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E. MULLER

2,223,182

INSIDE CALIPER

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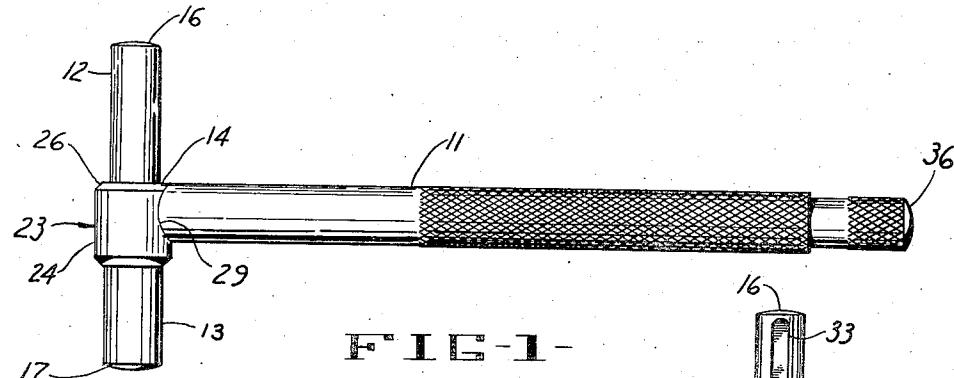


FIG-1-

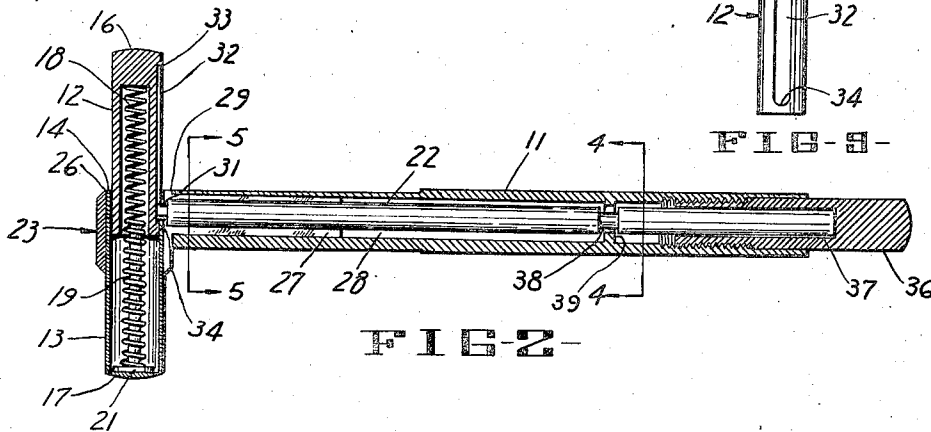


FIG-2-

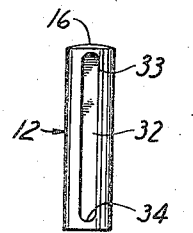


FIG-3-

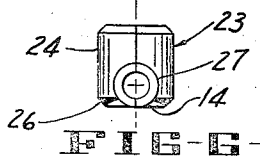


FIG-4-

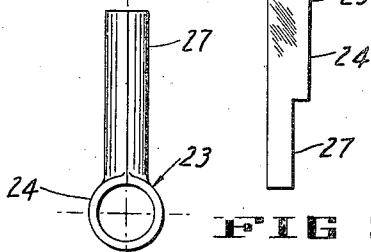


FIG-5-

FIG-6-

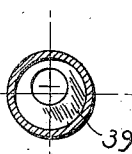


FIG-7-

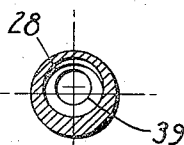


FIG-8-

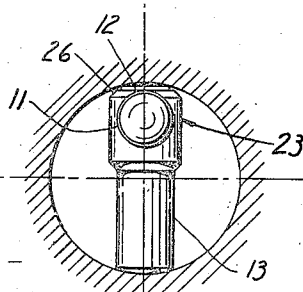


FIG-9-

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2,223,182

INSIDE CALIPER

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8 Claims. (Cl. 33—143)

The invention relates to measuring tools and more particularly to an inside caliper of the type generally known in the art as a telescope gauge.

An object of the present invention is to provide an inside caliper of the character described which is so constructed and arranged as to permit the use of the instrument in narrower and shallower slots and openings and the like for a given size of the instrument and to enable the positioning of the measuring parts of the instrument closer to shoulders and slots and opening side walls than has been heretofore possible in the present type of caliper.

Another object of the invention is to provide a caliper of the character above which is made substantially easier and cheaper to manufacture by the use of a one piece combination set and locking pin and the use of simple pressed fits and other features of construction.

Another object of the invention is to provide a caliper of the character described which may be simply and quickly disassembled and the several movable parts thereof completely removed for cleaning, inspection or replacement.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawing and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawing:

Figure 1 is a side elevation of an inside caliper constructed in accordance with the present invention.

Figure 2 is a longitudinal sectional view of the caliper.

Figure 3 is a plan view of the caliper as the same appears when fully compacted and placed in a cylindrical opening.

Figure 4 is a cross sectional view of the handle taken substantially on the plane of line 4—4 of Figure 2.

Figure 5 is a cross sectional view of the handle taken substantially on the plane of line 5—5 of Figure 2.

Figure 6 is a plan view of a collar forming part of the tool.

Figure 7 is an end elevation of the collar illustrated in Figure 6.

Figure 8 is a plan view of a blank of material from which the collar is pressed.

Figure 9 is a plan view of the inside section of the measuring cross head of the caliper.

The inside caliper of the present invention, and as illustrated in the accompanying drawing, as above indicated, is of the so-called telescope gauge type having a handle 11 and a measuring cross-head including inner and outer telescopic sections 12 and 13 of tubular form and arranged with the inner section 12 extendible from an open end 14 of the outer section. The outer ends 16 and 17 of the members 12 and 13 are closed and adapted for engagement with parts to be calipered. Within the inner and outer sections 12 and 13 is a coil spring 18, one end of which is mounted on a guide pin 19 having a head 21 at one end resting against the closed end 17 of the tube 13 and extending longitudinally through the spring to assist in retaining the latter in axial alignment within the inner tube. The spring operates within these inner and outer tubes to press them towards a relative extended position of the inner tube. In common with other calipers of this general type, the present caliper is assembled by connecting the handle 11 to the outer cross head member 13 and providing within the handle an adjustable means for engaging the inner section 12 for holding the latter in adjusted position. In addition, it is necessary in this type of measuring tool to provide means for preventing a disengagement of the inner and outer sections under the expansion action of the spring, and in previous devices this latter means has frequently been arranged independent of the adjustment locking means. In other of the prior devices the means for locking the sections in adjusted position and the means for preventing separation of the inner and outer tubular members has been somewhat combined by the use of a two piece locking pin, wherein one section of the locking pin was constantly held in engagement with a closed ended slot in the inner section to prevent a separation of the telescopic sections and a second pin section which was adapted to bear against the first pin section for forcing the latter against the inner telescopic section for holding the same against movement in adjusted position.

The present inside caliper, as aforementioned, is generally related to similar devices heretofore used and it will, therefore, be understood that the present invention lies not in a new type of measuring tool but rather to various improved features on the type of tool above described.

In accordance with the present invention I have substantially simplified the means for hold-

ing the telescopic sections in adjusted position and preventing separation of the sections when released by the use of a single one piece locking pin 22 which is utilized for both of these functions. Also, I have arranged for an improved form of connection between the handle and the outer telescopic section which substantially simplifies and cheapens the cost of manufacture and improves the usefulness of the tool by enabling a closer positioning of the tool to various parts to be measured, thereby enabling the calipering of shallower and narrower slots and openings and the like for a given size tool, than has been possible heretofore.

The means of connection between the handle and outer telescopic sections is here effected by means of a collar 23 formed from flat stock, see Figure 8, and stamped and formed in a die so as to provide a cylindrical portion 24 which is preferably pressed onto the outer periphery of the member 13 and arranged thereon with one end 26 of the cylindrical portion substantially flush with the open end 14 of the tubular member 13. The collar is additionally provided with a laterally extending tubular portion 27, which is likewise preferably formed in a die together with the portion 24 and from the same stock, and is preferably pressed into a bore 28 in the handle 11 opening to one end 29 of the handle. The handle end 29 is preferably curved to conform to the cylindrical shape of the collar so that the lower end 29 of the handle will snugly engage around the curved periphery of the collar. One of the important features of this construction lies in the fact that the flat stock, out of which the collar is made, may be stamped or otherwise impressed with a name or other identifying data, whereas the applying of such data to a cylindrical surface requires a rolling process. Also, the forming of the collar out of a flat strip which may be stamped and pressed up in a die, materially reduces the cost of construction and simplifies the manufacture of this part of the caliper. In addition, the forming of the collar out of flat stock enables the use of relatively thin material in the collar so as to produce a minimum obstruction around the outer tubular member, as may interfere with the insertion of the measuring cross-head into relatively narrow or shallow slots and openings and the like. In this connection applicant further provides for a beveling of the end 26 of the collar, so as to remove the laterally extending material of the collar at the end of the tubular member, whereby the cross-head may be inserted in an opening having a diameter substantially equal to the length of the outer tubular member, see Figure 3. This is of considerable importance in enabling a measuring of openings of minimum size where the inner section is substantially completely retracted into the outer section.

The means for holding the sections in adjusted position against the expansion action of the spring 18 and the means for preventing complete separation of the inner tubular section from the outer tubular section under the urge of the spring, is effected as above noted, by the use of a single one piece locking pin 22 which is carried in the handle bore 28 and extends for substantially the full length of the handle and extends through an opening 31 provided in the outer telescopic section adjacent the end 26 thereof for engagement in a closed ended longitudinal slot 32 in the periphery of the inner member. In order to obtain a maximum relative

movement of the inner and outer sections of the measuring cross-head, the slot 32 is extended for substantially the full length of the inner section and is provided with closed ends 33 and 34 adjacent the ends of the inner section, and the pin 22 is positioned as near as possible to the end 26 of the outer section so as to enable a maximum extension of the inner section. In order to obtain this latter positioning of the pin and for other reasons, as will be hereinafter mentioned, the bore 28 in the handle is arranged at the end 29 of the handle eccentrically to the axis of the handle and as near to the end 26 of the collar as is possible to safely and commercially construct, and the tubular extension 27 of the collar is formed substantially at the end 26 of the collar. In this manner the lower end of the locking pin is positioned as close as possible to the open end of the outer section, so as to permit a maximum extension of the inner section.

The sections are secured in adjusted position by pressing the locking pin longitudinally through the handle to bear against the inner telescopic member and as here shown, the means for so urging the pin here consists of a cap 36 threaded into the outer end of the bore 28 and provided with a tubular portion 37 somewhat larger than the diameter of the pin for loosely fitting over the outer end of the pin and adapted to seat against the pin in its inwardly threaded position in the handle. Preferably, the outer portion of the cap and the outer portion of the handle are knurled in order to facilitate relative turning of the cap and handle for locking and releasing the telescopic sections.

The means for holding the telescopic sections against separation upon unscrewing the cap 36 to release the pressure on the pin 22, here consists of laterally extending inter-engaging portions on the pin and handle and which are normally aligned so as to prevent retraction of the pin out of the slot 32 in the inner telescopic section. The inter-engaging means aforesaid here consists of an annular groove 38 provided on the pin adjacent the outer end arranged oppositely to an annular shoulder 39 in the bore 28 in the handle. The internal diameter of the shoulder 39 is preferably slightly larger than the diameter of the pin, so as to permit passage of the pin through the opening in the shoulder and the groove in the pin is normally held in position to engage the shoulder by the holding of the pin in a longitudinally inclined position through the bore so as to enter one side of the shoulder into the space of the groove. This is effected in part by the arrangement of the pin opening in the outer telescopic section and the eccentric position of the pin opening at the end 29 of the handle and the action of the cap 36 to substantially centralize the outer end of the pin in the bore, so that the axis of the pin will be inclined generally to the axis of the bore. To hold the pin in this inclined position, the pin opening in the outer telescopic section is preferably of smaller size than the bore and only a little larger than the pin itself. On the other hand, the bore is of substantially larger diameter than the pin so that upon removal of the cap 36, the pin may be shifted laterally in the bore to align the pin with the opening in the shoulder 39 to thereby enable withdrawal of the pin from the bore. Upon such withdrawal of the pin, the inner telescopic section may be removed from the outer section and the several moving parts of the tool disas-

sembled for cleaning, inspection, repair or replacement.

I claim:

1. An inside caliper comprising, an elongated handle having a longitudinally extending bore therethrough, a measuring cross-head formed of telescopically arranged inner and outer slidably engaged members with the inner of said members being extendible from an open end of said outer member, said outer member being secured to said handle adjacent the open end thereof, and means carried by said handle for holding said members in adjusted position comprising, a locking pin carried in said handle bore and engageable with said inner member, and means for pressing said pin against said inner member, said bore having an axis inclined to the axis of said handle so as to position the head end of said bore adjacent the open end of said outer member.
2. An inside caliper comprising, an elongated handle having a bore therethrough, a measuring cross-head formed of a pair of telescopically mounted tubular members arranged with an inner member extendible from an open end of an outer member, said outer member being secured to said handle adjacent said open end, spring means carried by said members for urging the outward extension of said inner member, said inner member being provided with a closed ended longitudinally extending groove in the outer periphery thereof, and a locking pin carried by said handle in said bore for engaging in said groove for holding said members in adjusted position and for preventing withdrawal of said inner member from said outer member, said bore opening to the head end of said handle eccentrically to the axis of said handle towards the open end of said outer member so as to afford a maximum extension of said inner member.
3. An inside caliper comprising, an elongated handle having a bore therethrough, a measuring cross-head formed of a pair of telescopically mounted tubular members arranged with an inner member extendible from an open end of an outer member, said outer member being secured to said handle adjacent said open end, spring means carried by said members for urging the outward extension of said inner member, said inner member being provided with a closed ended longitudinally extending groove in the outer periphery thereof, a one piece locking pin carried in said handle bore and extending substantially the full length of said handle and having one end engaged in said groove, means for pressing said pin into said groove, and laterally extending interengaging means on said pin and handle operative to retain said pin in said groove.
4. An inside caliper comprising, an elongated handle having a bore therethrough, a measuring cross-head formed of a pair of telescopically mounted tubular members arranged with an inner member extendible from an open end of an outer member, said outer member being secured to said handle adjacent said open end, spring means carried by said members for urging the outward extension of said inner member, said inner member being provided with a closed ended longitudinally extending groove in the outer periphery thereof, a one piece locking pin carried in said handle bore and extending substantially the full length of said handle and having one end engaged in said groove, means for pressing said pin into said groove, and laterally extending interengaging means on said pin and handle operative to retain said pin in said groove, said bore

in said handle being sufficiently larger than said pin to enable disengagement of said last named means and withdrawal of said pin.

5. An inside caliper comprising, an elongated handle having a bore therethrough, a measuring cross-head formed of a pair of telescopically mounted tubular members arranged with an inner member extendible from an open end of an outer member, said outer member being secured to said handle adjacent said open end, spring means carried by said members for urging the outward extension of said inner member, said inner member being provided with a closed ended longitudinally extending groove in the outer periphery thereof, a one piece locking pin carried in said handle bore and extending substantially the full length of said handle and having one end engaged in said groove, means for pressing said pin into said groove, and laterally extending interengaging means on said pin and handle operative to retain said pin in said groove, said bore having an axis inclined to the axis of said handle so as to normally retain said last named means in position for engagement.

6. An inside caliper comprising, an elongated handle having a bore therethrough, a measuring cross-head formed of a pair of telescopically mounted tubular members arranged with an inner member extendible from an open end of an outer member, said outer member being secured to said handle adjacent said open end, spring means carried by said members for urging the outward extension of said inner member, said inner member being provided with a closed ended longitudinally extending groove in the outer periphery thereof, a one piece locking pin carried in said handle bore and extending substantially the full length of said handle and having one end engaged in said groove, laterally extending interengaging means on said pin and handle operative to retain said pin in said groove, said bore having an axis inclined to the axis of said handle, and means at the outer end of said handle for centralizing said pin and for holding said last named means in position for engagement, said last named means being removable from said handle and said bore being larger than said pin whereby on removal of said last named means said pin may be displaced laterally to disengage said interengaging means.

7. An inside caliper comprising, an elongated handle having a bore therethrough, a measuring cross-head formed of a pair of telescopically mounted tubular members arranged with an inner member extendible from an open end of an outer member, said outer member being secured to said handle adjacent said open end, spring means carried by said members for urging the outward extension of said inner member, said inner member being provided with a closed ended longitudinally extending groove in the outer periphery thereof, a one piece locking pin carried in said handle bore and extending substantially the full length of said handle and having one end engaged in said groove, means for pressing said pin into said groove, laterally extending interengaging means on said pin and handle operative to retain said pin in said groove, said bore having an axis inclined to the axis of said handle, means at the outer end of said handle for centralizing said pin and for holding said last named means in position for engagement, said pin being formed intermediate its length with an annular groove, said bore being of a larger diameter than said pin and having an

annular inwardly extending shoulder of slightly larger diameter than said pin, said bore having an axis inclined to the axis of said handle so as to normally position said pin groove in engagement with said shoulder to prevent retraction of said pin from said member groove, and means for pressing said pin into said member groove to hold said members in adjusted position.

8. An inside caliper comprising, an elongated handle, a measuring cross-head formed of telescopic sections including an inner section extendible from an open end of an outer section, said outer section being secured to one end of said handle adjacent its open end, spring means carried by said sections for urging the outward extension of said inner section, said inner section being provided with a longitudinally extending closed ended slot in its periphery, said handle being provided with a longitudinal bore registering with an opening through said outer section adjacent the open end thereof, said opening in

said outer member being of smaller diameter than said bore and arranged eccentrically thereto, a locking pin carried in said bore and extending through said opening into engagement in said groove, said pin being provided with an annular groove, said handle being formed with an annular shoulder in said bore opposite said groove and of an internal diameter at said shoulder slightly larger than said pin, and a tubular cap threaded into the outer end of said handle bore and engaging over the outer end of said pin to hold said pin end substantially eccentrically arranged within said bore and to thereby maintain the axis of said pin inclined to the axis of said bore and said shoulder engaged in said groove to prevent withdrawal of said pin from said section slot, said cap being adapted to press against the outer end of said pin to lock said sections in adjusted position.

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