June 25, 1968 J. E. MAAS ET AL 3,390,237

TOGGLE SWITCH ASSEMBLY

Filed Oct. 26, 1966

FIG. 1

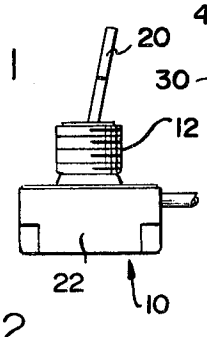


FIG. 4

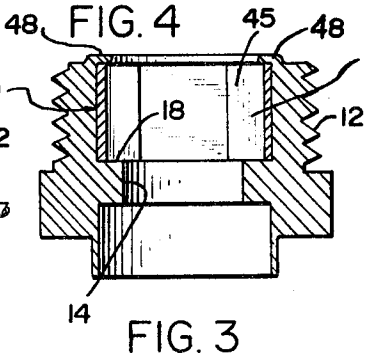


FIG. 5

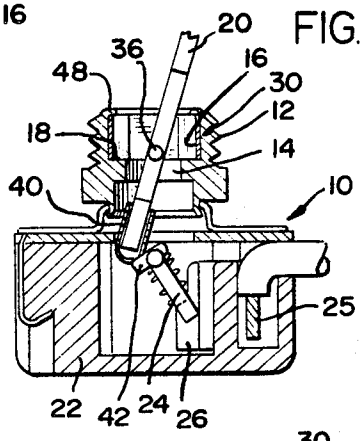


FIG. 2

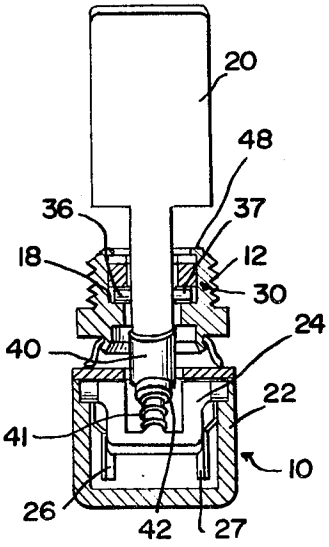


FIG. 3

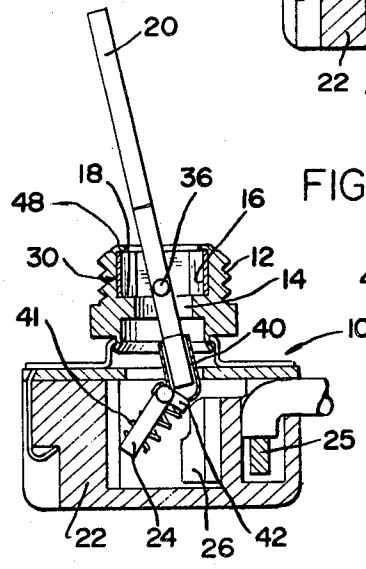


FIG. 6

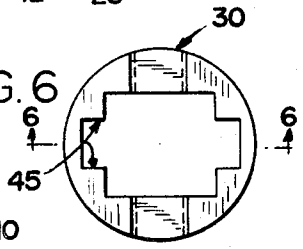


FIG. 7

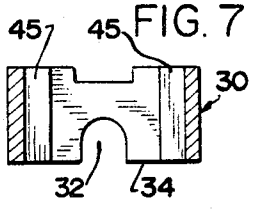


FIG. 8

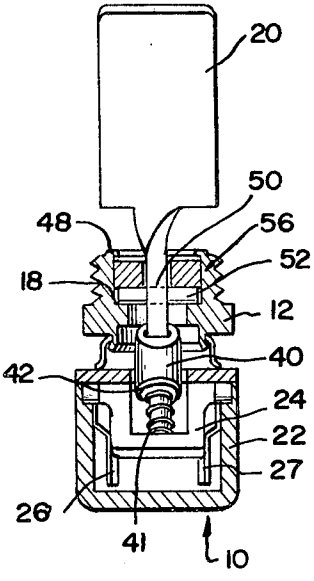


FIG. 9

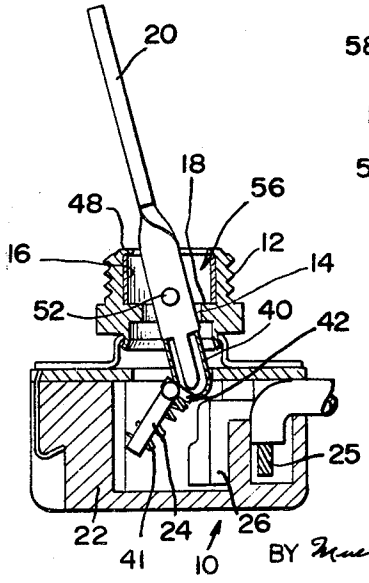


FIG. 10

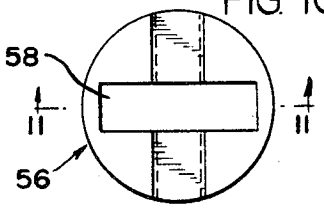
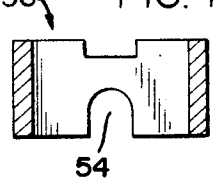


FIG. 11



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TOGGLE SWITCH ASSEMBLY

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ABSTRACT OF THE DISCLOSURE

A bushing on the housing of a toggle-type switch has a bore and a counterbore which form a shoulder portion. A plastic insert is inserted into the counterbore and ears integral with the switch bat are positioned within arc-like portions of the insert and are captured in the space between the top of the arc portions of the insert and the shoulder portion of the bushing. A spring couples the bat to the switch contact and biases the ears into the arc-like portions of the insert to pivotally mount the bat within the bushing. A crimped edge on the top of the bushing stakes the insert against longitudinal movement therewithin.

This application pertains to the mounting of the actuating arm of a bushing mounted toggle switch.

In the past, there have generally been accepted one or two standard ways of mounting the actuating arm or bat of a toggle switch of the bushing mounted type. Either the bat is made with a ball-shaped portion and employs a spring between the end of the bat and the contacts to bias the ball portion into a contoured cavity within the bushing thereby providing a pivotal mounting for the bat or holes are drilled in the bat and bushing and a pin is inserted through the aligned holes to pivotally mount the bat within the bushing. In the former the switch contacts are susceptible to damage caused by downward pressure on the bat moving the bat against the spring pressure to apply pressure on the contacts. In the latter production costs are relatively high due to the necessity of drilling both the bushing and bat and aligning the holes for insertion of the pin.

It is an object of this invention to provide an improved mounting for the actuating arm of a toggle switch of the bushing mounted type.

It is another object of this invention to provide an improved mounting for the actuating arm of a toggle switch of the bushing mounted type that eliminates damage to the switch contacts caused by excessive pressure being applied to the arm.

It is a further object of this invention to provide an improved mounting for the actuating arm of a toggle switch of the bushing mounted type that is relatively inexpensive to manufacture.

In one embodiment of this invention a toggle switch has a bushing supported by the switch housing. The actuating arm of the switch extends through the bushing and into the housing to move the switch contacts between first and second positions. In at least one of the two positions, the contacts bridge the switch terminals to complete the switch circuit. The actuating arm is pivotally supported within the bushing by an insert member. The insert member has two diametrically opposed arc-like portions in the walls at the bottom of the insert for receiving ear-like projections which extend from the actuating arm. The ear-like projections can be either trunnions which are made integrally with the bat arm or can be formed by a pin which is slipped through a hole in the actuating arm. The bushing has a counterbore which forms a shoulder portion. The insert is fitted in the counterbore

and the ear-like projections of the arm are captured in the space between the top of the arc-like portions and the shoulder of the bushing. A spring couples the actuating lever to the contacts to provide snap action of the contacts between the first and second positions. The spring also biases the actuating arm upwardly so that the ear-like projections are firmly received within the arc-like portion of the insert. The top of the bushing is then crimped over the insert to hold it in position against the spring pressure.

In the drawings:

FIG. 1 is a side elevation view of the device of this invention;

FIG. 2 is a front elevation view in cross-section of the device of FIG. 1;

FIG. 3 is a side elevation view in cross-section of the device of FIG. 1;

FIG. 4 is an enlarged side elevation view in cross-section of a portion of the device of FIG. 3;

FIG. 5 is a side elevation view in cross-section showing a different operating position of the device of FIG. 1;

FIG. 6 is a top plan view of a portion of the device of FIG. 1;

FIG. 7 is a side elevation view in cross-section taken along the lines 6—6 in FIG. 6;

FIG. 8 is a front elevation view in cross-section of a second embodiment of the device of FIG. 1;

FIG. 9 is a side elevation view in cross-section of the second embodiment of the device of FIG. 1;

FIG. 10 is a top plan view of a second embodiment of the portion of the device of FIG. 1; and

FIG. 11 is a side elevation view in cross-section taken along the lines 11—11 of FIG. 10.

Referring to the figures of the drawing, FIGS. 1 through 7 illustrate a toggle switch 10 having a bushing 12 for mounting the switch 10. The bushing 12 has a bore 14 and a counterbore 16. The counterbore 16 forms a shoulder 18 within the bushing. Actuating arm or bat 20 extends through the bushing 12 into the cavity of the insulated switch casing 22. The bridge contact 24 is pivotally mounted within the switch casing 22. A pair of terminals or conducting members 26 and 27 extend into the switch casing, and each has a wire attached thereto such as shown at 25. The contact 24 is movable to a first position (FIG. 3), which is the open position of the switch. When the contacts are moved to the second position as shown in FIG. 5, the contact 24 bridges the terminals 26 and 27 to complete the circuit between the conducting members to close the switch.

The actuating arm 20 is mounted in the switch by the use of a molded cylindrical insert 30 (FIGS. 6 and 7), which can be made of plastic or metal. The insert 30 has two diametrically opposed, axially extending arcuate or arc-like portions 32 in the walls that open to the base or bottom 34 of the cylindrical insert member 30. The insert member 30 is fitted in the counterbore 16 of the bushing 12 and rests on the shoulder 18 of the bushing 12.

The bat 20 has trunnions 36 and 37 which may be made, for example, integral with the bat 20 by stamping the complete assembly from a piece of sheet material. At the end of the arm 20 an insulator 40 is mounted. Insulator 40 is received in a cap 42. A spring 41 is compressed between the bridge 24 and the cap 42 to couple the arm 20 to the contact 24 to provide snap action between the first and second positions of the contact. The spring 41 also biases the arm 20 hence trunnions 36 and 37 upwardly into a position in the space between the top of the arc-like portions 32 and the shoulder 18 of the bushing 12. This firmly captures the trunnions 36 and 37 and restricts their movement along the longitudinal

axis of the insert member 30. However, the trunnions 36 and 37 are free to move within this space so that the arm 20 may be pivoted thereabout when operating the switch 10.

In assembling the switch 10 the insert 30 has a slot 45, which extends the length of the insert 30 to permit the insert 30 to be slid over the trunnions 36 and 37 prior to inserting in the bushing 12. The insert 30 and arm 20 are then fitted into the bushing 12 with the trunnions 36 and 37 being captured as heretofore explained. The bushing 12 is then crimped as shown at 48 (FIG. 4) to hold the insert member 30 in position within the bushing 12 against the pressure of spring 41. It can be seen that if pressure is applied in an attempt to pull the arm 20 out of the switch 10 or to push it into the switch 10, which pressure could cause possible damage to the switch 10, the described manner in which the trunnions 36 and 37 are captured within the bushing 12 prevents any movement in either of these two directions thereby eliminating a possible way of damaging the switch 10. The use of the insert 30 and integral trunnions 36 and 37 on the arm 20 also provides for rapid assembly of the switch 10 thereby reducing production costs.

FIGS. 8 through 11 show a second embodiment of the switch 10. In this embodiment all parts of the switch are the same as that shown in the first embodiment and are given like numbers except for the trunnions 36 and 37 and the insert member 30. In this embodiment a hole 50 is located in the actuating arm 20. A pin 52 is inserted through the hole 50 and provides the ear-like projections that are fitted into the arc-like portions 54 of insert member 56, which is substantially similar to insert member 30 of the first embodiment. In this embodiment, however, it is not necessary to have a slot similar to slot 45 in the insert 30 of the first embodiment, because the insert 56 may be placed over the actuating arm and the pin 52 then inserted through the arm 20. The slot 58 which extends through the member 56 provides the space through which the arm 20 may be swung when moving the contact 24 between the open and closed positions. Once again the bushing 12 is crimped as shown at 48 (FIG. 9) to hold the insert 50 in place.

It should be clear that in either embodiment described herein that aside from being a bushing mounted toggle switch the type of switch is not critical, and the invention could be used with any combination of poles and throws and could be a normally open or normally closed type.

What has been described, therefore, is an improved mounting for the actuating arm of the toggle switch of the bushing mounting type that eliminates damage to the switch contacts caused by excessive pressure being applied to the arm and that is relatively inexpensive to manufacture.

We claim:

1. A toggle switch including in combination, a switch housing, a bushing supported by said housing having a bore and a counterbore, an actuating arm, contact means within said housing movable to first and second positions, conducting means supported by said housing and being coupled to said contact means in at least one of said first and second positions, pivot means for pivotally mounting said actuating arm, an insert member slidably mounted within said counterbore of said bushing and having a portion receiving said pivot means, spring means coupling said actuating lever to said contact means to provide snap action thereof and biasing said pivot means into the portion for receiving the same of said insert member to pivotally mount said actuating lever within said bushing of the switch, and means including a crimped edge on top of said bushing engaging said insert for retaining the same within said bushing against the pressure of said spring means.

2. The toggle switch of claim 1 wherein said bore and said counterbore form a shoulder portion therewithin, and said pivot means is captured in the space between the portion of said insert member for receiving said pivot means and said shoulder portion thereby restricting the motion of said actuating arm along the longitudinal axis of said insert member.

3. In a toggle switch having an actuating arm for moving a set of contacts between first and second positions for contacting a conducting member within the switch in at least one of the positions of the contacts, the combination including means for mounting the actuating arm in the switch including, a mounting bushing supported by the switch and having a bore and a counterbore forming a shoulder within the bushing, a movable cylindrical insert of a slightly less diameter than the counterbore of said bushing, said insert having diametrically opposed arc-like portions opening to the bottom of the insert and being mounted within the bushing counterbore, integral ears projecting from the actuating arm, said ears being positioned within said arc-like portion of said insert and being captured in the space between the top of the arc portions of said insert and the shoulder portion of said bushing, a spring coupling the actuating arm to the contacts to provide snap action therefor and biasing said ears into said arc-like portions of said insert to pivotally mount the actuating arm within said bushing, and a crimped edge on said bushing for staking said insert therewithin.

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