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HERMETICALLY SEALED ELECTRIC SWITCH

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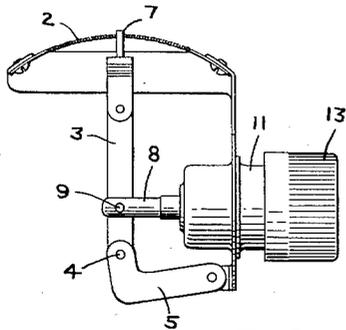


FIG. 1

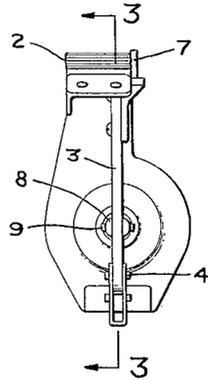


FIG. 2

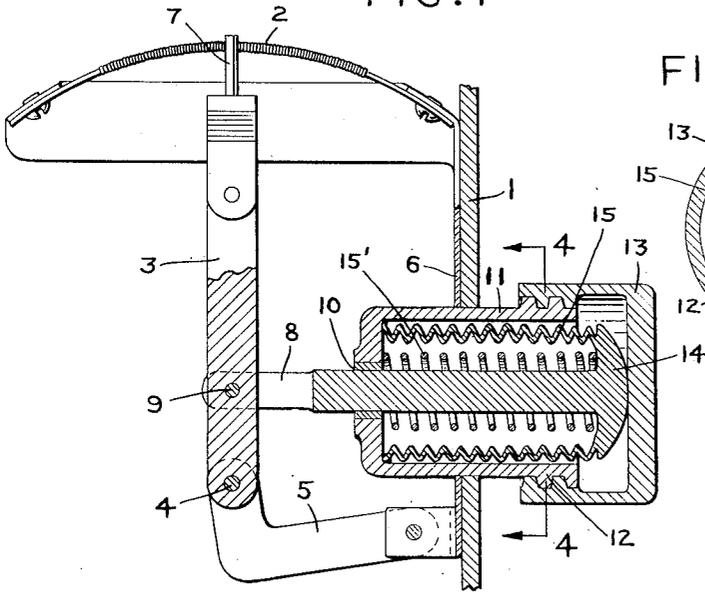


FIG. 3

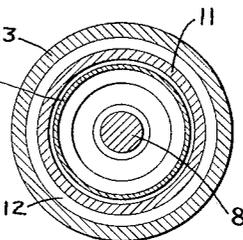


FIG. 4

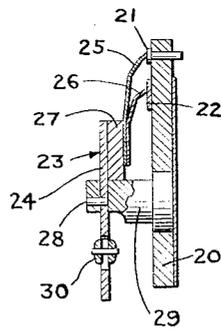


FIG. 6

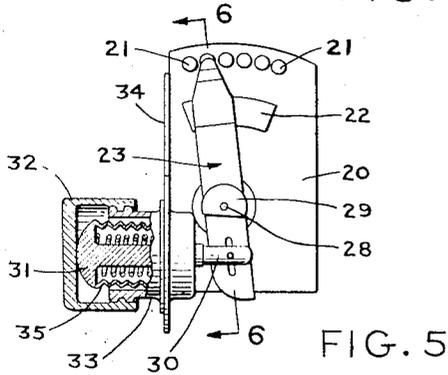


FIG. 5

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# UNITED STATES PATENT OFFICE

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## HERMETICALLY SEALED ELECTRIC SWITCH

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1 Claim. (Cl. 74-96)

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This invention relates to electrical switches or analogous structures and, more particularly to a hermetically sealed potentiometer, step switch, or the like.

An object of the present invention is to provide a potentiometer, step switch, or the like, wherein electric current flow-controlling elements are hermetically sealed in an air-tight container to protect the mechanism or parts thereof from affect by fluctuation of humidity, corrosive vapors, fungus growth or other deleterious conditions, while at the same time permitting adjustment of electric current flow-controlling elements from the exterior of the hermetically sealed switch structure without affecting the seal of the structure.

More specifically, the present invention embodies a hermetically sealed operating mechanism for operating or adjusting the moving arm of a potentiometer, step switch, or the like.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing a hermetically sealed electric switch of a preferred form embodying the invention, and the features forming the invention will be specifically pointed out in the claim.

In the drawings:

Figure 1 is a side elevation of the hermetically sealed electric switch structure.

Figure 2 is an end view of the switch structure.

Figure 3 is a longitudinal section through the switch structure taken on the line 3-3 of Figure 2.

Figure 4 is a cross section through the switch structure taken on the line 4-4 of Figure 3.

Figure 5 is a side elevation of a modified form of the switch structure.

Figure 6 is a vertical section through the modified form of the switch structure and taken on line 6-6 of Figure 5.

Referring more particularly to the drawings, 1 indicates a fragment of a hermetically sealed casing in which the potentiometer, step switch or analogous structure is mounted. The potentiometer or switch structure includes the stationary electric current flow-controlling element 2 and the movable flow-controlling element or switch arm 3. The switch arm 3 is pivotally connected as shown at 4 to an arm 5 which is, in turn, pivotally connected to the attaching plate 6 by means of which the potentiometer or switch structure is

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attached to the interior of the housing 1. In Figures 1 to 4 of the drawings the movable element or switch arm 3 has a contact 7 on its free ends which engages various coils of the element 1 for controlling the flow of electrical current. An operating rod 8 is pivotally connected to the lever 3 intermediate its ends, as shown at 9. The operating rod 8 extends through an opening 10 in a substantially cylindrical housing 11. The housing 11 is soldered or otherwise attached with a fluid-tight seal to the attaching plate 6 and to the outside of the housing 1. The outer end of the cylindrical housing 11 is open and it is provided with screw threads 12 on its outer surface extending inwardly a short distance along the length of the housing 11. A closure and adjusting cap 13 is threaded on the housing 11 and telescopes thereover upon rotary movement, through the medium of the screw threads 12.

The operating rod 8 has a head 14 attached to its outer end, the outer surface of which is preferably rounded and is engaged by the inner surface of the end of the adjusting closure cap 13. A flexible bellows 15 has the perimeter of its outer end attached to the head 14 with a fluid-tight seal and the perimeter of its inner end is attached by a fluid-tight seal to the inner surface of the inner end of the housing 11 and, thus, the operating rod 8 extends through a hermetically sealed flexible bellows to the head 14 so that by longitudinal adjustment of the cap 13 on the cylindrical housing 11 through the medium of the threads 12 the switch lever 3 will be moved upon its pivotal point 9. The bellows 15 embodies sufficient spring tension to force the rod 8 outwardly and move the lever 3 as the cap 13 is threaded outwardly or recedes on the housing 11.

If it is desired, or in the event the bellows 15 does not embody sufficient spring tension to effectively move the rod 8, a helical spring 15' may be placed within the bellows 8, with one end engaging the head 14 and the other end engaging the inner surface of the closed end of the housing 11. The spring 15' will assist the rod returning force of the bellows 15.

Figures 5 and 6 of the drawings show a modified form of the invention, namely, one form of a step switch, and comprises a switch panel 20 of insulating material having a plurality of individual contacts 21 carried thereby and spaced therealong, and a ring contact 22. The switch lever 23 comprises the carrying body 24 to which the spring contact arms 25 and 26 are connected through the medium of an insulating block 27. The spring contact arm 25 is provided for contact-

ing one of the step contacts 21 while the spring contact arm 26 contacts the ring or strip contact 22.

The contact arm 23 is pivotally connected intermediate its ends, as shown at 28, to a suitable post 29 carried by the panel 20. The end of the switch lever 23 which projects beyond the pivot 28 is connected to an operating rod 30. The operating rod 30 has its end remote from the end connected to the contact lever 30 connected to a button or head 31 which contacts the inner surface of the adjustable cap 32. The cap 32 is adjustable, by means of suitable screw threads along the cylindrical housing 33 which corresponds to the housing 11 in the form of the invention shown in Figures 1 to 4 of the drawings and is sealed to the casing 34 in which the contact switch structure is mounted. A bellows 35, which is made of spring material, has its outer end connected with a fluid-tight seal to the cap 32 and its inner end connected with a fluid-tight seal to the inner surface of the inner end of the cylindrical housing 33 so as to form a fluid-tight flexible and expansible container surrounding the operating rod 30 to permit adjustment of the contact arm 23 from the exterior of the casing 34 without breaking the hermetic seal of the casing.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown, but that they may be widely modified within the invention defined by the claim.

#### What is claimed is:

In a hermetically sealed potentiometer or electric switch structure having an electric current regulating arm, means for pivotally supporting said arm, a housing, an operating member connected to said arm and extending into said housing, an elastic bellows in said housing and having one end hermetically sealed to said housing and the other end hermetically sealed to said operating member, and a closure cap threaded on said housing and engaging said operating member for moving said operating member to move said arm and collapse or permit expansion of said bellows.

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