A. L. DE LEEUW

GAUGE.

APPLICATION FILED OCT. 26, 1918.

1,416,694.

Patented May 23, 1922.

2 SHEETS—SHEET 1.

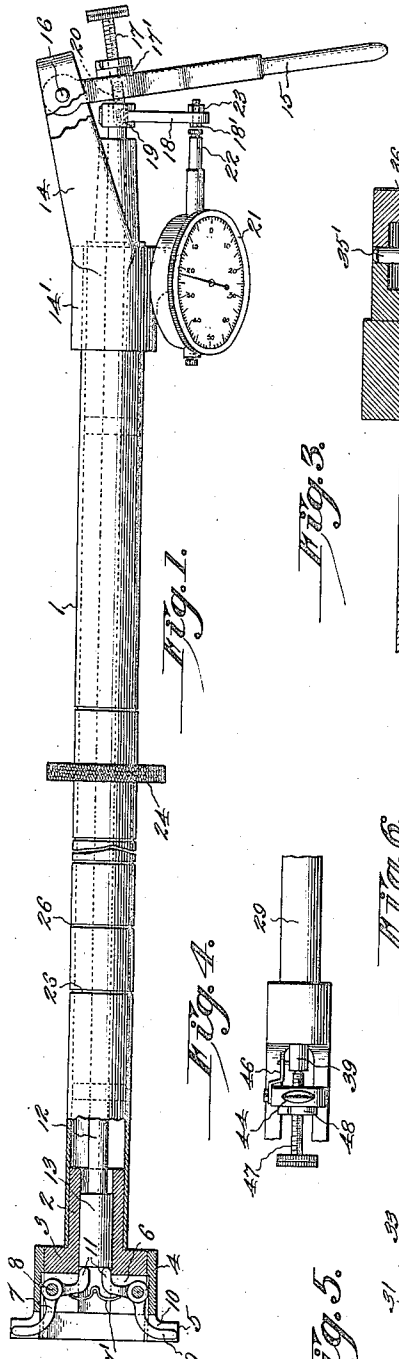


Fig. 1.

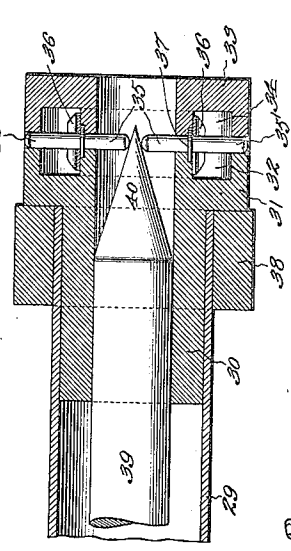


Fig. 3.

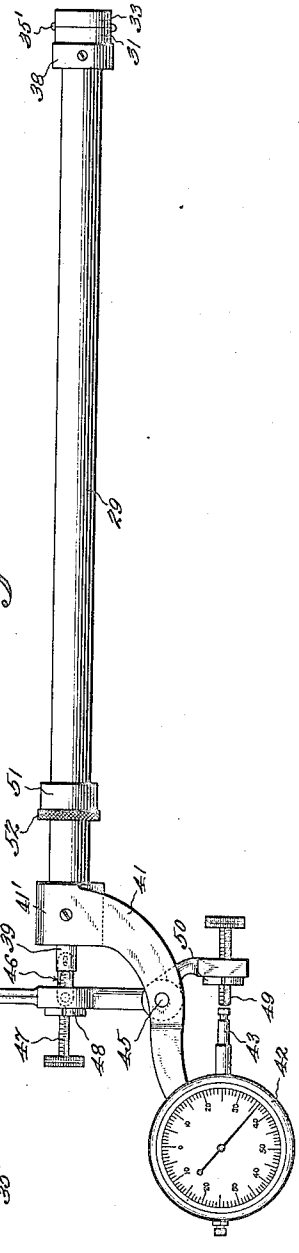


Fig. 2.

Fig. 4.

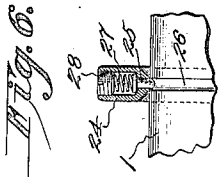


Fig. 6.

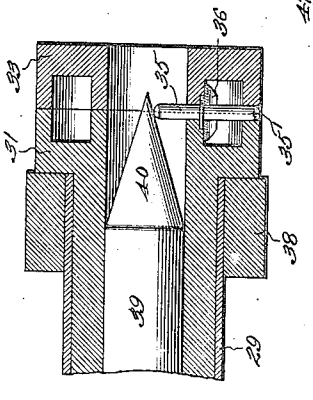


Fig. 5.

WITNESSES:

J. H. Crawford

G. F. Gourley

INVENTOR

Adolph L. De Leeuw

BY Henry J. Miller

ATTORNEY

A. L. DE LEEUW

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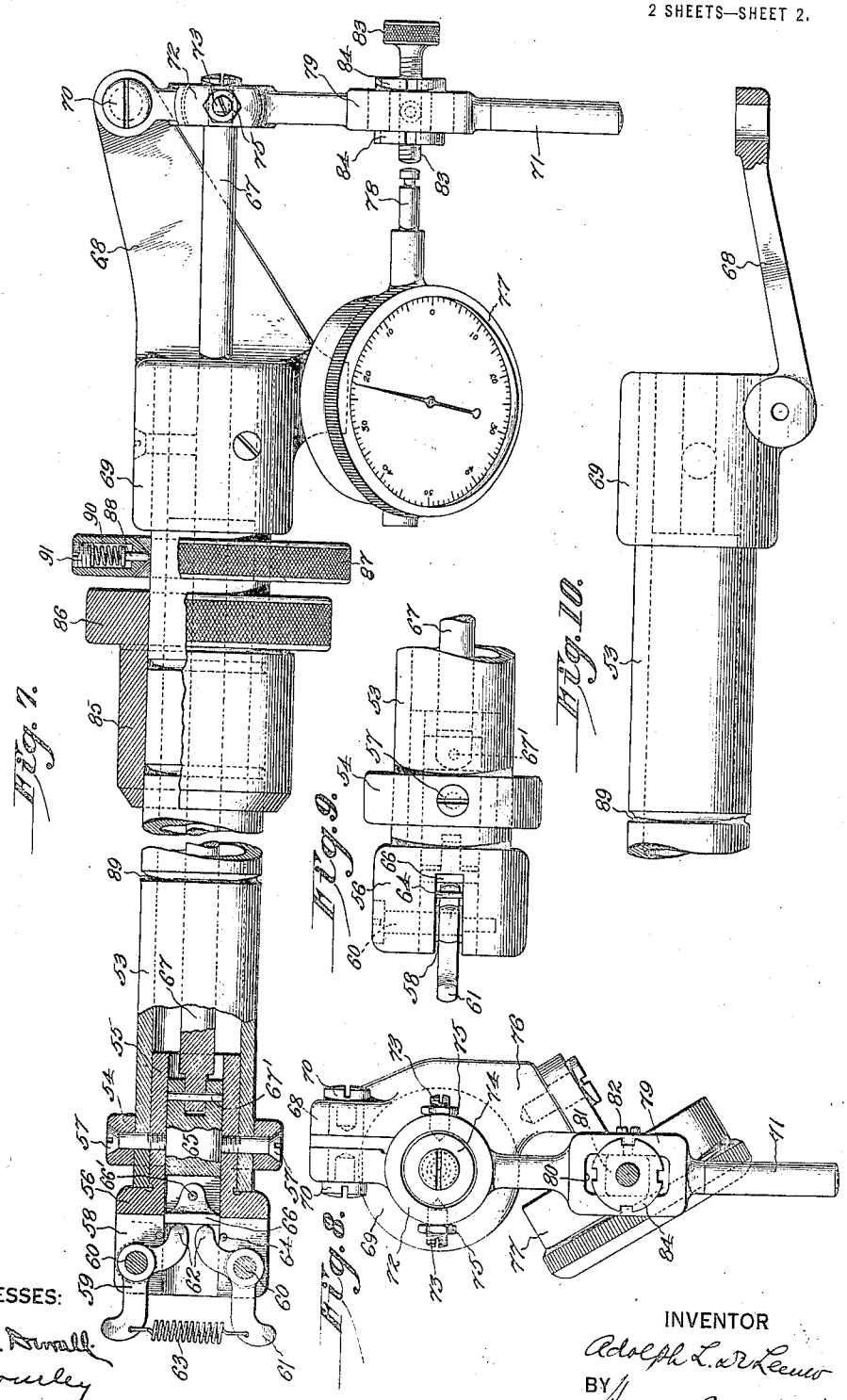


Fig. 7.

Fig. 9.

Fig. 10.

Fig. 8.

WITNESSES:

W. Mag. Ramell

G. F. Gourley

INVENTOR

Adolph L. DeLeeuw

BY

Henry Miller

ATTORNEY

UNITED STATES PATENT OFFICE.

ADOLPH L. DE LEEUW, OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

GAUGE.

1,416,694. Specification of Letters Patent. Patented May 23, 1922.

Application filed October 26, 1918. Serial No. 259,813.

To all whom it may concern:

Be it known that I, ADOLPH L. DE LEEUW, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Gauges, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a gauge, more particularly to a gauge for directly and rapidly indicating variations from a predetermined standard in the bores of tubes, and has for its object to provide a simple, inexpensive and reliable instrument of this type.

In its preferred embodiment it comprises a carrier adapted to be inserted in the bore to be tested, movable contact points carried thereby, a push-rod for positively advancing said points, yielding means for retracting said points, a hand-lever for actuating the push-rod, and indicating means operable by the movement of said lever.

In the drawings, Fig. 1 is a top plan view of the gauge, partly in section. Fig. 2 is a top plan view of a modification. Fig. 3 is a horizontal section of the front end of the form shown in Fig. 2. Fig. 4 is a detail side elevation of the rear end of the same form. Fig. 5 is a sectional view of the front end of a slight modification of the form shown in Fig. 2. Fig. 6 is a detail section of a holding or stop ring. Fig. 7 is a top plan view, partly in section, of another modification. Fig. 8 is a rear end elevation of the latter. Fig. 9 is a side elevation of the front end, and Fig. 10 is a side elevation of the rear end thereof with certain parts omitted.

Referring to Fig. 1, the numeral 1 designates a carrier in the form of a tube adapted to be inserted in the bore to be tested. Secured in the forward end of the tube is a bearing sleeve 2 having an enlarged flange 3 at its outer end; and secured to said flange is a casing 4 having at its outer end an enlarged fixed bearing or centering ring 5. The flange 3 has slots 6 therein at diametrically opposed points, and movable in said slots are levers 7 fulcrumed on pins 8. The forward ends 9 of said levers are bent out in opposite directions to form contact points and move in diametrically opposed slots 10 in the bearing ring 5. The rear ends 11 of levers 7 are bent backwardly and project slightly within the bore of sleeve 2. The levers 7 are normally held with their contact points 9 retracted or in inoperative position by a leaf spring 7′ bearing against the rear portions of the levers. Slidably mounted in the carrier 1 is a push-rod 12 having a plunger 13 at one end slidable in sleeve 2 and adapted to engage the ends 11 of levers 7 and advance the contact points 9 against the pressure of spring 7′, while the other end of the push-rod extends beyond the rear end of the carrier. A yoke 14 secured to the rear end of the carrier by a sleeve 14′ has an operating lever 15 fulcrumed therein at 16, said lever having an adjusting screw 17 threaded therethrough and adapted to engage the rear end of the push-rod. The adjusting screw is held in position by a lock-nut 17′. Secured to the rear end of the push-rod is an arm 18, the hub 19 of which has a pin and slot connection with a link 20 pivoted on the lever 15. An indicator 21 of well known form is carried by the sleeve 14′, said indicator having an actuating plunger 22 projecting therefrom in line with a contact-screw 18′ threaded in the end of arm 18, which screw is held in adjusted position by a lock-nut 23. A holding or stop ring 24 (Figs. 1 and 6) which is adapted to engage the outer end wall of a bore to be tested, is slidably mounted on the carrier 1 and has a pin 25 mounted therein, which pin, as the carrier is moved relatively to the ring, is adapted to engage any one of a series of annular grooves 26 cut on the outer surface of the carrier. The pin is yieldingly held in a groove by a coil spring 27 compressed between the head of the pin and a screw 28 threaded into the ring.

In the modification shown in Figs. 2 to 4 the carrier 29 has a bearing sleeve 30 (Fig. 3) mounted therein at its forward end, said sleeve having an enlargement 31 at its outer end formed with an annular recess 32. A ring 33 having a complemental recess 34 is secured to the enlargement, the ring and enlargement forming a housing for a pair of diametrically opposed slidable pins 35 having contact points 35′ at their outer ends. These pins are normally held in retracted or inoperative position by leaf-springs 36 bearing against flanges 37 on said pins. A fixed bearing or centering ring 38 is secured to the carrier adjacent the enlargement 31. The pins 35 are moved outwardly against the pressure of the springs 36 by a push-rod 39

having a bearing in the sleeve 30 and formed with a conical point 40 at its forward end adapted to pass between and separate the inner ends of the pins. A yoke 41 is secured to the rear end of the carrier by a sleeve 41′ and carries at its end an indicator 42 having an actuating plunger 43 projecting therefrom. An operating lever 44 is fulcrumed in the yoke at 45 and has a link 46 pivoted thereto, which link has a pin-and-slot connection (Fig. 4) with the rear outwardly projecting end of the push-rod 39. An adjusting screw 47 is threaded in the lever 44 and has a point adapted to engage the end of push-rod 39, the screw being held in position by a lock-nut 48. A contact-screw 49 is threaded in the lower arm of the lever 44 in alinement with the plunger 43 and is held in position by a lock-nut 50. A freely slidable bearing or centering ring 51 having an enlarged bearing flange 52 is mounted on the carrier.

The modification illustrated in Fig. 5 is identical in all respects with the form shown in Figs. 2 to 4, except that a single contact pin 35 is used instead of a pair of opposed pins.

In the form shown in Figs. 7 to 10 the numeral 53 designates a carrier tube provided adjacent its front end with a fixed bearing or centering ring 54. Within the front end of the tube is mounted a bearing sleeve 55 provided with an enlargement or flange 56 at its outer end, the sleeve, carrier and ring being secured together by screws 57. Diametrically opposed slots 58 are formed in the enlargement 56, and levers 59 movable in said slots are fulcrumed on pins 60. The front ends of said levers are turned outwardly in diametrically opposite directions to form contact points 61, while the rear ends 62 of the levers are turned backwardly. The contact-points are normally held retracted by a coil spring 63 secured to the levers, their inward movement being limited by stop-pins 64 adapted to engage the levers adjacent their rear ends. A plunger 65 is slidably mounted in the sleeve 55 and has a contact piece 66 pivotally connected to its front end at 66′, which piece is adapted to engage the rear ends of levers 59 to advance the contact points against the tension of spring 63. The plunger is actuated by a push-rod 67 pivotally connected to its rear end at 67′, the push-rod extending through the carrier 53 and beyond its rear end. The pivots 66′ and 67′ are disposed at a right angle to each other and form a universal joint between the contact piece 66 and push-rod 67. A bracket-arm 68 is secured to the rear end of the carrier by a sleeve 69, and fulcrumed on the arm at 70 is an operating lever 71. The lever has an enlargement 72 (Fig. 8) having a circular opening therein, and pivot pins 73 threaded in said enlargement are adapted to engage a ring 74 carried by the rear end of the push-rod and disposed in said opening. Lock-nuts 75 secure the pivot pins in adjusted position. A second bracket-arm 76 extends from the sleeve 69, and secured thereto is an indicator 77 having an actuating plunger 78 extending therefrom. Opposite the plunger 78 the lever 71 is provided with a second enlargement 79 having an elongated opening 80 therein, and a slidable block 81 is adjustably secured in said opening by a set-screw 82. Threaded in the block is a contact-screw 83 adapted to actuate the plunger 78 when the lever 71 is operated, said screw being secured in adjusted position by lock-nuts 84. Freely slidable on the carrier 53 is a second bearing or centering ring 85 coacting with the fixed ring 54 to properly locate the gauge in the bore to be tested, and said ring 85 has an enlarged bearing flange 86 at its rear end adapted to engage the end wall at the entrance to the bore when the gauge is slid in the latter. A holding or stop ring 87 is slidably mounted on the carrier in rear of the ring 85 and has a pin 88 mounted therein, which pin, as the carrier is moved relatively to the ring, is adapted to engage any one of a series of annular grooves 89 cut on the outer surface of the carrier. The pin is yieldingly held in a groove by a coil spring 90 compressed between the head of the pin and a screw 91 threaded into the ring 87.

In use the gauge is inserted in a test bore or ring, the lever actuated to advance the contact points against the wall thereof, and the indicator set at zero. The indicating means shown is common and forms no part of my invention, and in this form the indicator is set at zero by rotating the dial while the contact points are held against the test ring. Any other desired means for accomplishing the purpose may be employed. The gauge is then placed in the bore to be tested and advanced at intervals, the operating lever being actuated at each stop and the variations from the test ring being noted on the indicator. The gauge is also rotated in the bore and readings taken on different diameters at the same interval to test the bore for variations from a true circle at that interval and disclose their location. The holding or stop ring and grooves shown in Figs. 1 and 7 provide means for advancing the gauge at regular or predetermined intervals, and it is obvious that they may also be applied to the forms shown in Figs. 2 and 5. The forms shown in Figs. 2, 5 and 7 are provided with a freely slidable rear centering or bearing ring, the latter having a flange adapted to bear against the outer end wall of the bore to be tested. The form shown in Fig. 1 is

intended to be used with a fixed rear support and the rear centering ring is unnecessary in this case, but it is obvious that it may be applied if desired. The form shown in Figs. 5 is particularly adapted for use with bores having rifling or other grooves therein. It will be noted, in the form shown in Fig. 7, that unless the operating lever be made very rigid the application of undue pressure after the contact points are in engagement with the bore, will tend to flex or bend the lever, thereby moving the contact-screw 83 and plunger 78 a further distance and producing a reading on the indicator in excess of the true one. This difficulty is avoided in the forms shown in Figs. 1 to 5, the contact-screw 18′ as shown in Fig. 1 being carried directly by an arm on the push-rod and therefore unaffected by any bending of the operating lever, while in the form shown in Fig. 2 the power from lever 44 is applied to the push-rod on one side of the fulcrum 45 while the contact-screw 49 is carried on the opposite side of the fulcrum and is therefore unaffected by undue pressure on the handled end of the lever.

It will be seen that by the use of applicant's lever operated construction the readings may be taken very rapidly, since the mere moving forward of the lever at once brings the contact points into engagement with the bore, and upon release of the pressure the spring-pressed contact points are at once withdrawn. Moreover by making the indicating means independent of the gauge operating means but actuated thereby, the indicator may be instantly set at zero while the contact points are pressed against the surface of the object used as a standard, without any danger of varying the position of the contact points in the operation. The positive or negative variations from a standard in the object to be tested may be thus accurately and very rapidly read directly from the scale on the indicator, and the gauge indicating means may be instantly changed when another standard is to be used for comparison.

Having thus set forth the nature of the invention, what I claim herein is—

1. In a gauge, movable contact means, positive means for advancing and yielding means for retracting said movable means, said positive means including an operating lever, a separate indicating means, and means controlled by the movement of said lever for actuating said indicating means.

2. In a gauge, a carrier, means for properly positioning said carrier longitudinally and transversely with respect to an object to be tested, a plurality of opposed contact points adjacent one end of the carrier, manual means for separating said points, and means separate from but actuated by said manual means for indicating variations in the amount of separation.

3. In a gauge, a carrier, centering means thereon, a plurality of oppositely directed movable contact points supported by said carrier, an indicator, means for separating said points, and operating connections between said means and indicator, including a hand-lever fulcrumed outside of said carrier at its rear end.

4. In a gauge, a carrier, a plurality of movable contact points mounted in the carrier, yielding means for retracting said points, a movable push-rod adapted upon its advancement to advance said points, an operating lever for advancing or retracting said rod, and indicating means adapted to be actuated upon advancement of said rod.

5. In a gauge, a carrier, a centering ring thereon, contact points movable transversely of said carrier, a push-rod operatively associated with said contact points at one end and extending outside the carrier at its other end, an indicator mounted on said carrier and having a plunger, an arm on said push-rod having a contact pin adapted to engage said plunger, a lever fulcrumed on said carrier and having a link connection with said push-rod, and a contact-pin on said lever adapted to engage said push-rod.

6. In a gauge, a carrier, pivotally mounted arms having diametrically opposed outwardly directed contact points, a fixed centering ring adjacent said points, a movable centering ring surrounding said carrier, actuating means for said arms extending through said carrier, an operating lever fulcrumed on said carrier and connected to said actuating means, and means for indicating differences in the movement of said contact points.

7. In a gauge, a carrier, a plurality of opposed contact points adjacent one end thereof, means whereby said carrier may be centered in a bore to be tested, means for determining the position the gauge will assume in the bore to be tested including a movable stop with means for yieldingly retaining the same in any one of a plurality of predetermined positions on the carrier, manually operable means for separating said points to contact with the element to be gauged, and means for indicating differences in the movements of said points at the different positions.

In testimony whereof, I have signed my name to this specification.

ADOLPH L. DE LEEUW.