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SEALING MEANS FOR ELECTRIC SWITCHES

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Fig. 1

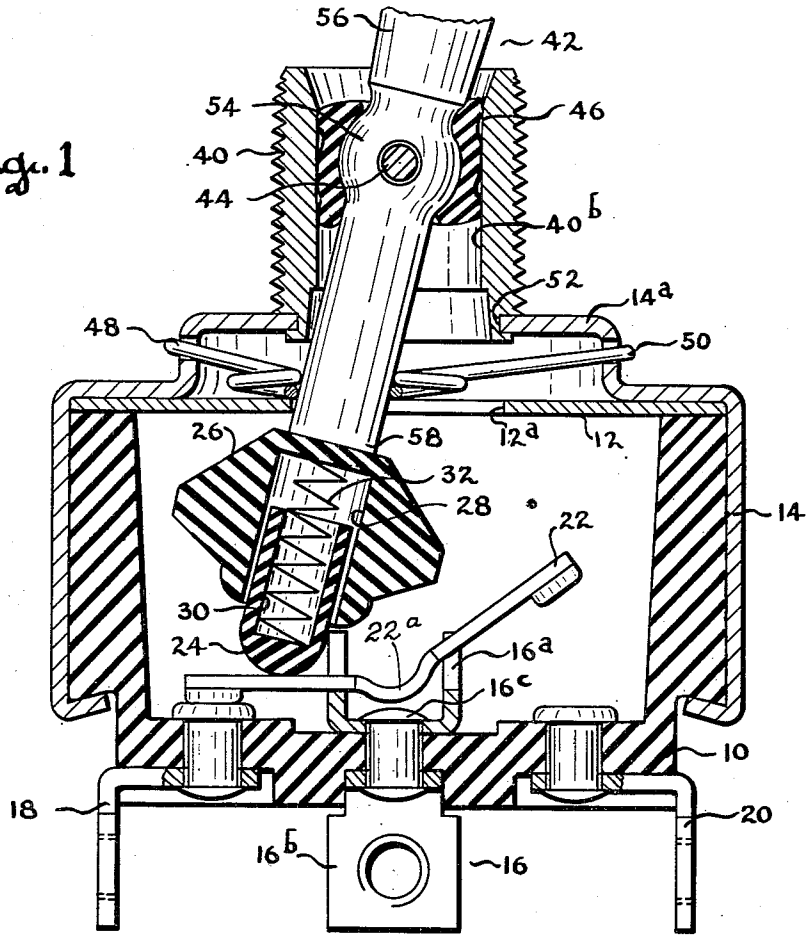


Fig. 2

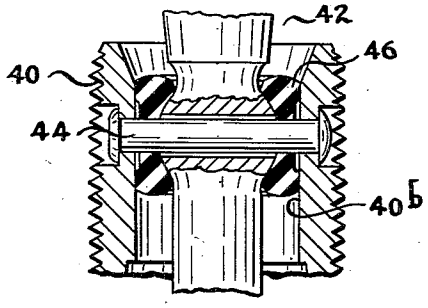
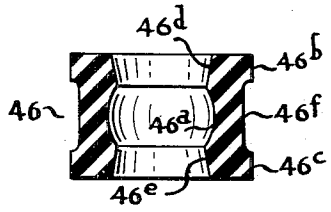


Fig. 3



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SEALING MEANS FOR ELECTRIC SWITCHES

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3 Claims. (Cl. 200—168)

This invention relates to sealing means for electric switches. It relates particularly to sealing means for actuator openings in switch casings.

A primary object of the invention is to provide effective, easily assembled and low cost sealing means for electric switches.

Another object is to provide a seal for actuator openings in switch casings which will permit easy and proper operation of the switch actuator.

Another object is to provide a compact but effective seal for actuator openings in electric switches.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawings illustrate an embodiment of the invention which will now be described, it being understood that the invention is susceptible of embodiment in other forms, and that various modifications may be made in respect of structural details of the device illustrated without departing from the scope of the appended claims.

In the drawings, Figure 1 is a vertical cross- sectional view of an electric switch embodying the invention, certain of the parts being shown in elevation;

Fig. 2 is a fragmentary vertical sectional view, at right angles to the view of Fig. 1, with certain portions shown in elevation; and

Fig. 3 is a cross-sectional view of a preferred form of the sealing member employed, shown in normal or relaxed condition.

Referring to the drawings, the electric switch shown includes a casing consisting of a box-like insulating base **10**, a cover plate **12** overlying the top of the base **10** and a punched and stamped sheet metal switch frame **14** overlying the cover plate **12** and having portions thereof bent into clamping engagement with inwardly and upwardly angled shoulders formed in the outer surfaces of the end walls of base **10**.

The switch mechanism comprises a fixed, common terminal assembly **16** secured at the mid-point of the length of the bottom wall of the base **10**, fixed terminal assemblies **18** and **20** secured to the bottom wall of base **10** on opposite sides of the common terminal assembly **16**, a rocking-type bridging contactor **22**, a bridging contactor operating finger **24** and an actuator **26**. Each of terminal assemblies **18** and **20** includes a lug which is riveted to the underside of the bottom wall of the base **10**. The rivet head is seated against the inner surface of the bottom wall of the base **10** and serves as a stationary contact tip. The common terminal assembly **16** includes a U-shaped pivot member **16a** and a lug **16b** which are electrically interconnected and secured to the upper and lower surfaces, respectively, of the bottom wall of base **10** by a rivet **16c**. The upwardly extending arms of the U-shaped member **16a** are slotted to accommodate the bridging contactor **22** and to provide a double pivot for the latter; said contactor having laterally extending lugs located between said upwardly extending arms of member **16a** to prevent substantial endwise displacement of said contactor upon rocking or tilting thereof one of said lugs being shown at **22a** in Fig. 1.

The bridging contactor operating plunger **24** is slidably disposed in a recess **28** in the actuator **26**. The plunger **24** is provided with a recess **30** and is biased into engagement with the bridging contactor **22** by a coiled compression spring **32**. The latter is held under compression between the top of recess **28** and the bottom of recess **30**.

The mounting bushing and operating mechanism for the switch includes an externally threaded bushing **40** having an axial opening **40b** therethrough, an operating lever **42** which is preferably formed of metal, a pivot member **44** for the operating lever **42**, a sealing member **46**, and a pair of like return springs **48** and **50** of known form.

The upper central portion **14a** of the switch frame **14** is offset vertically from the cover plate **12**. This offset portion is provided with an opening **52**. The lower end of bushing **40** has an enlarged inside diameter and a reduced outside diameter and extends through opening **52**. The relatively thin extreme lower end portion of bushing **40** is upset radially outwardly or riveted over the lower surface of portion **14a** to effect a rigid and non-rotatable connection between the bushing **40** and the switch frame **14**. The operating lever **42** consists of a somewhat enlarged, generally spherical portion **54** disposed within the axial opening **40b** of the bushing **40**; and an operating handle portion **56** formed integrally with and extending upwardly from the spherical portion **54** and outwardly beyond the bushing **40**; and an integral shank portion **58** which extends downwardly from the spherical portion **54** through opening **52** and a relatively large opening **12a** in cover plate **12** and is connected at its lower end to the top of actuator **26**.

The headed pivot pin **44** penetrates openings in the walls of bushing **40** and extends through the center of the spherical portion **54** of lever **42** in a direction to provide for pivotal movement of the lever **42** in the plane of movement of bridging contactor **22**; the opposite end of pin **44** being upset, as shown in Fig. 2. Return springs **48** and **50** are trapped within the offset portion **14a** of switch frame **14** on opposite sides of the shank **58** and said springs respectively act individually to normally bias the lever **42** from one of its "on" positions toward its central, upright or "off" position. If desired, of course, either or both of the springs **48** and **50** may be omitted, if a "momentary contact" type of switch actuation is not required.

The sealing member **46** is composed of elastic, rubber-like material. It is substantially cylindrical and has an axial opening therethrough. In its relaxed state the outside diameter of member is substantially greater than the diameter of the axial opening **40b** in bushing **40**. The intermediate portion **46a** of the axial opening in the sealing member **46** is of a shape corresponding to the middle frustum of a sphere. The dimensions of intermediate portion **46a** are substantially less than the outside dimensions of the portion **54** of lever **42**.

When in assembled relation with the switch bushing and operating mechanism, the sealing member **46** is interposed between the bushing **40** and the portion **54** of lever **42**. Said sealing member surrounds and hugs or elastically embraces portion **54** and the opposite end portions **46b** and **46c** of its outer peripheral wall are compressively engaged with a peripheral portion of the cylindrical wall of said opening **40b** in bushing **40**. The ends **46d** and **46e** of the axial opening in sealing member **46** are each enlarged in an outward direction to provide clearance between said sealing member **46** and the portions of lever **42** on opposite sides of the portion **54** of lever **42**. The ends of sealing member **46** are free to

bulge in the direction of the axis of the opening in the bushing 40 when the handle portion 56 of lever 42 is moved to the right, as shown, or to the left. Also the sealing member 46, as shown, is provided with a wide, annular, peripheral groove 46[t] to provide a space between the peripheral wall of opening 40[b] and the sealing member 46 into which the latter may bulge. As an alternative a relatively wide groove might be provided in the inner wall 40[b] of the bushing 40.

These structural features permit a substantial amount of bulging or distortion of the sealing member 46 as the lever is operated without material increase in the force required to operate the lever even though the sealing member is maintained under a relatively high degree of compression. Moreover, the spherical portion 54 is relatively free to rotate with respect to the sealing member as the lever is operated.

I prefer to form the sealing member 46 without perforations to accommodate the pivot member 44. After the lever 42 and the sealing member 46 are placed in assembled relationship within bushing 40, the sealing member is pierced as the pivot pin 44 is inserted into openings provided for it in the lever 42 and in the walls of the bushing 40; the piercing end of pin 44 being then upset, as shown in Fig. 2.

I claim:

1. In an electric switch, in combination, a mounting bushing member having an axial opening therethrough of cylindrical form, an operating lever having a generally sperical portion disposed within the opening in said bushing member, a substantially cylindrical elastic sealing member having an outside diameter normally greater than the inside diameter of the peripheral wall of said bushing opening, said elastic sealing member having an axial opening therethrough of normally smaller dimensions than the outside dimensions of the sperical portion of the operating lever, one of said members having formed therein an annular peripheral groove, said elastic sealing member elastically embracing said sperical portion of said lever and extending axially of said lever the length of said sperical portion and being compressively engaged at the outer periphery thereof and on opposite sides of said annular groove with the peripheral wall of said bushing opening, and a pivot member extending through said elastic sealing member and said spherical portion of the lever and about which pivot member the lever may be pivotally moved with respect to said bushing.

2. In an electric switch, in combination, a mounting bushing having an axial opening therethrough, an operating lever having a generally spherical portion disposed within the opening in said bushing, a cylindrical elastic sealing member substantially as long as the diameter of said spherical portion of the lever, said elastic sealing member having an outside diameter normally greater than the diameter of said bushing opening and having an axial opening therethrough of normally smaller dimensions than the outside dimensions of the sperical portion of the operating lever, said elastic sealing member elastically embracing said sperical portion of said lever and being compressively engaged at the outer periphery thereof with the peripheral wall of said bushing opening, a pivot member extending through said elastic sealing member and said spherical portion of the lever and about which member said lever may be pivotally moved with respect to said bushing while insuring a sealed relationship therebetween, said elastic sealing member being provided with an annular external recess between the upper and lower ends thereof, and said sealing member being free to bulge at said recess and to bulge axially of the opening in said bushing as said lever is pivotally moved relatively to said bushing.

3. In an electric switch, in combination, a mounting bushing having an axial opening therethrough, an operating lever having a generally spherical portion disposed within the opening in said bushing, a cylindrical elastic sealing member substantially as long as the diameter of said sperical portion of the lever, said elastic sealing member having an outside diameter normally greater than the diameter of said bushing opening and having an axial opening therethrough of normally smaller dimensions than the outside dimensions of the sperical portion of the operating lever, said elastic sealing member elastically embracing said spherical portion of said lever and being compressively engaged at the outer periphery thereof with the peripheral wall of said bushing opening, a pivot member extending through said elastic sealing member and said sperical portion of the lever and about which member said lever may be pivotally moved with respect to said bushing while insuring a sealed relationship therebetween, said elastic sealing member being provided with an annular external recess between the upper and lower ends thereof, and said spherical portion of said lever being relatively free to rotate with respect to said sealing member as the latter is bulged as an incident to pivotal movement of said lever with respect to said bushing.

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