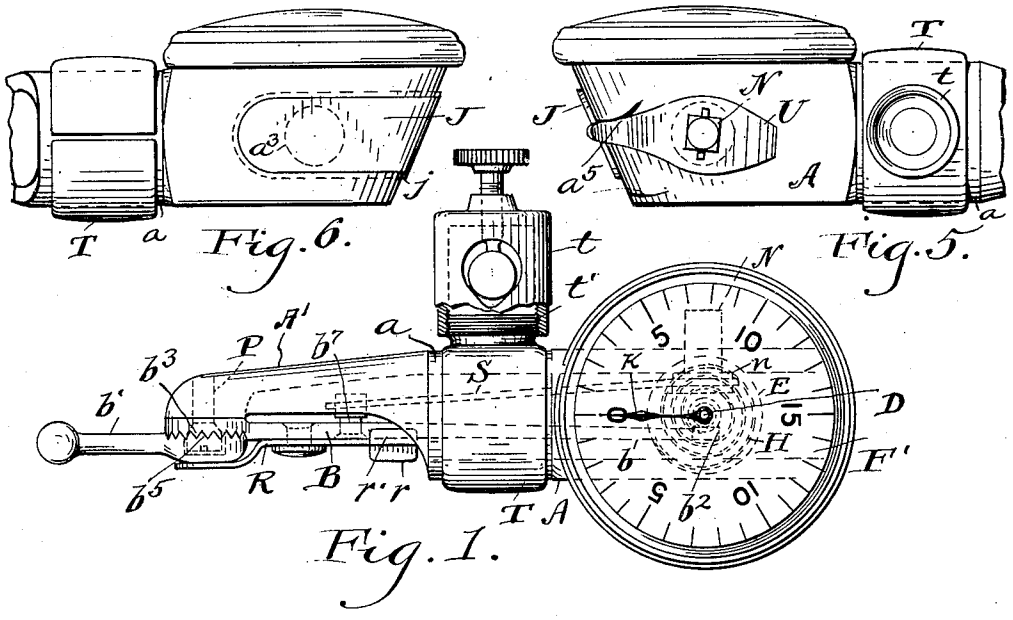

Fig. 6. Fig. 5. Fig. 1.

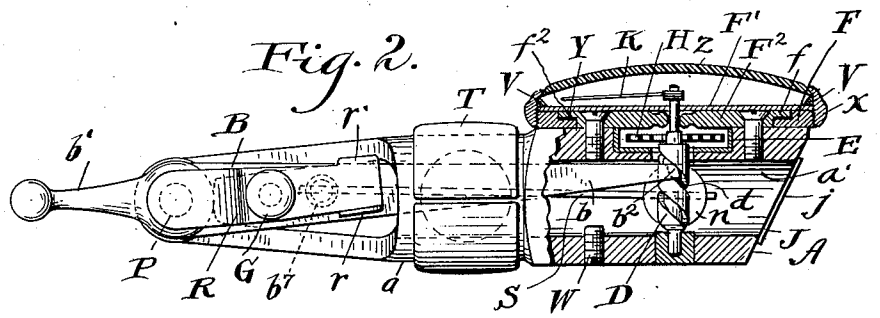

Fig. 2.

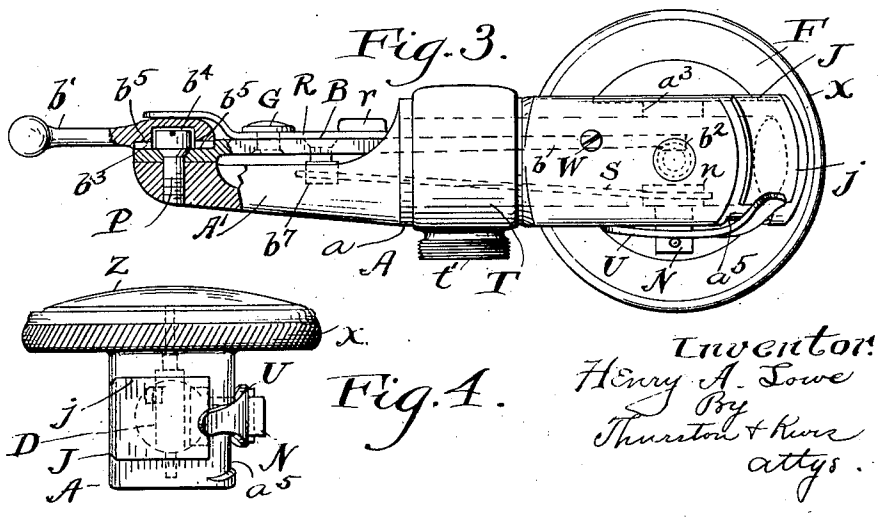

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

HENRY A. LOWE, OF CLEVELAND, OHIO.

TEST INDICATOR.

Application filed February 17, 1919. Serial No. 277,438.

To all whom it may concern:

Be it known that I, HENRY A. LOWE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Test Indicators, of which the following is a full, clear, and exact description.

This invention consists of improvements upon the test indicator which forms the subject of my prior Patent No. 1,144,367, granted June 29, 1915. In general, the object of the invention is to increase the useful capacity of the indicator, and to practically eliminate the possibility of error in its operation. More specifically, the object is to so organize the device that when attached, for example, to the tool post of a lathe, the instrument may be made to occupy an almost infinite number of positions relative to the surface to be tested. Also to facilitate the removal of one work engaging arm of the operating lever, and the substitution of another; also to provide means for readily adjusting the two arms of the lever with respect to each other, and for preventing any accidental displacement of said two arms when so adjusted; also to provide means where by pressure either up or down upon the work engaging arm of the operating lever will cause a corresponding deflection of the indicator pointer.

The invention consists in the construction and combination of parts shown in the drawing and hereinafter described and pointed out definitely in the appended claims.

In the drawings, Fig. 1 is a plan view partly broken away of the instrument; Fig. 2 is a side elevation with the part of the device adjacent the spindle and dial shown in vertical section; Fig. 3 is a bottom view of the device,—the connection between the two arms of the operating lever being shown in section; Fig. 4 is a rear view, that is to say, a view from the right end of Figs. 1, 2 and 3; Fig. 5 is an enlarged front elevation of the rear end of the instrument, and Fig. 6 is a side view of the rear end of the instrument.

The instrument includes a body A which has all of the functions of the body plate of the instrument shown in the prior patent, but by reason of its peculiar shape, as will be hereinafter described, it has additional functional capacities. A spindle D is rotatably mounted within the body and projects through a graduated dial F′ and has a pointer K fixed to its projecting upper end. A spiral groove d is formed in the surface of the spindle. An operating lever B is pivoted to the body, and has at one end a tooth b^2 which engages in the above mentioned spiral groove. The body likewise supports a spring barrel E in which is a spiral spring H which is connected with the spring barrel and with the spindle, and acts upon the spindle to turn it counter-clockwise to bring the pointer K back to the zero point. The lever B is formed of two arms, viz. the arm b which carries a tooth b^2, and a work contact arm b^1.

In respect to the parts and their arrangement above referred to, the instrument is generically like that which is disclosed in my said prior patent. In the instrument of that prior patent, however, two arms b, b', of the operating lever B are connected with a friction joint concentric with the pivot of the lever. Experience has shown that unless the one using this instrument is exceedingly careful after he has once adjusted these two arms to the proper relative position, the adjustment may be displaced, wherefore the instrument will indicate inaccurately.

Also, as shown in said prior patent the substitution of one contact arm b' for another was not easy. To remedy both of these defects the operating lever around the pivot screw P by which it is pivoted to the body is formed with an annular row of radial serrations b^3. The contact arm b' is formed with a recess b^4 for the reception of the head of the pivot screw; and around this hole the arm b' is an annular row of radial serrations b^5 which are complementary to the serrations b^3 of the lever arm b'.

When the serrations of one of these lever arms are interlocked with the serrations of the other arm there can be no relative turning as between these two levers. To hold these serrations in engagement, and thereby to hold the contact arm b' in operative position, a resilient lever R is pivoted by means of a rivet G to the lever arm b, and is so bent that it may engage the convex upper face of the lever arm b' directly over the pivot P and to exert such a pressure thereon as will hold the two rows of serrations in operative engagement. This lever R has adjacent its rear end a forwardly bent lip r which the operator may easily take hold

of so as to swing this lever; and it likewise has a rearwardly turned lip r' which when swung to operative position as shown will engage the lever arm b and will be stopped in that position. If it is desired to change the relative positions of the two lever arms one may take hold of both and turn arm b' about its axis. The spring R will yield enough to let the serrated surfaces ride over each other as the contact arm b' is moved to the desired position.

The pivot screw P extends through the extremity of what may be termed the tapered fore-end A′ of the body A, which tapered fore-end is partly cut away to permit the insertion of the lever B.

At a point about midway between its ends the body A is formed with a cylindrical portion a. A spring ring T is fitted upon this cylindrical portion but may be turned thereon. It is, however, made to grip this portion so tightly that it will remain operative in any position to which it may be turned. This spring ring T is formed with an externally threaded boss t' upon which may be screwed a nut t, through which the instrument may be attached to any suitable support. The various kinds of connecting devices which have been commonly employed permit the instrument to occupy many positions relatively to the work to be tested. But because the connections include as before described, the clamp ring which may be turned upon the body, the instrument may operate in a greatly increased number of positions.

The cylindrical part a of the body and the rear end of said body are tubular, and the recess a' in said body contains the spindle and some other parts of the device which will be presently explained. It is also desirable that there shall be a hole a^3 in one side of the body, adjacent the spindle. In the side in which this hole is formed, a dove-tail groove is formed, and extended to the rear end of the body. A slide J having dovetail edges is fitted to this groove, and it has a flange j on its rear end. When the slide is in place it covers the hole a^3, and its flange j covers the hole in the rear end of the body.

A little rotating shaft N projects through and is mounted in one side wall of said recess. It has an enlarged head n on its inner end; and its outer end is squared for the reception of an operating lever U which is secured thereon. A delicate wire spring S is fixed in a hole which passes diametrically through the head n of this shaft; and, from this point, said spring extends toward the pivot of the lever B and passes slidably through a hole in a stud b^7 fixed to said lever. When this shaft is turned in one direction the spring is put under such tension that it will act upon the lever to swing it up; when turned into another position this spring will act upon the lever to push it down. In order that this shaft may be moved with certainty into either of the two positions referred to, there is a notch a^5 cut in the side of the body adjacent the rear end thereof; and the lever U is made of spring metal and of such shape that it enters this notch and may be moved down against one end of said notch or up against the other and by this movement the shaft will be turned sufficiently to change the direction of the action of the spring S.

When the pointer is at O under normal conditions, the lever arm b will engage the wall of the recess in the body in which it lies whereby said lever can not move up any farther. W represents an adjustable screw which screws through the bottom of the body, and into such position that, when the lever arm b has been moved down far enough to exactly turn the spindle through one revolution, the lever arm b will engage the inner end of this adjustable screw and be stopped. In other words, the lever arm b is permitted such a range of movement only as will be accompanied by one complete revolution of the spindle, and consequently of the pointer K. When the shaft N is in the position shown in Fig. 2 the spring S is exerting upon the lever arm b slight upward pressure sufficient to lift the lever to the position shown in that figure. But it is the spiral spring H which turns the spindle to carry the pointer back to zero. In that event pressure upward upon the outer end of the work contact arm b' will be required to swing the lever in opposition to its spring, and the lever acting on the spindle will turn the spindle clockwise, in opposition to the spiral spring, into an indicating position. If the shaft N be so turned to its other operative position the spring S will be caused to exert a downward pressure great enough to turn the spindle clockwise in opposition to the spiral spring one complete revolution, at which time the lower edge of the lever will engage the inner end of the screw W and the pointer will be at O. In that event downward pressure upon the outer end of the contact arm b' as shown in Fig. 2 will cause the arm b' to swing upward, which allows the spiral spring to turn the spindle and the pointer counter clockwise. Because the pointer can operate in either direction it has been found desirable to graduate the dial in both directions from O as shown in Fig. 1.

The dial of the instrument shown is likewise made adjustable. In order that this may be possible, the dial plate F is in the form of a flat ring having a rabbeted inner periphery. This fits rotatively around a dial holding plate F^2 which is secured to the

body and has an outwardly directed flange f^2. This overlies the inwardly directed flange f of the dial ring; and between these two flanges a thin flat slightly deformed spring ring Y is placed. This deformed spring ring is merely an annulus formed of thin spring metal which is corrugated or bent to a greater or less extent out of the original plane of the metal so as to constitute a friction washer.

The bezel ring X of the dial structure is screwed onto the outer periphery of the dial ring F. Its upper edge overhangs the edge of the crystal Z and presses this edge slightly down upon a ring V which is fitted within the bezel and bears upon the top of the dial near its outer edge thereby fastening the dial immovably to the dial plate.

There are many circumstances of use under which this adjustability of the dial will be found a valuable feature, for example, in testing any surface the arm b' had been adjusted to such a position that a normal surface being tested causes a slight deflection of the pointer from that shown in Fig. 1. In that event the dial could be turned until the O thereon came into alignment with the pointer in this position. After this the instrument will accurately measure additional deflections of the pointer.

Having described my invention, I claim:—

1. In a test indicator, the combination of a body, an indicator operating lever arm pivoted thereto and provided concentric with respect to its pivotal axis with an annular row of serrations, a work engaging lever arm which is formed with complementary serrations which engage the serrations of the first named lever arm, a spring secured to the indicator operating arm and engaging the outer face of the work engaging lever arm adjacent the axis thereof and acting to yieldingly hold the two serrated surfaces in engagement.

2. In a test indicator, the combination of a body, an indicator operating lever arm pivoted thereto and provided concentric with respect to its pivotal axis with an annular row of serrations, a work engaging lever arm which is formed with complementary serrations which engage the serrations of the first named lever arm, a resilient lever pivoted to the indicator operating arm and engaging the outer face of the work engaging lever arm adjacent the axis thereof and having a positioning part for engagement with said lever arm.

3. In a test indicator, the combination of a body carrying one indicator element, a spindle rotatively mounted upon the body and carrying the other indicator element, which spindle has a spiral groove in its periphery, an operating lever pivoted to said body and having a tooth which engages in the spiral groove in the spindle, a spring engaging said operating lever, and means to change the direction in which said spring acts upon said lever arm whereby the spring will push the lever in either direction as required.

4. In a test indicator, the combination of a body carrying one indicator element, a spindle rotatively mounted upon the body and carrying the other indicator element which spindle has a spiral groove in its periphery, an operating lever pivoted to said body and having a tooth which engages in the spiral groove in the spindle, a spring engaging said operating lever, and means to change the direction in which said spring acts upon said lever arm whereby the spring will push the lever in either direction as required, a stop limiting the movement of said lever arm in one direction, and a second stop which is adjustably secured to the body in position to engage said lever and limit its movement in the other direction.

5. In a test indicator, the combination of a body, a spindle rotatively mounted upon the body and carrying an indicator pointer, —which spindle has a spiral groove in its periphery, an operating lever pivoted to said body and having a tooth which engages in the spiral groove in the spindle, a spring engaging said operating lever, and means to change the direction in which said spring acts upon said lever arm whereby the spring will push the lever in either direction as required, a stop limiting the movement of said lever arm in one direction and a second stop which is adjustably secured to the body in position to engage said lever and limit its movement in the other direction, and a dial which is rotatably supported upon said body.

6. In a test indicator, the combination of a body, a spindle rotatively mounted upon the body and carrying an indicator pointer, which spindle has a spiral groove in its periphery, an operating lever pivoted to said body and having a tooth which engages in the spiral groove in the spindle, a spring engaging said operating lever, and means to change the direction in which said spring acts upon said lever arm whereby the spring will push the lever in either direction as required, a stop limiting the movement of said lever arm in one direction and a second stop which is adjustably secured to the body in position to engage said lever and limit its movement in the other direction, a dial which is rotatably supported upon said body, and a friction brake acting upon said dial to prevent its accidental turning.

7. In a test indicator, the combination of a body carrying one indicator element, a spindle rotatively mounted upon the body and carrying the other indicator element

which spindle has a spiral groove in its periphery, an operating lever pivoted to said body and having a tooth which engages in the spiral groove in the spindle, a shaft rotatably supported upon the body, a post carried by said lever and a spring which is fixed to said shaft and passes slidably through said post.

8. In a test indicator, the combination of a body carrying one indicator element, a spindle rotatively mounted upon the body and carrying the other indicator element which spindle has a spiral grove in its periphery, an operating lever pivoted to said body and having a tooth which engages in the spiral grove in the spindle, a shaft rotatably supported upon the body, a post carried by said lever, a spring which is fixed to said shaft and passes slidably through said post, an operating lever fixed to said shaft, and stop shoulders carried by the body for engagement with said operating lever to limit the turning movement of the shaft.

9. In a test indicator, the combination of a tubular body having a tapered fore-end and a cylindrical portion, an operating lever pivoted to said body, a portion of said fore-end cut away to allow the insertion of said operating lever, a rotatably mounted shaft in said body and carrying an indicating pointer, said lever extending through said cylindrical portion of the body and directly connected to said shaft, and said cylindrical portion of said body carrying a rotatably mounted clamp.

10. In a test indicator, the combination of an integral tubular body having a tapered fore-end and a cylindrical portion, an operating lever pivoted to said body, a portion of said fore-end cut away to allow the insertion of said operating lever, a rotatably mounted shaft in said body and carrying an indicating pointer, said lever extending through said cylindrical portion of the body and directly connected to said shaft, and said cylindrical portion of said body carrying a rotatably mounted clamp

11. In a test indicator, the combination of a body having a cylindrical portion, an operating lever arm pivotally mounted upon said body, a contact element pivotally mounted for adjustment upon said lever arm but detachable therefrom, means forming a pivot for said lever arm, and means for adjustably and removably holding the contact element to said lever arm, an indicating hand, means for transmitting through the lever arm the movement of said contact element to said hand, said cylindrical portion on said body carrying a rotatably mounted clamp

12. In a test indicator, the combination of a body having a cylindrical portion, an operating lever arm pivotally mounted upon said body, a contact element pivotally mounted upon said lever arm, means for interlocking said contact element and lever arm into a relatively fixed position, means separate from said last mentioned means for forming a pivot for said lever arm, indicator mechanism operated by said lever arm, said cylindrical portion on said body carrying a rotatably mounted clamp.

13. In a test indicator, the combination of a body, an operating lever arm pivotally mounted upon said body, a contact element pivotally mounted for adjustment upon said lever arm but detachable therefrom, means forming a pivot for said lever arm, means for adjustably and removably holding the contact element to said lever arm, an indicating hand, and means for transmitting through the lever arm the movement of said contact element to said hand.

14. In a test indicator, the combination of a body, an operating lever arm pivotally mounted upon said body, a contact element pivotally mounted upon said lever arm, means for interlocking said contact element and lever arm into a relatively fixed position, means separate from said last mentioned means for forming a pivot for said lever arm, and indicator mechanism operated by said lever arm.

In testimony whereof, I hereunto affix my signature.

HENRY A. LOWE.