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C. D. ROE

3,085,140

ENCAPSULATED SWITCH

Filed Feb. 24, 1959

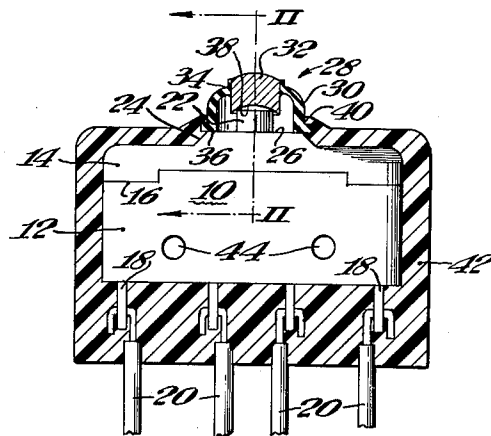


Fig. 1.

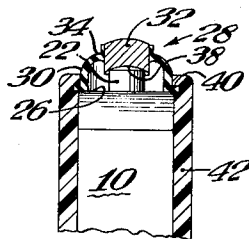


Fig. 2.

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ENCAPSULATED SWITCH

Clarence D. Roe, Columbus, Ohio, assignor to Robertshaw-Fulton Controls Company, Richmond, Va., a corporation of Delaware

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2 Claims. (Cl. 200-168)

This invention relates generally to switches and more particularly to means for encapsulating switches of the type that have a movable actuating means.

It has been found desirable in many switch applications to protect the switch operating mechanism from exposure to the environmental effects of moisture, dirt, and other corrosive elements. This may be accomplished by embedding the switch casing and the conductor leads in a mass of sealing material. However, in switches having movable switch actuating means accessible from the exterior of the switch, some difficulty has been encountered in providing an effective seal around the region of the actuating means while permitting actuation from the exterior of the switch.

It is an object of this invention to protect the switch operating mechanism of a switch of the indicated type from exposure to the environment of the switch.

Another object of this invention is to effectively encapsulate a switch of the indicated type.

In a preferred embodiment of the invention, the switch operating mechanism is encased in a switch casing and a flexible diaphragm means is mounted on the switch casing to enclose the switch actuating means. The diaphragm means has a flange portion which defines a sealing surface engaging the switch casing. The switch casing and the flange portion of the diaphragm means are embedded in a molded mass of sealing and insulating material whereby an effective seal is provided for the actuating means. Also, the flexible diaphragm permits movement of the actuating means from the exterior of the switch.

The above and other objects and features of the invention will become apparent from a consideration of the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a sectional view of a preferred embodiment of the invention; and

FIG. 2 is a fragmentary section taken on line II—II of FIG. 1.

Referring now more particularly to the drawing, the switching device illustrated therein includes a substantially rectangular switch casing 10 which encases the switch operating mechanism (not shown) which may be of any suitable type, such as a snap-action mechanism. Switch casing 10 is comprised of a base 12 and a cover 14 which are sealed together at the junction 16 thereof. Base 12 has a plurality of terminals 18 extending therefrom with each of the terminals 18 having a lead wire 20 connected thereto. Switch casing 10 has an actuating plunger 22 in the form of a shaft mounted for axial movement in cover 14 and extending from a raised portion 24 formed thereon and having a flat upper wall 26.

Means are provided for encapsulating switch 10, terminals 18, the connecting portion of lead wires 20 and actuating plunger 22. To this end, a diaphragm unit 28 is provided comprising a generally cup-shaped member 30 of a resilient material having a metal rod 32 molded in the base 34 thereof. Cup-shaped member 30 is mounted on raised portion 24 so as to enclose the extending portion of actuating plunger 22. In this position, the rim 36

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of cup-shaped member 30 engages the upper wall 26 of raised portion 24 and rod 32 is disposed in axial alignment with actuating plunger 22. Rod 32 has a spherical recess 38 in the inner end thereof adapted for engagement with actuating plunger 22. Rim 36 has an outwardly extending annular flange 40 formed thereon which engages upper wall 26 of raised portion 24 to form a substantial sealing surface therebetween.

To complete the encapsulation of switch casing 10 and actuating plunger 22, an epoxy resin 42, or some other suitable sealing and insulating material, is molded in a substantially rectangular shape with switch casing 10, terminals 18, the connecting portion of leads 22, and flange 40 of cup-shaped member 30 embedded therein. Since flange 40 provides a substantial annular sealing surface in engagement with upper wall 26 of raised portion 24 and the epoxy resin 42 completely encloses flange 40 and a portion of the side wall of cup-shaped member 30, an effective seal is provided in the region of the actuating plunger 22. Also, with this arrangement, the epoxy resin 42 serves as a retaining means for the diaphragm unit wherefore it is not necessary to provide a separate housing to retain the diaphragm unit 28 in place.

Since cup-shaped member 30 is formed of a resilient material, base 34 is flexible and is adapted to act as a diaphragm to permit operation of actuating plunger 22 upon depression of rod 30. Switch casing 10 has a pair of mounting holes 44 formed therein which are aligned with corresponding holes in the epoxy resin 42.

It is to be understood that although one embodiment of this invention has been shown and described for purposes of illustration, the invention can be variously embodied and changes may be made in the construction and arrangement of parts without departing from the scope of the invention as defined by the appended claims.

I claim:

1. In a sealed switching device, the combination comprising a switch casing having a raised portion formed with a flat upper wall having sidewall portions depending therefrom, a switch actuating plunger extending outwardly from said raised portion beyond said upper wall, a resilient cup-shaped member having the open end thereof overlying said plunger and being operatively engageable therewith, said member having an outwardly extending flange portion on said open end seated on said upper wall and extending outwardly beyond said raised portion, said flange portion having opposed surfaces, and a molded mass of sealing and insulating material enclosing said switch casing and said sidewall portions, said flange portion being completely embedded in said mass to retain and seal said cup-shaped member in said seated position whereby said molded mass is disposed against each opposed surface of said flange portion of said cup-shaped member to prevent relative movement therebetween.

2. In a sealed switching device, the combination comprising a substantially rectangular switch casing having a raised portion formed with a flat upper wall having sidewall portions depending therefrom, a switch actuating plunger extending outwardly through said upper wall for axial movement through said raised portion, a cup-shaped flexible member having a rim portion at the open end thereof and seated on said upper wall, said rim portion being formed with an outwardly extending flange portion having a diameter sufficient to extend beyond said raised portion, said flange portion having opposed surfaces, an operating rod molded in the closed end of said cup-shaped member and engageable with said plunger, and a molded

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mass of sealing and insulating material enclosing said switch casing and said sidewall portions, said flange portion beyond said raised portion being completely embedded in said mass whereby said cup-shaped member is sealed to and retained in said seated position on said raised portion and whereby said molded mass is disposed against each opposed surface of said flange portion of said cup-shaped member to prevent relative movement therebetween.

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