SELF-LOCKING ADJUSTABLE SCREW DEVICE
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This invention relates to improvements in machine elements and more particularly to a screw device that is
of such a type as to be self-locking in all positions of its
adjustment, and to remain so adjustably interlocked with
precision against all vibration and impact that might tend
to dislodge it.

Another object of my invention is to construct a device
of the kind described that will serve the added func-
tion of providing an effective seal against unwanted leak-
age of fluids therepast at all intervals of the adjustment
range.

An added object of the invention is to so construct such a device that its several parts will be permanently
interlocked together to prevent rotary or other movement
relatively therebetween.

Further objects of my invention are to so construct such a device that it will be neat and attractive in appear-
ance, of but few parts permanently assembled together
as a unit, simple and economical in construction, and which may be used and re-used repeatedly without loss of
effectiveness.

Many other objects and advantages of the construc-
tion herein shown and described, and the uses thereof,
will be obvious to those skilled in the art to which this
invention appertains, all of which will be more clearly
pointed out in the following disclosure.

To this end, my invention consists in the novel construc-
tion, arrangement and combination of parts herein shown and described, and the uses set forth, as will be readily
understood by the following specification.

In the drawings, wherein like or corresponding parts
are represented by like reference characters throughout
the views.

FIGURE 1 is a sectional view, showing the device in
operative adjusted position in a cooperating mechanism;
FIGURE 2 is an exploded perspective view of the parts
of the device before assembly; and
FIGURE 3 is a greatly enlarged fragmentary sectional
detail, showing the device in its initial and in its adjusted
position.

Referring more particularly to the drawings, wherein
I have illustrated a preferred embodiment of the inven-
tion, I represents the sleeve or shell portion of any selected
machine member, with which the control device is in-
tended to cooperatively associate, said sleeve having a
chamber 2 therein that has female threads 3 forming the
bounding peripheral wall of the chamber of said sleeve
adjacent one end of the latter. An inlet 4 leads into
said chamber from any source of fluid supply, and there
is a discharge outlet 5 from the chamber. A ball 6 is
movable within said chamber to control passage of fluid
between said inlet and outlet, and normally seating on
the bottom wall of said chamber to close the passage-
way of the fluid during normal operation but to lift from
its seat when the fluid pressure exceeds a predetermined
amount.

Said machine member is here shown as in the nature
of a by-pass valve structure, being closed under normal
pressure, and permitting by-pass of fluid at excess pres-
sure. A spring 7 is arranged within the chamber, ex-

citing axial pressure against a plate 8 that is in constant
contact with said ball, so that the degree of spring pres-
sure will determine the maximum pressure that the fluid
must reach before the ball is momentarily unseated
against said spring pressure.

Sometimes there is an adjustment of spring pressure
provided through the use of screws that engage the spring
means, and usually with jam nuts or a keying arrange-
ment to hold the spring means in adjusted positions. However,
such adjustment holding means are not simple in construc-
tion, nor sufficiently positive and accurate in opera-
tion, and they usually permit leakage of fluid from said
chamber.

Although the device of my invention is shown herein
as being used with a valve structure, it is to be pointed
out that this is but one of the many different types where-
in the device may be employed, the same being just as
well adapted to many other uses.

The device includes a lead-screw element 9 of a
strong inflexible material, as of steel, having male threads
10 on its peripheral bounding wall to cooperably engage
with said female threads of the chamber, as shown, and
in this instance provides an upper wall or back stop
against which the spring engages.

A ring or washer 11 of resiliently yieldable material,
such as of nylon or other suitable plastic having good
elastic recovery or memory, is superimposed on the top
face of said element 9 and is of such size and shape that
its external peripheral face is of slightly greater diam-
eter than the minor diameter or inner crests of the
female threads of the chamber, as shown most clearly
by the dotted lines in FIG. 3, and in this instance said
peripheral surface of the ring is preferably smooth or
unthreaded. The outer bottom corner of said ring is
provided with a bevel 21 to serve as a lead-in portion
during advancement of the ring into the chamber. Said
ring may have one or more grooves or notches 12 pro-
vided into its top face, as shown most clearly in FIG. 2.

A plate 13, of a strong inflexible material, as of steel,
is arranged above said element 9, with its peripheral
portion provided with an axial flange 14 and a terminal hori-
izontal flange 15 extending radially outwardly from said
flange 14, said flanges being so sized as to neatly receive
said plastic ring and tightly engage the latter at its top
wall and inner wall, the terminal edge of the flange 15
being spaced away from the threaded portion of the
chamber, as shown. To prevent relative movement be-
tween said ring and plate the latter has lugs 16 provided in
its rim, spaced apart to cooperatively seat in the notches
12 in the plastic ring.

To hold the plate and element 9 tightly together against
any relative movement, a rivet or other suitable fitting
17, is arranged with knurls or splines 18 on its shank
portion and is forced into tight-fit relationship with said
plate and element 9, one end of said fitting having a tool-
engageable head 19 and its other end radially expanded
or peened into a counterbore in the underside of the ele-
ment 9, as illustrated in FIG. 1.

To further insure rigid interlocking of the various parts
of the device, a serrated saw-toothed lock washer 20 may
be interposed, if so desired, between the head of said
fitting 19 and said plate 13. From the foregoing, it is
seen that the various interlocks insure that there will be no relative rotation nor other relative movement, permitted between any two parts of the screw device.

In use, the assembled screw device is pre-assembled into an integral permanently interlocked unit, from the parts shown in FIG. 2, and is then ready for operative positioning into the threaded chamber of the selected machine part.

As illustrated in dotted lines in FIG. 3, the lead-in portion or screw 9 is screwed into the open end of the chambered opening, of course carrying the follower elements therewith, into said opening. The lead-in corner 21 of the plastic ring 11 enters said chamber, and then the outer peripheral wall of the plastic ring engages said female threads. Continued advancement of the element 9 into the chamber will crowd said ring into engagement with said female threads, as indicated in full lines in FIG. 3, said ring deforming or extruding into the voids of the female threads in such a manner as to form a good interlock therewith and an effective seal thereat.

The desired degree of tightness of such interlock between the ring 11 and the chamber can be varied in several ways, as by changing the amount of oversize of the ring or varying the lengths of engagement, the degree of sharpness of the crests of the female threads, pitch of threads, etc., as well as by variations in the relative diameters of the mating parts.

Because plastic of this kind has good elastic memory or recovery from its deformation, it can be used and reused repeatedly without loss of its function.

It is apparent that the screw unit will stay fixed after each interlock, at whatever point it is positioned, and provides a very simple means of adjustment as desired or needed.

The plain 13 may be made substantially planar if desired, as in the form of a washer, the only basic requirement being that it be shaped and sized to sufficiently confine the plastic ring, provide proper engagement therewith and be able to crowd or exert the ring radially outwardly into threaded engagement with the chamber upon rotation of the screw and the advancement axially of the latter.

I claim:

1. A self-locking and sealing device for adjusting control of the pressure-seating of a first member against displacement in the chamber of a second member that is provided with an internally-threaded opening therein, from one end to communicate with said chamber, said device including a relatively inflexible first element provided with peripheral male threads to cooperate with the threads of said opening, a resiliently yieldably deformable ring superimposed on said first element to cooperatively engage said female threads but which is initially of larger external diameter than that of the inner crests of the latter threads, a retainer superimposed on said ring, there being interlocking lugs and notches provided therebetween, and means permanently interlocking said retainer and first element together as an integral unit and whereby said device may be operably adjusted.

2. A device as set forth in claim 1, further characterized in that there is a toothed washer interlocking said retainer and said means, and which aids in preventing rotary or axial movement relatively between said first element, retainer and ring and permanently interlocking means.

3. A self-locking adjustable screw device for repeatable installation in a threaded opening comprising a resiliently yieldable member having a cylindrical side wall larger in diameter than the minor diameter of the internal threads of the opening in which the device is to be installed, and a rigid member positioned axially adjacent to the yieldable member, the rigid member having external threads complementary to and engageable with the internal threads of the opening, and means for connecting the rigid member to the yieldable member and for causing the yieldable member to rotate with the rigid member and yield to form threads mating tightly with the internal threads of the opening when the rigid member is threaded into the opening, the edge of the side of the yieldable member which first enters the opening being beveled to a reduced diameter to facilitate entry into the opening and starting of threads in the yieldable member.

4. A self-locking adjustable screw device for repeatable installation in a threaded opening comprising a resiliently yieldable member having a cylindrical side wall larger in diameter than the minor diameter of the internal threads of the opening in which the device is to be installed, and a rigid member positioned axially adjacent to the yieldable member, the rigid member having external threads complementary to and engageable with the internal threads of the opening, and means for connecting the rigid member to the yieldable member and for causing the yieldable member to rotate with the rigid member and yield to form threads mating tightly with the internal threads of the opening when the rigid member is threaded into the opening; a rigid retainer, the yieldable member being positioned between the rigid member and the retainer, the means for connecting the retainer to the rigid member; the rigid member, the retainer, and the yieldable member having holes through their centers and the connecting means comprising a stud extending through the holes, the stud having a head on one end bearing against one of either the retainer or the rigid member and having its end opposite the head flanged outwardly and bearing against the other of the retainer or the rigid member.

5. A self-locking and sealing device for adjusting control of the pressure-seating of a first member against displacement in the chamber of a second member that is provided with an internally-threaded opening therein, from one end to communicate with said chamber, said device including a relatively inflexible first element provided with peripheral male threads to cooperate with the threads of said opening, a resiliently yieldably deformable ring superimposed on said first element to cooperatively engage said female threads but which is initially of larger external diameter than that of the inner crests of the latter threads, a retainer superimposed on said ring, there being mutually projecting interengaging means between the retainer and ring to prevent relative rotation between the retainer and ring, and means connecting the retainer and first element together as an integral unit and whereby said device may be operably adjusted.

6. A self-locking adjustable screw device for repeatable installation in a threaded opening comprising a follower member having a resiliently yieldable cylindrical un-threaded side wall larger in diameter than the minor diameter of the internal threads of the said opening, and a rigid member positioned axially adjacent to the follower member, the rigid member having external threads complementary to and engageable with the internal threads of the opening, and means for connecting the rigid member to the follower member and for causing the latter member to rotate with the rigid member and yield to form threads on its cylindrical side wall mating tightly with the internal threads of the opening when the rigid member is threaded into the opening, and a retainer means rigidly connected to said follower member and rigid member to prevent relative rotation therebetween.

7. A self-locking adjustable screw device for repeatable installation in a threaded opening comprising a follower member having a resiliently yieldable cylindrical un-threaded side wall larger in diameter than the minor diameter of the internal threads of the said opening, and a rigid member positioned axially adjacent to the follower member, the rigid member having external threads complementary to and engageable with the internal threads of
the opening, and means for connecting the rigid member to the follower member and for causing the latter member to rotate with the rigid member and yield to form threads on its cylindrical side wall mating tightly with the internal threads of the opening when the rigid member is threaded into the opening, the leading edge of the side of the follower member which first enters the opening being of a reduced diameter to facilitate its entry into the opening and then starting of threaded formation in the side wall of the follower member.

References Cited by the Examiner

UNITED STATES PATENTS

1,878,327 9/1932 Rimmelspacher et al. 220—39
2,516,782 7/1950 Magrum 137—539.5 X
2,720,845 10/1955 Whitlock 251—297
2,747,948 5/1956 Jergens 308—187.1
3,101,739 8/1963 Pribonic 137—539.5 X

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