June 17, 1958 T. Y. KORSGREN, JR 2,839,629

SWITCH OR THE LIKE

Filed Nov. 15, 1956

FIG. 1

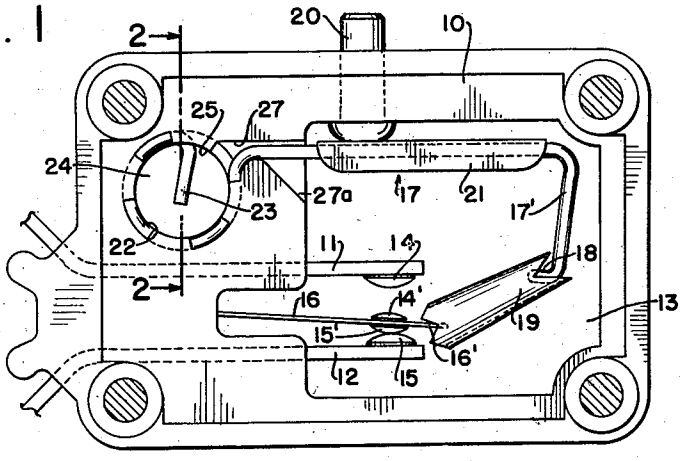


FIG. 3

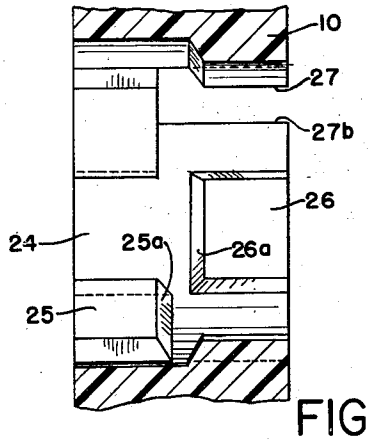


FIG. 2

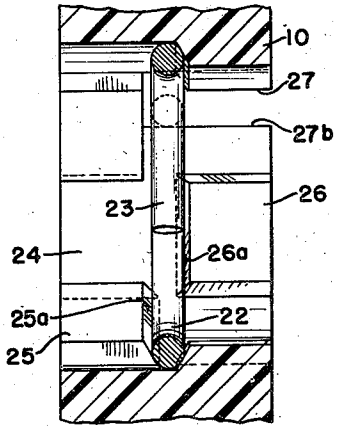
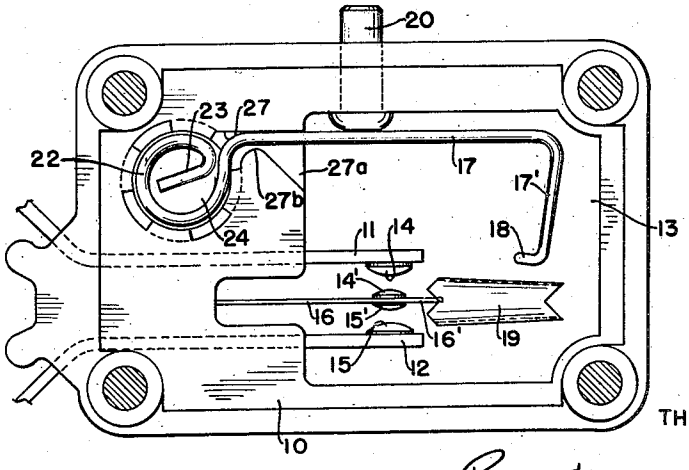


FIG. 4



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SWITCH OR THE LIKE

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10 Claims. (Cl. 200—67)

The present invention relates to electrical switches and similar devices, and has particular reference to improved features of construction for incorporation in small snap switches and like mechanisms to simplify the manufacture and assembly thereof.

A common type of small size snap-acting switch comprises a casing in which are rigidly mounted a pair of spaced contact members. Between the fixed contact members is a movable contact which may be pressed against either of the fixed contacts to alternately close one of two circuits through the switch. The movable contact is manipulated by means of an actuating member anchored at one end in the casing and having its other end connected to the movable contact through a toggle element. Broadly, this structure is well known, and the present invention is directed to certain specific improvements therein, particularly in respect to the anchoring of the actuating member.

As one of its advantageous features, the switch of the present invention is provided with an opening having novel arrangements therein for engaging and retaining the end of a switch actuating member. The design of the opening is such that a pair of spaced opposed shoulders may be formed within the opening with a conventional two-part mold. The actuating member has an anchor portion of novel design which is adapted to be compressed and inserted axially into the opening and then released to be received in the groove defined by the opposed shoulders. The actuating member is thereby rigidly locked in place by its anchor portion and cannot be accidentally removed or displaced.

As another advantageous feature, the device of the invention includes an actuating member of novel and improved design. In this respect, the actuating member of the new switch may be formed of a length of conventional spring wire, which may be readily bent into the desired shape and which provides an anchor portion having desired resilient characteristics.

For a better understanding of the invention, reference should be made to the following detailed description and accompanying drawing, in which:

Fig. 1 is a longitudinal cross-sectional view of a switch assembly incorporating the improved features of the invention;

Fig. 2 is an enlarged fragmentary cross-sectional view taken along line 2—2 of Fig. 1;

Fig. 3 is an enlarged cross-sectional view similar to that of Fig. 2, with certain parts removed; and

Fig. 4 is a longitudinal cross-sectional view similar to Fig. 1, showing the manner in which an actuating member is assembled with the switch casing.

Referring now to the drawing, the numeral 10 designates generally a switch casing part of generally rectangular outline. The casing part 10 conventionally forms the center section of the complete casing, with suitable cover plates (not shown) being secured to the opposite faces of the central part. In accordance with conventional switch

construction, a pair of fixed contact supports 11, 12 are rigidly mounted in the casing 10 and project into an enlarged opening or window 13 therein. The supports 11, 12 are mounted in spaced relation and carry inwardly facing contacts 14, 15 at their outer ends.

Rigidly mounted at one end in the casing 10, and extending into the enlarged opening 13, is a flexible contact support 16. The movable support 16 is locked between the fixed supports 11, 12 and mounts suitable contacts 14', 15' adjacent its free end. As will be apparent in Fig. 1, the movable contact support 16 may be flexed toward the fixed supports 11, 12, closing one or the other of the sets of contacts to complete circuits through the switch.

For moving the contact support 16 between the fixed supports 11, 12, an actuating member 17 is provided which is anchored at one end, in a manner to be described in detail, and has an L-shaped outer portion extending downwardly in the enlarged opening 13 and having a tip portion 18 projecting toward the sets of contacts. Extending between the tip portion 18 and the free end 16' of the movable contact support is a toggle element 19 made of glass or glass-like material for good wear as well as insulation. In accordance with conventional practice, the length of the toggle element is somewhat greater than the space between the tip portions 18 and 16' of the actuating member and movable contact member. Also in accordance with usual practice, the actuating member 17 is biased upwardly in the enlarged opening 13, while being movable downwardly therein by means of an actuating plunger 20 slidably received in the casing 10. The arrangement is such that with the parts of the switch in their normal positions the outer leg portion 17' of the actuating member exerts a force through the toggle element 19 to hold the movable contact support 16 downwardly and maintain the contacts 15, 15' in engagement. When the plunger 20 is depressed the actuating member is urged downwardly to a point where the tip 18 thereof is below the end of the movable contact member 16. This causes the toggle element 19 to over-center and snap the movable contact support 16 upwardly, bringing the contacts 14, 14' into engagement. Upon release of the plunger 20 the upward bias on the actuating member 16 causes it to return to its normal position, as shown in Fig. 1.

In accordance with the invention, the actuating member 17 may be formed of a length of resilient wire, though it is of course contemplated that other forms of material may be employed, for example flat spring metal strip material (substantially rectangular in cross section). The outer or free end portion of the wire is bent in the form of an L, and is so designed that the depending leg 17' is flexed outwardly by the toggle element 19. The resilient nature of the wire material thereby causes an inward force to be maintained upon the toggle element for holding the movable contact 16 in one or the other of its operative positions. The horizontal or long leg portion of the actuating member may be strengthened by an elongated reinforcing member 21, which may be of U-shaped cross-section. Also in accordance with the invention, the actuating member 17 is provided with an anchor portion 22 at its left hand. The anchor portion 22 is provided by bending the end of the wire actuating member in the form of an incomplete circle and bending the end extremity of the wire inwardly of the generally circular outline of the anchor to form a tab 23.

For mounting the anchor portion 22 in the casing 10, the latter is provided with a generally circular opening 24 extending transversely through the casing, from one side to the other thereof. In accordance with the invention, the opening 24 is provided with a first plurality of

circumferentially spaced integral bosses **25** which project radially inward from the wall of the opening and form spaced abutment surfaces **25***a* in the central portion of the opening. The bosses **25** are uniformly spaced about the opening, and the abutment surfaces **25***a* thereof define an internal shoulder. In the illustrated form of the invention, the abutment surfaces **25***a* are disposed at a slight angle to the wall in the opening **24**. Opposite the first plurality of bosses **25** is a second plurality of similar bosses **26** which are spaced circumferentially about the wall of the opening **24** and are so arranged with respect to the bosses **25** that the bosses of one plurality are aligned and coextensive with the spaces between the bosses of the other plurality. The arrangement is such that in the molding of the casing **10** the abutment surfaces **25***a*, **26***a* of the respective bosses **25**, **26** are formed by the mold parts which form the spaces between bosses of the opposite plurality thereof. Thus, a conventional two part mold may be employed to form a pair of inwardly facing shoulders within a circular opening, it being understood in this respect that the formation of such shoulders in accordance with conventional construction practices would require expensive collapsible mold parts. With the improved structure, however, a pair of male mold parts projecting from opposite sides of a conventional two part mold may be used in forming the opening **24** and its bosses **25**, **26**, and these mold parts may be simply withdrawn axially at the end of the molding operation to free the molded part.

Connecting the circular opening **24** and the enlarged opening **13**, in the casing **10**, is a recess **27** for receiving the shank of the actuating member **17**. The recess **27** opens at one side of the casing **10** and has a depth somewhat greater than half the thickness thereof. As shown in Figs. 1 and 4, the recess **27** is flared out adjacent the enlarged opening **13**, as at **27***a*, and has a rounded shoulder **27***b* adjacent the smaller circular opening **24**.

As indicated in Fig. 1, the diameter of the opening **24**, between the opposed abutment surfaces **25***a*, **26***a*, is approximately the same as or slightly smaller than the diameter of the circular anchor portion **22** of the actuating member **17**. Of course, the outer portions of the opening **24** are substantially constricted by the bosses **25**, **26**. Accordingly, to insert the actuating member **17** into the casing, the anchor portion **22** of the actuating member is deformed to a reduced diameter, to an extent such that the anchor portion may be inserted axially through the constricted portion of the opening **24**. When the circular anchor portion is aligned with the groove defined by the abutment surfaces **25***a*, **26***a* it is permitted to return to its normal size, so that the anchor portion is locked in the groove, as shown in Figs. 1 and 2.

In order to deform the anchor portion **22** to a reduced diameter, in the manner desired, the inwardly projecting tab portion **23** thereof may be gripped with pliers or other suitable instruments and rotated in a clockwise direction, as indicated in Fig. 4. As will be readily understood, this operation may be carried out quickly and efficiently, and facilitates assembly of the switches. Moreover, the assembly procedure is ideally suited to be carried out with automatic machinery, wherever desirable.

The invention provides an improved structure for snap-acting switches and similar devices which incorporate novel arrangements for anchoring a movable member in a casing or other component. The anchor means in the casing comprises an essentially circular opening formed by a two part mold of a generally conventional type with a plurality of integral bosses spaced circumferentially about the wall of the opening and aligned with a second plurality of bosses in such manner that the bosses of one plurality are aligned and coextensive with the spaces between bosses of the other plurality. This novel structure is such that a mold part entering the opening from one side forms an abutment surface at the end of a boss otherwise formed by a mold part entering from the opposite side of the opening. With this construction a discontinuous groove is formed within the opening which is adapted to receive and securely retain a generally circular anchor portion of a movable actuating member.

Another advantageous feature of the invention resides in the structure of the actuating member itself. In this respect, the actuating member is formed of a length of wire bent to provide a generally circular anchor portion at one end, to be received and retained by the groove in the anchor opening, and having an inwardly bent tab portion which may be gripped to deform the anchor portion to a reduced diameter for axial insertion in the opening.

It will be understood that the specific device herein illustrated and described is intended to be representative only, as certain changes may be made therein without departing from the clear teachings of the invention. For example, it is contemplated that the described structure may be useful in assemblies other than switches. Accordingly, reference should be made to the following appended claims in determining the full scope of the invention.

I claim:

1. In a switch of the type having a casing, a pair of fixed contacts mounted in said casing and disposed in spaced relation, a movable spring contact element mounted at one end in said casing and extending between said fixed contacts, a spring-like actuating member mounted in said casing and having a tip portion spaced outwardly of said spring contact element, and a toggle element interconnecting said spring contact and actuating member; the improvement in said casing and actuating member characterized by said casing having a generally circular transverse opening therein extending from one side to the other of said casing, a first plurality of circumferentially spaced integral bosses projecting radially inward from the wall of said opening and forming a first plurality of spaced abutment surfaces, said abutment surfaces defining an internal shoulder within said opening, a second plurality of circumferentially spaced integral bosses projecting radially inward from said wall and forming a second plurality of spaced abutment surfaces, said second plurality of abutment surfaces defining a second internal shoulder spaced from and facing said first shoulder, said bosses being so arranged that the bosses of one plurality thereof are aligned with the spaces between the bosses of the other plurality thereof, said actuating member having a generally circular anchor portion formed of resilient material and having a normal diameter greater than the diameter of the reduced opening defined by said bosses, said anchor portion being deformable to a reduced diameter for insertion axially into said opening and being of a width to be received between said shoulders, said casing having a recess therein connecting said opening and adapted to receive said actuating member upon insertion of said anchor portion into said opening.

2. The switch of claim 1, characterized by said bosses extending longitudinally of said opening from the outer ends thereof to points adjacent the central portion thereof.

3. The switch of claim 1, characterized by said actuating member being formed of wire and having an integral generally circular end forming said anchor portion.

4. The switch of claim 3, characterized by said abutment surfaces being disposed at angles to the wall of said opening, the arrangement being such that oppositely facing abutment surfaces define a circular recess of V-shaped cross-section.

5. The switch of claim 1, characterized by said anchor portion having a tab projecting inwardly of its generally circular outline, said tab being adapted to be gripped

and rotated to reduce the diameter of said anchor portion for insertion thereof in said opening.

6. In a switch of the type having a casing, switch contact means, and a switch actuating member anchored in said casing and movable therein to effect opening and closing of said contact means; the improvement characterized by said casing having a generally circular transverse opening therein extending from one side to the other of said casing, a first plurality of circumferentially spaced integral bosses projecting radially inward from the wall of said opening and forming a first plurality of spaced abutment surfaces defining an internal shoulder within said opening, a second plurality of circumferentially spaced integral bosses projecting radially inward from said wall and forming a second plurality of spaced abutment surfaces, said second plurality of abutment surfaces defining a second internal shoulder spaced from and facing said first shoulder, said bosses being so arranged that the bosses of one plurality thereof are aligned with the spaces between the bosses of the other plurality thereof, said actuating member having a generally circular anchor portion formed of resilient material and having a normal diameter greater than the diameter of the reduced opening defined by said bosses, said anchor portion being deformable to a reduced diameter for insertion axially into said opening and being of a width to be received between said shoulders.

7. In a switch of the type having a casing, switch contact means, and a switch actuating member anchored in said casing and movable therein to effect opening and closing of said contact means; the improvement characterized by said casing having a generally circular opening therein and means forming spaced facing shoulders in said opening, said switch actuating member having a generally circular anchor portion formed of resilient material and having a normal diameter greater than the diameter of said shoulders and a width to be received between said shoulders, said anchor portion being deformable to a reduced diameter for insertion axially into said opening.

8. The switch of claim 7, characterized by said actuating member being formed at least in part by a length of wire, said anchor portion comprising an end of said length of wire bent into generally circular form.

9. The switch of claim 8, characterized by said anchor portion including a tab projecting inwardly of its generally circular outline, said tab being adapted to be gripped and rotated to reduce the diameter of said anchor portion.

10. In a device comprising a molded anchoring member and a resilient member secured in said anchoring member; the improvement characterized by said anchoring member having a transverse opening therein extending from one side to the other of said anchoring member, a first plurality of spaced integral bosses projecting inwardly from the wall of said opening and forming a first plurality of spaced abutment surfaces defining an internal shoulder within said opening, a second plurality of spaced integral bosses projecting inwardly from the wall of said opening and forming a second plurality of spaced abutment surfaces, said second plurality of abutment surfaces defining a second internal shoulder spaced from and facing said first shoulder, said bosses being so arranged that the bosses of one plurality thereof are aligned with the spaces between the bosses of the other plurality thereof, said resilient member having an anchor portion at one end formed of resilient material and shaped to substantially conform to said opening, said anchor portion being deformable to a reduced size for axial insertion in said opening and being of a width to be received between said shoulders.

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