

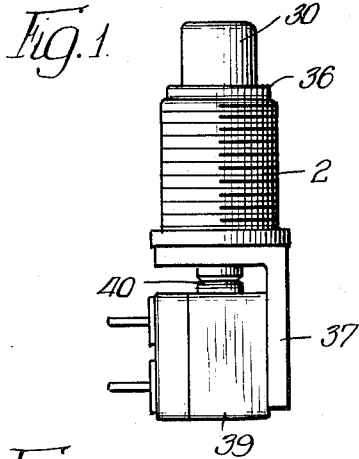
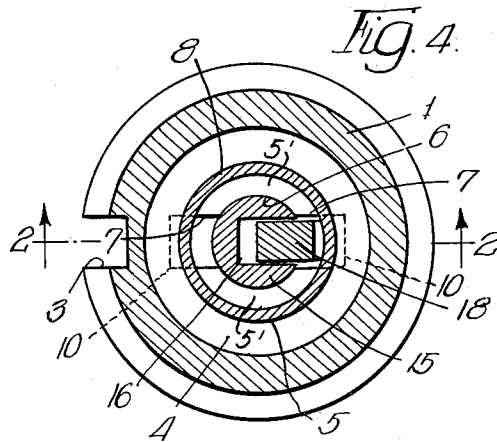
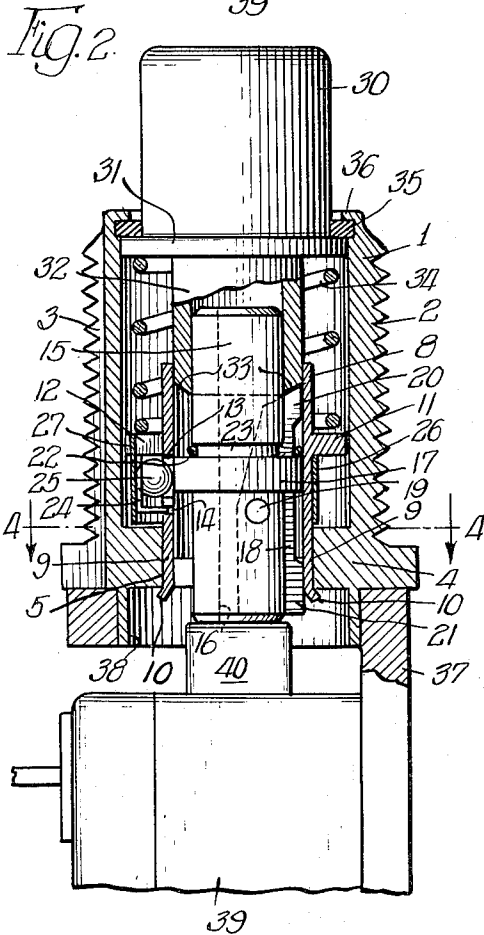
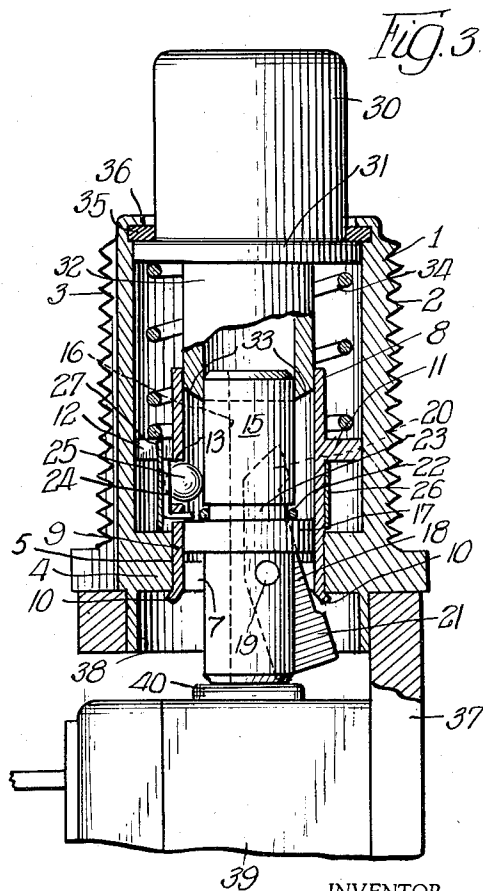
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ACTUATOR MECHANISM

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ACTUATOR MECHANISM

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16 Claims. (Cl. 74-503)

This invention relates to actuator mechanisms of the alternate action or so-called "push-push" type, and has for its principal object the provision of a new and improved mechanism of this kind.

It is a main object of the invention to provide a push-push actuator mechanism that is compact in design and reliable in its action.

Another object of the invention is to provide a push-push actuator mechanism which is positively locked in operated position and not affected by vibrations.

Another object of the invention is to provide an actuator mechanism the main parts of which travel from normal to operated position solely in translatable motion.

Another object of the invention is to provide an actuator mechanism of the push-push type that is positive in its action both on operation and release.

Another object of the invention is to provide a push-push actuator mechanism that can be manufactured at low cost without sacrificing quality.

Further objects of the invention not specifically mentioned here will be apparent from the detailed specification and claims which follow, reference being had to the accompanying drawings in which a preferred embodiment of the invention is shown by way of example and in which:

Fig. 1 is an elevational view showing the actuator of the present invention applied to an electric switch;

Fig. 2 is a view partly in section, along the line 2-2 of Fig. 4, drawn to an enlarged scale and showing the actuator in normal position;

Fig. 3 is a view similar to Fig. 2, showing the actuator in operated position; and

Fig. 4 is a cross sectional view taken along the line 4-4 of Fig. 2, looking in the direction of the arrows.

Alternate action mechanisms, commonly called push-push mechanisms, are frequently used to operate electric switches and other similar devices. Such mechanisms usually include a push button which pressed a first time moves the device from a normal to an operated position. The next pushing of the button reverses the operation, that is, moves the device from its operated to its normal position. The present invention relates to such an actuator mechanism.

Push-push mechanisms of the prior art of which I am aware have frequently incorporated an actuator whose movement from normal to operated position included rotation either around the axis of the actuator or around an axis at right angles thereto. The mechanism of the present invention involves only translatable motion in the travel of its actuator from normal to operated position. Also, in the mechanism of the present invention, the actuator is positively locked or latched in its operated position and is not affected by vibration.

Referring now to the drawings in more detail, the actuator of the present invention is housed in a bushing 1 having external threads 2 and the usual keyway 3 for the reception of a lug washer by which rotation of the bushing around its axis is prevented when the bushing is

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mounted upon a panel. The bushing 1 contains an end wall 4, in the upper surface of which a socket 5 is indented, that part 5' of the end wall 4 beneath the socket containing a circular perforation 6 from which diametrically opposed slots 7 extend to the outer periphery of the socket 5. The bushing thus takes the form of a hollow cylinder partially closed at its lower end.

Fitted within this cylinder is a sleeve 8 which is in the form of a hollow cylinder the lower end of which abuts against that portion 5' of the end wall 4 forming the bottom of the socket 5. The sleeve 8 contains tongues 9 which project through the slots 7 and are bent outwardly over the lower surface of the end wall 4, as indicated at 10, to fix the sleeve in the bushing. The sleeve 8 contains a radially outwardly projecting collar 11 that extends into close proximity to the inner surface of the bushing 1 and contains a slot 12. Located adjacent the slot 12 in the collar is a circular perforation 13 in the sleeve 8 and below this perforation is an elongated slot 14.

Slidably fitted within the sleeve 8 is an actuator 15 which is cylindrical in form and contains a keyway slot 16 that extends from end to end of the actuator. Projecting radially outwardly from the cylindrical portion of the actuator is a collar 17 that has sliding fit engagement with the inner surface of the sleeve 8.

The actuator 15 has sliding fit engagement with the portions of the end wall 4 defining the perforations 6 therein, and this engagement of the actuator with the wall together with the engagement of the collar 17 with the sleeve 8 maintains the actuator concentrically in the sleeve.

Mounted in the keyway groove 16 of the actuator is a rocker 18 supported upon a pivot 19 and having end portions 20 and 21 which engage the inner surface of the sleeve 8 when the actuator is in normal position. A spring 22, fitted in a groove 23 in the actuator, bears against the rocker 18, tending to rotate it counterclockwise, as seen in Fig. 2, around its pivot 19.

Mounted outside of the sleeve 8 is a latch 24 that is L-shaped and has one of its legs projecting into the slot 14 in the sleeve. The other leg of the latch contains a perforation in which is seated a ball 25 that projects through the opening 13 in the sleeve 8 into engagement with the collar 17 when the actuator is in normal position. A spring 26 encircles the sleeve 8 and engages the latch 24 and ball 25, and is tensioned to urge these members inwardly towards the center of the sleeve. A tongue 27 on the spring 26 projects into the slot 12 in the collar 11 of the sleeve to prevent rotation of the spring around the axis of the sleeve.

Mounted in the bushing 1 is a push button 30 that is equipped with an outwardly extending flange 31 and a centrally located hollow boss 32 that is telescoped into the sleeve 8 and into the hollow portion of which the actuator 15 is telescoped. It will be noted that the lower edge of the boss 32 is beveled, as indicated at 33, and that the adjacent end of the end portion 20 of the rocker 18 is beveled at the same angle. A coil spring 34 surrounds the boss 32 and sleeve 8 and is abutted against the collar 11 on the sleeve and the flange 31 on the push button to urge the push button upwardly, as seen in Fig. 2. A retaining ring 35, fitted against a shoulder in the bushing 1 and held by the overturned edge 36 of the bushing, stops the push button 30 in its movement outwardly of the bushing.

When the actuator mechanism is applied to an electric switch, an L-shaped bracket 37 is fitted on a cylindrical projection 38 of the bushing 1 and serves as a mounting for the switch 39. The operating button 40 of the switch abuts against the end of the actuator 15.

When it is desired to operate the switch 39, pressure is applied to the push button 30, moving it downwardly. The beveled end 33 of the boss 32 being engaged with

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the end of the rocker 18, moves that rocker downwardly. Since the rocker is pivotally connected to the actuator 15, the actuator is likewise moved downwardly in translatable motion, thereby forcing the operating button 40 of the switch downwardly, as seen in Fig. 2, to effect an operation of the switch. Movement of the actuator 15 downwardly moves the collar 17 out of engagement with the ball 25, permitting that ball to move inwardly through the opening 13 thereby bringing the end of the latch 24, which projects through the opening 14, into engagement with the edge of the collar. Further downward movement of the actuator 15 moves the collar 17 downwardly out of engagement with the latch 24, whereupon spring 26 moves the latch and ball inwardly so that the lower end of the latch 24 overhangs the upper edge of the collar 17 thereby to positively latch the actuator in operated position independently of the push button 30. Downward movement of the actuator 15 is arrested by engagement of the lower surface of the collar 17 with the portions 5' of the end wall 4 of the bushing disposed alongside of the opening 6 therein. This occurs when the collar has moved sufficiently far to permit the latch 24 to be moved inwardly into latching position, at which time the button 40 of the switch 39 will be in its fully operated position and damage to the switch mechanism is thereby definitely prevented.

During downward movement of the actuator 15, the end portion 21 of the rocker 18 is moved out of engagement with the tongue 9 on the sleeve 8, thus freeing the rocker for rotation around its pivot 19. As pressure is removed from plunger 30, spring 34 moves it upwardly and the end 33 of the boss 32 is thus backed away from the end of the rocker 18. Spring 22 then rotates the rocker, moving it from the position in which it is shown in Fig. 2 into the position shown in Fig. 3. It will be noted that in this latter position, the end portion 20 is positioned entirely within the slot 16.

It will be noted that it is not necessary for the push button 30 to return completely to normal to condition the mechanism for re-operation as this occurs as soon as end portion 20 is moved into slot 16. Thus should it be necessary to operate and restore switch 39 quickly, it can be done.

When it is desired to re-operate the switch to restore it to its normal position, push button 30 is again operated and the beveled end 33 of the boss 32 thereby brought into engagement with the ball 25 causing further downward movement of the push button to move the ball 25 outwardly and thereby move the latch 24 outwardly. As soon as the push button has been fully operated, the boss 32 thereon will be sufficiently far down in the sleeve 8 to cause the ball to bear against the outer surface of the boss, thereby to hold it in the outward position in which it is shown in Fig. 2. As pressure on the push button 30 is released, the spring bearing against the operating button 40 of the switch 39 raises the actuator 15, moving the collar 17 thereon into engagement with the latch 24 and later with the ball 25 as the actuator returns to normal position. Upward movement of the actuator 15 engages the beveled edge of the end portion 21 on the rocker with the bent-over portion 10 of the tongue 9 of the sleeve, thereby to rotate the rocker 18 in a clockwise direction, as seen in Fig. 3, into the position in which it is shown in Fig. 2, this rotation tensioning the spring 22 in readiness for a subsequent operation of the mechanism. As soon as the outer surface of the end portion 20 is moved into engagement with the inner surface of the sleeve 8, further rotation of the rocker 18 is prevented and the rocker will thus be held in the position in which it is shown in Fig. 2.

Preferably the bushing 1 and the bracket 37 are formed of metal suitably plated for appearance's sake and to prevent rusting. The sleeve 8 might likewise advantageously be formed of metal suitably plated, and the actuator 15 and rocker 18 may be formed either of

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metal or plastic, within the teachings of the invention.

While the invention is illustrated by showing its connection with an electric switch, such illustration is by way of example only, as the actuator of the present invention may be put to other uses within the teachings of the invention.

While I have chosen to show my invention by illustrating and describing a preferred embodiment of it, I have done so by way of example only, as there are many modifications and adaptations which can be made by one skilled in the art within the teachings of the invention.

Having thus complied with the statutes and shown and described the preferred embodiment of my invention, what I consider new and desire to have protected by Letters Patent is pointed out in the appended claims.

What I claim is:

1. A push-push actuator mechanism comprising: a hollow cylindrical bushing; a hollow cylindrical sleeve concentrically fixed in said bushing; a cylindrical actuator concentrically disposed in said sleeve; a rocker pivotally mounted on said actuator and having end portions normally engaging the sleeve; a push button fitted in said bushing and extending outwardly therefrom; means for limiting movement of said push button outwardly of said bushing; a hollow boss on said push button telescoped into said sleeve and into which said actuator is telescoped, said boss engaging said rocker to move the actuator from normal to operated position as the push button moves into the bushing; latch means for holding the actuator in operated position; spring means for moving the end of the rocker engaged by the boss out of the path of the boss; and spring means for moving said push button outwardly of the bushing and into engagement with said movement limiting means.
2. A mechanism as specified in claim 1, in which the bushing contains an end wall having a centrally located cylindrical socket into which the sleeve projects into abutment with the end wall.
3. A mechanism as specified in claim 2, in which the end wall contains a perforation of smaller diameter than the socket and centered therein, which perforation contains diametrically opposed slots that extend to the outer periphery of the socket.
4. A mechanism as specified in claim 3, in which the sleeve contains opposed tongues extending through the slots in the end wall and thence outwardly over the face of the end wall that is remote from the socket to secure the sleeve in the bushing.
5. A mechanism as specified in claim 4, in which the portions of the end wall against which the sleeve abuts form opposed shoulders projecting into the sleeve at the end thereof.
6. A mechanism as specified in claim 5, in which the sleeve contains a radially outwardly extending collar that engages the bushing and is spaced from the end wall thereof.
7. A mechanism as specified in claim 6, in which the latch means is located between the collar and the end wall of the bushing.
8. A mechanism as specified in claim 7, in which the actuator contains a radially outwardly extending collar that engages the sleeve and the end wall shoulders engage the actuator to guide the actuator during movement longitudinally of the sleeve.
9. A mechanism as specified in claim 8, in which the collar on the actuator engages the shoulders in the bushing thereby to limit movement of the actuator in a direction away from the push button.
10. A mechanism as specified in claim 8, in which the latch means engages the collar on the actuator to hold the actuator in operated position.
11. A mechanism as specified in claim 10, in which the latch means comprises: an L-shaped latch one arm of which projects through a slot in the sleeve into the path

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of the actuator collar; a ball projecting through a second perforation in the sleeve and engaging the actuator and the other arm of the latch; and a latch spring encircling the sleeve and engaging the latch and ball to urge the latch means into latching position.

12. A mechanism as specified in claim 11, in which the projection on the push button engages the ball and moves it and the latch outwardly against the tension of the latch spring responsive to an operation of the push button to release the actuator from operated position.

13. A mechanism as specified in claim 12, in which the collar on the actuator in normal position of the actuator engages the ball to hold the latch out of the path of the collar and against the tension of the latch spring.

14. A push-push actuator mechanism comprising: a hollow cylindrical bushing; a hollow cylindrical sleeve fixed in said bushing; a cylindrical actuator concentrically disposed in said sleeve; a key groove extending from end to end of said actuator; a rocker disposed in said groove and held therein by a pivot pin located near the midpoint of the rocker, said rocker having end portions normally engaging the sleeve; a push button fitted in said bushing and extending outwardly therefrom; means for limiting movement of said push button outwardly of said bushing; a hollow boss on said push button telescoped

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into said sleeve and into which said actuator is telescoped, said boss engaging said rocker to move the actuator from normal to operated position as the push button moves into the bushing; latch means for holding the actuator in operated position; spring means for moving the end of the rocker engaged by the boss out of the path of the boss; and spring means for moving said push button outwardly of the bushing and into engagement with said movement limiting means.

15. A mechanism as specified in claim 14, in which, with the actuator in operated position, the spring means moves the end of the rocker adjacent the push button into the keyway groove and moves the end of the rocker remote from the push button outwardly beyond the end of the sleeve.

16. A mechanism as specified in claim 15, in which as the actuator moves from operated to normal position the end of the rocker remote from the push button engages the sleeve to cause movement of the actuator to rotate the rocker on its pivot thereby to move the end of the rocker adjacent the push button out of the keyway groove against the tension of the spring means and into engagement with the sleeve.

No references cited.