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STEM LOCK FOR DIAL GAUGES

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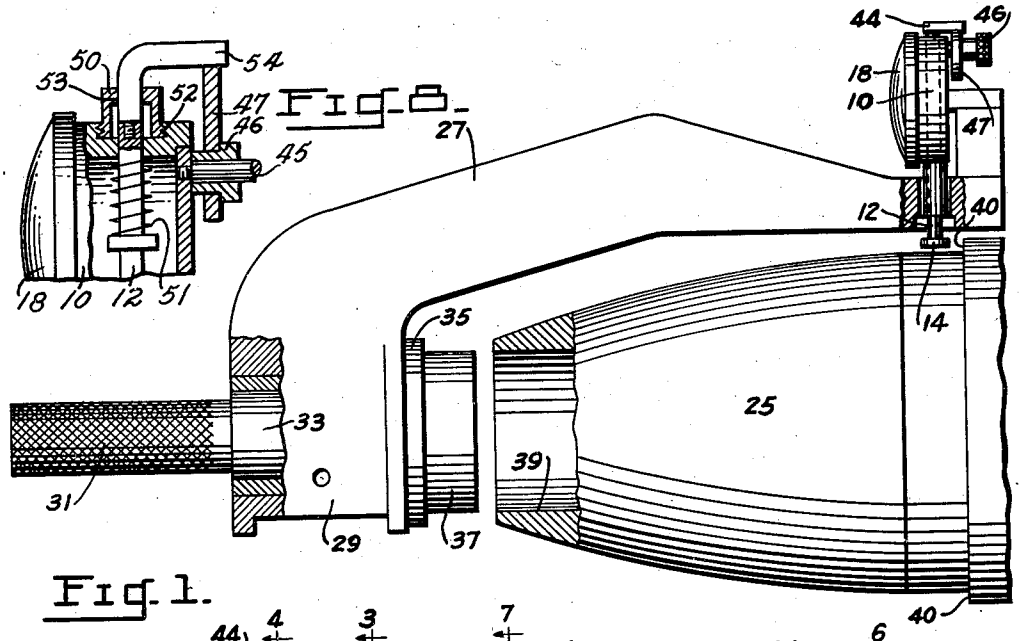


Fig. 1.

Fig. 8.

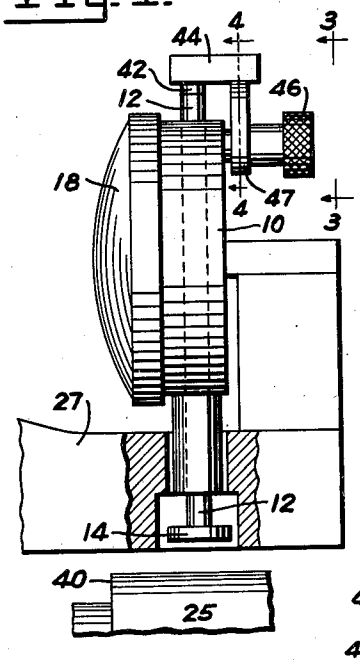


Fig. 2.

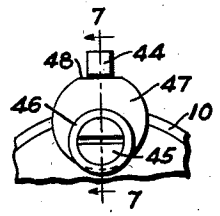


Fig. 3.

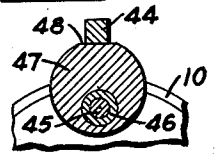


Fig. 4.

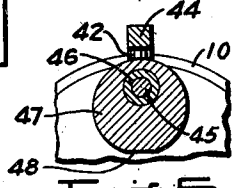


Fig. 6.

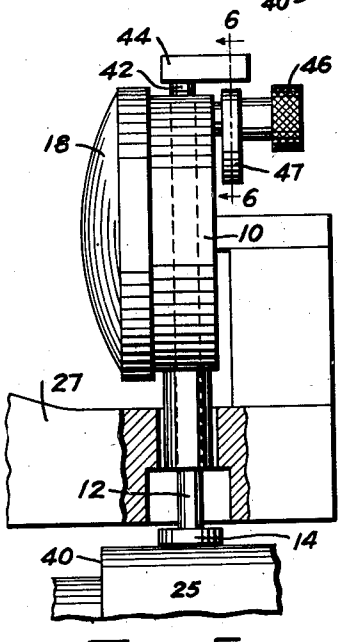


Fig. 5.

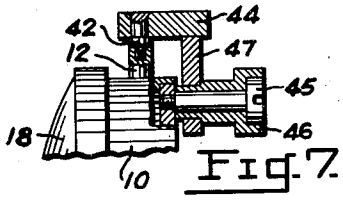


Fig. 7.

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STEM LOCK FOR DIAL GAUGES

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3 Claims. (Cl. 33—172)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to us of any royalty thereon.

Our invention relates to dial indicator and other gages of the retractable stem type and it has special reference to selectively effective means for holding the stems of such gages fully retracted.

Broadly stated, the object of our invention is to improve the operating effectiveness of dial indicators and other retractable stem gages.

A more specific object is to safeguard the stems of such gages from damage during set up of the work to be measured.

Another object is to provide improved means for locking the stem of such gages in their fully retracted positions with a single manipulation.

A further object is to provide such locking means which are operative with gages whose stems have either short or long ranges of travel.

A still further object is to provide a gage stem lock of improved design and enhanced usefulness.

In practicing our invention we attain the foregoing and other objects and advantages by providing a gage stem lock that has the unique construction and the superior performance presently to be described. One preferred form of our improved device is shown by the accompanying drawings wherein:

Fig. 1 is a side view of a conventional dial indicator "concentricity gage" and an ammunition shell to be gaged, showing our new lock installed on the gage's case and stem, and depicting same released to allow the full stem protrusion represented;

Fig. 2 is an enlarged similar showing of the new lock when functioning to hold the gage stem fully retracted;

Fig. 3 is a frontal view of our device in operative locking position as seen from line 3—3 of Fig. 2;

Fig. 4 is a section on line 4—4 of Fig. 2 showing constructional details of the lock in its locking position;

Fig. 5 shows the gage stem in gaging position after the new lock is released from the Fig. 2 fully retracted position;

Fig. 6 is a section on line 6—6 of Fig. 5 showing constructional details of the lock when not functioning to raise the gage stem;

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Fig. 7 is a section taken from line 7—7 of Fig. 3 to show further details of the lock parts and their relationships with the conventional dial indicator gage; and

Fig. 8 is a view similar to Fig. 7 except that a portion of the gage case wall has been removed to show details of the gaging stem and spring therefor; the view also shows a one-piece extension of the gage stem substituted for the two-piece extension shown in the other drawings.

Gages with which lock is usable

Retractable stem gages of a wide variety of types may be benefited by our improved locking device. The dial indicator gage shown in the drawings is illustrative of these. It comprises a case body 10 having a stem 12 longitudinally movable therethrough. The "gaging" or lower end of this stem is normally protruded by spring action, as shown by Figs. 1, 5 while the upper or "follower" end is correspondingly retracted into the gage case.

Affixed to the stem gaging end is a tip 14 for contacting the surface of the work to be measured. Indication of the thickness or other characteristic of such work is given by the usual pointer (not shown) that is rotated by movement of the stem 12 through case 10 and that registers with a graduated scale (likewise not shown) also within the case. A transparent cover 18 allows both this scale and the pointer to be viewed by the gage operator.

In the drawings the illustrative dial indicator gage to which our invention has been applied is shown employed as a component of a conventional "concentricity gage" with which the concentricity of a heavy caliber ammunition shell 25 is to be tested.

As Fig. 1 shows, this "concentricity gage" comprises a substantially L-shaped frame 27 whose base terminates in a cylindrical sleeve portion 29. Fitting like an "axle" within this sleeve 29 is a cylindrical object comprising the protruding handle 31, an expanded portion 33 actually housed within sleeve 29 and about which frame 27 is rotatable, a further expanded shoulder 35 and a plug 37.

The operator desiring to check the concen-

tricity of an object such as shell 25 fits plug 37 into snug-fitting engagement within the shell's mouth 39. (If the mouth is threaded, as for attachment of a fuze, plug 37 can be threaded to mate therewith.) As reference to Fig. 1 will make clear, in so doing it is necessary to withdraw the indicator gage stem 12 upwardly into frame 27 or else the stem's tip 14 will strike the stepped up portion 40 of the shell. Once stem 12 is so withdrawn (see Fig. 2), plug 37 is fitted into shell mouth 39 and then the gage stem can be released so that the tip 14 on the stem's gaging end rests on shell 25's surface as in Fig. 5.

Concentricity of the shell is then determined in a conventional manner. The operator may preferably rotate frame 27 about expanded portion 33 of the earlier mentioned "axle," all the while observing the dial indicator (not shown) to see if there is any deflection, a lack of such movement indicating a shell circumference which is concentric with the shell's bore.

Further details of the concentricity gage's operation are not pertinent here and need not be elaborated on for the instrument is well known to the prior art and its operation or structure has not been changed by us. As the description proceeds, moreover, it will become apparent that this arrangement is merely representative of a number of other extensively used gage set-ups wherein full protrusion of stem 12, as indicated by Fig. 1, prevents placement of the work to be gaged thereunder until the stem has been retracted as shown in Fig. 2.

Stem 12 is urged downwardly by an internal spring 51 (see Fig. 8); hence unless the described retraction is first effected, placement of "work" such as shell 25 into gaging position will cause stem 14 to be pushed to one side, typically bending or even breaking the stem and thereby both damaging and impairing operativeness of the complete gage. Thus, in the illustrative showing of Fig. 1, if stem 12 is not sufficiently retracted, tip 14 will strike the shell's stepped-up portion 40 to cause the damage just described.

Early practice in effecting the required retraction was to utilize toggle clamps (not shown) in a way to withdraw the entire indicator 10, along with the stem, away from the gaging position. An improvement thereover which eliminated much of the mechanical complications and inconvenience was then made and disclosed by Longworth in a co-pending application entitled "Stem lock for dial gages" which was filed on June 11, 1945, and bears Serial No. 598,742, now Patent 2,415,105 granted February 4, 1947.

Longworth's improvement made possible the use of a stationary mounting of the gage body in a manner similar to that of our present invention. As will be seen, however, our herein described improvement overcomes the faults of that Longworth lock disclosed by Ser. No. 598,742, namely the inability to operate effectively on gage stems having short ranges of travel plus the need for first lifting up the stem before putting the lock in operation.

Our improved stem lock

In the illustrative construction shown, our new stem lock replaces the dust cap 50 (see Fig. 8) and a retaining screw thereunder (not shown) which prevents the stem from dropping out of the gage case. This cap 50 conventionally screws into the top of the gage case as indicated at 52, while the retaining screw is screwed into the follower end of the gage stem 12. In the stem's threaded hole which was intended to receive the conventional retaining screw now dispensed with, the threaded end of an adapter 42 is screwed tight.

This adapter supports a cross-bar 44 to which it is made fast in any suitable manner. In the construction shown by Fig. 7, the non-threaded end of the adapter is fitted into a hole in cross-bar 44 and is peened over to form a lip which serves to keep the bar and adapter fastened together.

As Fig. 7 also shows, a hole is drilled and tapped directly into the rear of gage case 10. This hole receives the threaded end of a stud 45 which supports a knob or handle 46 and an eccentric cam 47. The knob 46 is "press-fitted" into a hole in eccentric cam 47 so that when the knob is turned about stationary stud 45 cam 47 will likewise be turned.

When our locking device is released as shown in Figs. 1, 5, 6, the gage is operable for measuring the work (in our illustrative case this measurement is of a shell's concentricity and is made when the gage is installed in the Fig. 5 position). This operation is performed in exactly the same manner as if the stem lock were not installed on the gage. Under this lock-released condition, stem 12 is free to move throughout its complete range of travel and the intended measuring functions of the gage are unhampered.

In order to lock stem 12 in the retracted position, it is merely necessary to twist knob 46 clockwise or counterclockwise and thereby move eccentric cam 47 to the position shown in Figs. 2, 3, 4, 7. In thus turning knob 46, cam 47 is brought into contact with and raises up cross-bar 44 plus the adapter 42 and stem 12 attached thereto. When the eccentric cam 47 finally reaches the position of Figs. 2, 3, 4, 7 the flat portion 48 of the cam's edge supports and locks the cross-bar 44 at its illustrated elevated level, thereby restraining the attached gage stem from downward movement under spring action.

Under this lock-engaged condition the stem tip 14 is positively held out of reach of the shell 25 (as in Fig. 2) or other work to be gaged, and the work may therefore be placed in gaging position (Fig. 5) without contacting of damaging the gage stem. When placed in the gaging position, release of the lock is effected at will merely by twisting knob 46 about so that cam 47 drops to its Fig. 6 position out of contact with cross-bar 44, thus permitting the stem 12 to assume the condition shown by Figs. 1 and 5.

The superior features of our just described lock, aside from its evident positive locking action and ease of operation, reside in the opportunities for adapting it to practically any existent dial indicator gage. Thus, the adapter 42 can be made longer or shorter than shown depending on the length of the stem 12 with which a particular gage may have been supplied, and the amount of upward and downward travel required of the stem. Likewise, the eccentric cam 47 can be made smaller or larger so as to raise cross-bar 44 a greater or lesser amount than the distance shown, depending on the individual gage's requirements.

With such a choice the entire lock unit is readily installable in place of the conventional dust cap 50 and a stem retaining screw (not shown) thereunder on dial indicator and other gages of the retractable stem type. It is even possible to use the lock without removing the dust cap if so desired; this may be done by boring a hole 53 through the cap (see Fig. 8) and selecting an adapter 42 whose size permits it to slide

freely through that hole. A further alternative would be to use a one-piece, L-shaped extension 54 of stem 12 (as shown in Fig. 8) instead of the two-piece adapter 42 and cross-bar 44 construction shown. Still other design details may also be varied as required without departing from the spirit and intent of our invention.

Summary

From the foregoing it will be seen that we have provided selectively efficient means for holding the stems of dial indicator and other gages fully retracted; that we have safeguarded the stems of such gages from damage during set up of work to be measured; that we have provided means by which the stems may be locked in their fully retracted position with a single manipulation; that we have provided locking means which are operative with gages whose stems have either short or long ranges of travel; and that we have provided a gage stem lock of improved design and enhanced usefulness.

Our invention is therefore broad in its adaption and hence is not to be restricted to the specific form here shown by way of illustration, but may be embodied in other forms within the scope of the appended claims.

We claim:

1. In combination, a dial indicator gage comprising a case, a stem extending through said case for longitudinal movement with respect thereto and having gaging and follower ends that protrude from axially aligned openings on opposite case sides, resilient means urging said stem in a direction to protrude its said gaging end from the case to a maximum and withdraw its said follower end into the case, an adapter having a first end threadedly secured to the gage stem's said follower end and a second end protruding axially therefrom through one of said case openings to the case exterior, an arm-like extension of said adapter's second end protruding laterally therefrom beyond an edge of said case, and an eccentric cam pivotably attached to a side of said case below the protruding arm-like extension of the adapter for selective turning thereabout so as to contact and supportingly raise the extension together with the adapter and stem attached thereto from an "unlock" position where the aforesaid stem movement is in no way interfered with to a "lock" position wherein the stem is held against said resilient means with the gaging end thereof withdrawn toward the case and the follower end thereof correspondingly protruded from the case.

2. For use with an indicator type gage made up of a case, a longitudinally movable stem extending through said case and having a gaging end which protrudes from one side of said case plus a follower end which axially aligns with an opening in the opposite side, a dust cap covering said opening and removably attached to said case, and resilient means urging the stem in a direction to effect a maximum protrusion of the stem's gaging end from the case and withdrawal of the stem's follower end away from said dust cap, the combination of a substantially L-shaped

member extending through a hole in said dust cap and having one end secured to the gage stem's said follower end and the other end protruding first axially and then laterally therefrom beyond an edge of said case's exterior, and an eccentric cam pivotably attached to a side of said case below the protruding L-shaped member for selective turning thereabout so as to contact and supportingly raise said member and stem attached thereto from an "unlock" position where the aforesaid stem movement is in no way interfered with to a "lock" position wherein the stem is held against said resilient means with the gaging end thereof withdrawn toward the case and the follower end thereof correspondingly protruded from the case.

3. In combination, a dial indicator gage comprising a case having an indicating dial on its front face and having backed thereagainst a rear face, a stem extending through said case between the said front and rear faces for longitudinal movement with respect thereto and having a gaging end which protrudes from one side of said case plus a follower end that axially aligns with an opening in the opposite case side, resilient means urging said stem in a direction to protrude its said gaging end from the case to a maximum and withdraw its said follower end into the case, an adapter having a first end threadedly secured to the gage stem's said follower end and a second end protruding axially therefrom through said opening to the case exterior, an extension of said adapter's second end protruding laterally therefrom beyond an edge of said case's rear face, an axle-like stud threadedly attached to the rear face of said case below the protruding adapter extension, a cylindrical shaft encircling said axle-like stud's non-threaded portion, and a substantially circular cam having an off-center hole through which said shaft extends in tight fitting relationship therewith so that upon selective turning of the shaft about said axle-like stud the cam pivots eccentrically thereabout and the portion of its edge which is farthest away from the cam's pivot point contacts and supportingly raises said adapter extension and stem attached thereto from an "unlock" position where the aforesaid stem movement is in no way interfered with to a "lock" position wherein the stem is held against said resilient means with the gaging end thereof withdrawn toward the case and the follower end thereof correspondingly protruded from the case.

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