July 24, 1956 E. J. WITCHGER 2,755,557

DIAL TEST INDICATOR

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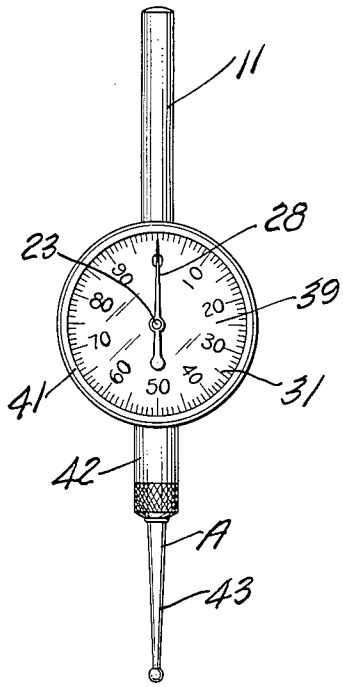


Fig. 1

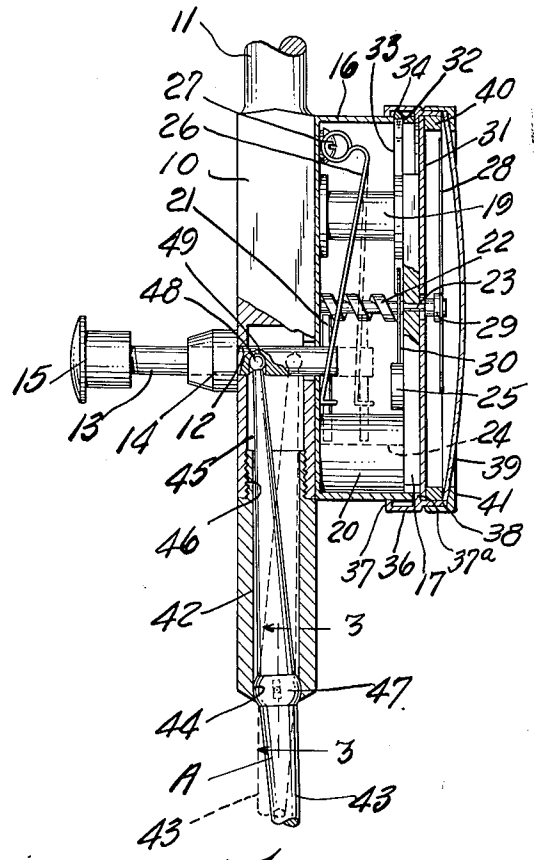


Fig. 2

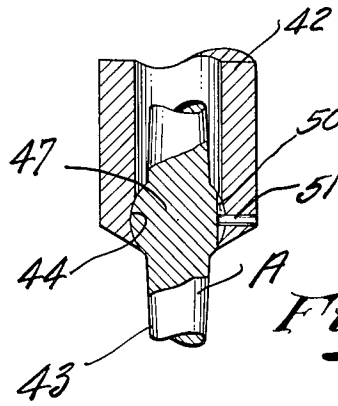


Fig. 3

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DIAL TEST INDICATOR

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This invention relates to inside attachments for dial test indicators for lining up shafts, checking holes, slots and the undersides of surfaces and the like, and more particularly to a means for confining or limiting the movement of the attachment arm.

In some previous devices of the type herein described, the attachment arm has been swivelly mounted in the manner illustrated and described in Patent No. 2,345,845, to permit all of the parts, except the extending end thereof, to be totally enclosed and protected against clogging and abrasive machinings, dirt, grit, and the like. While these prior art devices were very satisfactory from this standpoint, and could be economically manufactured and assembled, it was found, in actual practice, that they were not as accurate as desired. If the arm is permitted to turn in its socket or revolve, the readings will often be inaccurate since the indicating arm may, in some instances, merely turn in its socket and avoid the untrue surface without imparting a movement to the plunger. Further, if the ball joints of the attachment or indicating arm joint and the sockets in which they are mounted in a device in which the arm is permitted to freely revolve are not absolutely true, some error occurs.

Other devices have employed a pin through the attachment joint to restrict the movement of the arm to a definite plane, but since it is desirable to provide a removable attachment arm threaded in the casing, it will be obvious that the arm cannot, without great difficulty and adjustment, be threaded in so that the pin will always be at right angles to the plane of plunger movement. When it is not, movement of the arm will be restricted by this pin and the readings will be inaccurate.

Accordingly, one of the prime objects of my invention is to design an inside attachment for a test indicator of the type herein described which will permit extremely accurate readings to be taken at all times, and which is highly reliable and cannot be jarred out of register.

Another object of my invention is to design an inside attachment in which means is provided for insuring that the full movement of the attachment arm in the axial plane of plunger movement is in no manner restricted, no matter in which position the means is disposed relative to the plane of plunger movement when the attachment arm is threaded in.

A further object of the invention is to design an inside attachment and movement confining means therefor, which permit free and full movement of the attachment in the plane of plunger movement without binding, while positively limiting all other movement which would produce inaccurate readings.

Another object of the invention is to design an inside attachment of the type described, which is of simple and practical construction, and which can be very economically manufactured and assembled.

With the above and other objects in view, the present invention consists in the combination and arrangement of parts, hereinafter more fully described, illustrated in the accompanying drawing, and more particularly pointed

out in the appended claims, it being understood that changes may be made in the form, size, proportion, and minor details of construction, without departing from the spirit, or sacrificing any of the advantages of the invention.

In the drawings:

Fig. 1 is a top plan view of a dial test indicator with the inside attachment thereon.

Fig. 2 is an enlarged, fragmentary, part sectional, elevational view thereof, the broken lines illustrating the movement of the attachment arm.

Fig. 3 is a still further enlarged, part sectional, fragmentary, elevational view of the attachment arm.

Referring now more particularly to the drawing in which I have shown the preferred embodiment of my invention, the test indicator shown in Figs. 1 and 2 of the drawing is of the general type disclosed in Patent No. 2,345,845. The indicator includes a base 10 with an integrally formed extension or shank 11 formed thereon to facilitate mounting the instrument on a tool post or the like. A passage 12 is formed in the base 10 to receive a plunger 13 which is supported by a bearing 14 provided on the base 10, and a removable contact head 15 is threaded on the outer end of the plunger 13 as usual.

A cylindrical casing 16 is mounted on the base 10 to enclose the working parts of the indicator, and a plate 17 is provided thereabove, the plate 17 being secured in position by means of screws (not shown) in the spacer posts 19 and 20. The plunger 13 extends through the bottom of the casing 16 into the interior thereof, and a transverse pin 21 is rigidly mounted in the inner end thereof, the one end of said pin engaging a worm cam 22 provided on a centrally disposed operating shaft 23, the opposite end extending into a vertical slot or groove 24 formed in the post 20, and it will be obvious that an axial movement of the plunger 13 will revolve the shaft 23, and that the plunger itself is prevented from rotation by the disposition of the end of the pin 21 in the groove 24.

Depending from the plate 17 in position to be engaged by the end of the plunger 13 is a stop member 25 which limits the rotation of the shaft 23 as usual, and provided within the casing 16, to normally retain the plunger 13 in its outer position, is a spring 26 secured at one end by a screw 27 and at the other by wrapping it around one end of the pin 21. Further, a hair spring 30 is provided on the shaft 23 and is connected to the member 25 to materially increase the sensitivity of the device.

An indicator hand 28, having a central hub 29, is non-rotatably mounted on the outer end of the shaft 23, and a dial 31, which is usually graduated in thousandths of an inch, is provided thereunder, it being obvious that the worm cam 22 is so pitched that the exact lineal movement of the plunger 13 is accurately represented on the dial 31.

The dial 31 is mounted in a new and improved bezel unit which can be rapidly and easily assembled and disassembled, and which forms the subject matter of a copending application for Dial Test Indicator, Serial No. 331,890, filed January 19, 1953, by Charles Zelnick, now Patent No. 2,726,626, issued December 31, 1955, and will not be herein further described. Broadly, a given number of circumferentially spaced, horizontal slots 32 are formed in the wall of the casing, and mounted within the casing and bearing against the inner face of the side wall thereof, is a split annular spring 33 which is formed with a predetermined number of circumferentially spaced, offset portions 34 to project through the slots 32.

A lower bezel member 36 is adapted to be slipped over the upper portion of the casing 16 previous to insertion of the spring 33, the member 36 being formed with a lower flange 37 to space the bezel member 36 from the wall of the casing 16, all as clearly shown in Fig. 2 of the drawing, and it will be apparent that when the spring

33 is inserted, the offset portion 34 of the spring will engage the inner peripheral wall of the member 36 and resist rotative movement thereof, so that the member 36 can be set in a given position with relation to the indicator hand 28. Since the flange 37 is disposed directly below the offset portions 34 of the spring 33, the bezel member 36 is also prevented from slipping off the casing 16. An intermediate interior flange 37a formed on the bezel member 36 to rest on the upper edge of the casing 16, and the graduated dial 31 is mounted on said flange in frictional engagement with a shouldered portion 38 of the bezel member 36, so that the dial 31 revolves with the member 36.

A transparent crystal 39 is suported above the indicator hands 28 by a spacer ring 40 to close off the indicator chamber and prevent dirt and dust from entering the device, and an upper bezel member 41 is adapted to snap over the shouldered portion 38 to retain the crystal in position. Thus, it will be obvious that the entire bezel assembly revolves as a unit, the upper bezel member 41 frictionally engaging the shouldered portion 38 of the lower bezel member 36.

The inside attachment A which forms the subject matter of the instant invention comprises a support 42 and an attachment arm 43 swivelly mounted in a socket 44 formed in the outer end of the support 42. The base 10 of the test indicator is bored as at 45 to accommodate the inner end of the arm 43, and the outer end of the bore 45 is interiorly threaded as at 46 so that the threaded support 42 may be screwed therein.

The attachment arm 43 is enlarged intermediate its ends to form a ball joint 47 which seats in the socket 44, and it will be ovious that the attachment arm 43 pivots in the socket 44 when its outer end is moved, and that the inner ball end 48 thereof, which seats in the socket 49 in the plunger 13, moves the plunger 13 to register the reading in accordance with the degree of movement. To limit the swivelling of the arm 43 and prevent its turning or revolving in the socket 44 about its axis, a slot 50 is provided in the ball joint 47, and a transversely disposed pin 51 is mounted in said support and extends into said slot. The pin 51 is a sufficiently close fit in the slot 50 to prevent revolution of the arm 43 without binding the arm 43, and I wish to direct particular attention to the fact that the pin 51 need not be disposed in the axial plane of plunger movement of the device to operate accurately. If it is, the ball joint 47, of course, moves back and forth guided by the pin 51 which prevents its revolving sideways in the ball socket. If the pin 51 is disposed at right angles or with respect to the plane of plunger movement, the ball joint 47 still moves in that plane and the action is one of fulcruming on the pin 51. In the event that the pin 51 is disposed at a 45° angle with respect to the axial plane of plunger movement after the attachment arm has ben screwed in, the arm still moves in the same plane, half of the motion occurring as the ball joint guides on the pin and half as it fulcrums on the pin 51. By the same token, if the pin is disposed at other points between the above position, the motion will occur in a ratio of, for example, 63° of fulcruming movement on the pin to 37° guiding movement, or the like.

From the foregoing, it will be obvious that I have perfected a very novel and improved inside attachment for dial test indicators which is extremely accurate no matter how far it is screwed into the indicator base, and which can be economically manufactured and assembled.

What I claim is:

1. A dial test indicator including a casing having a removable, work engaging, inside attachment received by the casing comprising, a plunger slidably mounted in said casing, indicating means operably connected to said plunger and actuated into indicating position by axial movement thereof, said attachment comprising an elongated barrel which is received by the casing and an attachment arm having an enlarged ball joint intermediate its ends extending through said barrel, an end of said arm being in said casing and being operably associated with the plunger to transmit movement of the opposite end thereto, and the barrel having a socket formed therein to swivelly receive said ball joint, the said opposite end of the arm being unobstructed so that it can engage a work surface, and means in said barrel in engagement with the ball joint permitting unrestricted pivoting of said joint in the axial plane of movement of said plunger to record a true measurement regardless of the angular disposition of the means relative to the axial plane of movement of the plunger, caused by said casing receiving the barrel in different circumferential position when the attachment is replaced after removal, while preventing revolution of the ball joint in said barrel about the axis of the arm.

2. A dial test indicator including a casing with a threaded opening having a removable, work engaging, inside attachment threaded into said opening comprising, a casing including a graduated dial, a pointer for said dial, a plunger reciprocable in said casing extending transversely relative to said opening, means connected between said plunger and pointer to translate axial movement of said plunger into rotation of said pointer to cause the latter to indicate relative to said dial, said attachment comprising an elongated barrel with a threaded end received in said opening and a straight attachment arm having ball members on each end and an enlarged ball joint intermediate its ends, the plunger having a socket receiving the ball on one end of the arm and the barrel having a socket swivelly receiving the intermediate ball joint, the opposite end of said arm extending outwardly beyond said barrel and being unobstructed so that it can engage a work surface, said ball joint having a groove parallel to the axis of the arm, and a pin fixed in said barrel perpendicularly to the said axis of the barrel projecting into said groove and permitting unrestricted pivoting of said joint out of the axis of the barrel in the axial plane of movement of said plunger to record a true measurement regardless of the disposition of the pin at an angle to the plane of plunger movement, while preventing rotation of the ball joint in the barrel about the axis of the arm.

3. A dial test indicator including a casing having a removable work engaging, inside attachment received by the casing comprising, indicating means in said casing including a member having movement in a certain general plane and an indicating member, said latter member being actuated to an indicating position from another position by movement of said other member in said plane, said attachment comprising an elongated barrel which is received by the casing and an attachment arm having an enlarged swivel joint portion intermediate its ends extending through said barrel, an end of said arm being in said casing and being operably associated with the indicating means to transmit movement of the opposite end thereto, and the barrel having means swivelly receiving the said joint, the said opposite end of the arm being unobstructed so that it can engage a work surface, one of said arm joint and barrel having a groove parallel to the axis of the arm, and the other having pin means projecting into the said groove and permitting unrestricted pivoting of said joint in the plane of movement of said first mentioned member of the indicating means while preventing axial revolution of the attachment arm in said barrel.

References Cited in the file of this patent

UNITED STATES PATENTS

2,026,444	Trott	Dec. 31, 1935
2,345,845	Wells	Apr. 4, 1944
2,401,838	Mitchell	June 11, 1946