June 6, 1933. H. A. DOUGLAS 1,912,624

ELECTRIC SWITCH

Filed July 13, 1932

Fig. 1

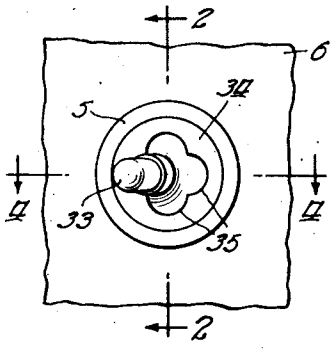


Fig. 2

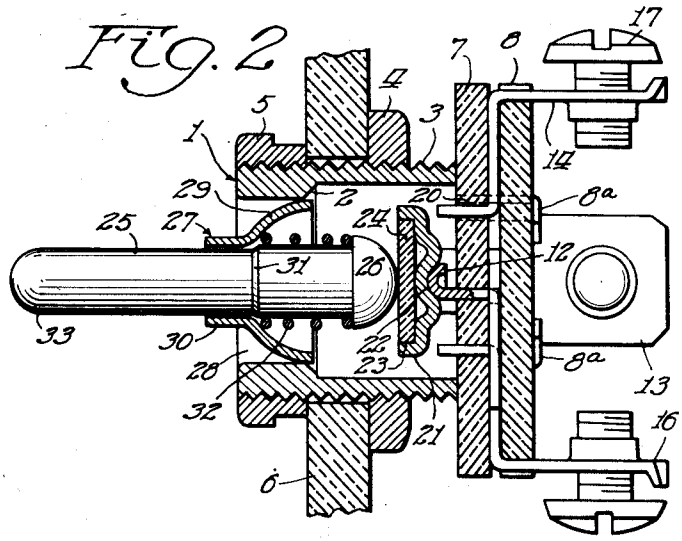


Fig. 3

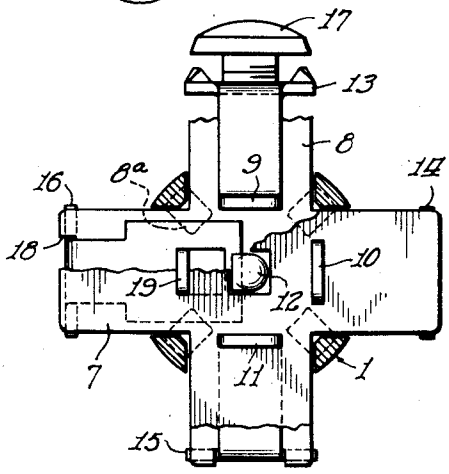


Fig. 4

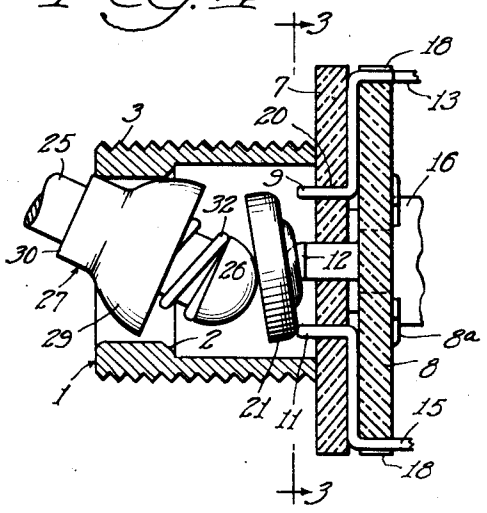
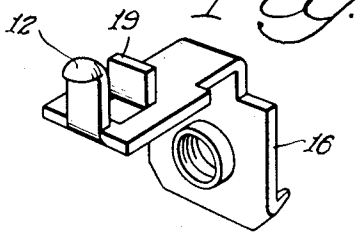


Fig. 5



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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

Application filed July 13, 1932. Serial No. 622,206.

This invention relates to electric switches and more particularly to switches of the so-called toggle type which may be selectively biased to different operative positions.

The invention is particularly useful when embodied in a four-position toggle switch adapted to be mounted on the instrument panel of an automotive vehicle, for example.

Among other objects, the invention aims to prove a switch of the character referred to which is simple in construction, and which at the same time will operate with a positive snap action.

My improved switch embodies a minimum of parts and is desirably inexpensive to manufacture, both marked advantages since switches of this type are usually made small and inconspicuous and sell at a relatively low price.

The invention will be more fully explained in connection with the accompanying drawing, in which—

Figure 1 is a front elevation of my improved switch and mounting therefor;

Figure 2 is a longitudinal section taken on the line 2—2 of Figure 1 on a somewhat larger scale;

Figure 3 is a cross-section taken on the line 3—3 of Figure 4;

Figure 4 is a longitudinal section taken on the line 4—4 of Figure 1 on a somewhat larger scale similar to Figure 2, but parts being shown in elevation; and

Figure 5 is a perspective view of one of the contact bars included in the structure of the foregoing figures.

The illustrative switch desirably includes the cylindrical metallic casing 1 open at both ends and having the internal shoulder 2. The casing is advantageously screw-threaded on its cylindrical exterior as at 3 so as to permit the clamping nuts 4 and 5 to be screwed thereon to clamp the casing to a suitable mounting 6 which may be the instrument panel of an automotive vehicle, for example.

One end of the casing 1 carries a block of insulation which acts as a closure for that end and also as a contact carrier for the electric contacts of the switch. In this instance, this block of insulation is formed of two cruciform separate fiber layers 7 and 8 which may be appropriately secured to the casing as by four integral prongs 8a formed on the casing and bent over the fiber layers in a well known manner.

The two fiber layers have clamped between them and thus secured to the casing, the metallic contacts 9, 10, 11 and 12, which comprise, respectively, the contact bars 13, 14, 15 and 16, each of which terminates on the exterior of the casing in a wire binding means which includes a binding screw 17. The contact bars 13, 14, 15 and 16 are received in notches 18 in the margins of the fiber layer 8, are then bent to lie flatly between the layers 7 and 8 and are then turned to project through slots 20 in the layer 7 to terminate inside the casing in the contacts 9, 10, 11, and 12. The contact 12 is desirably somewhat dome-shaped and is disposed centrally of the casing while the contacts 9, 10 and 11 are grouped circumferentially about the central contact 12. A stop 19 formed integrally with the contact 12 and disposed diametrically opposite the contact 10 completes the circle and constitutes the "off" position of the switch as presently explained.

Pivoted on the dome-shaped contact 12, in this instance loosely, for universal movement thereabout, I have shown the metallic bridge plate 21 which is desirably circular and on one of its faces has a shallow spheroidal depression 22 which receives the dome-shaped contact 12. On its other face the plate 21 has a cup-shape recess 23 which receives the insulating insert 24.

In the illustrative construction the bridge plate 21 is held to its pivot on the contact 22 by the metallic operating rod 25, the head 26 of which bears against the insulating insert 24. The operating rod 25 is loosely carried by a bearing shell 27 which closes the open end 28 of the casing 1. The bearing member 27 has a spheroidal portion such as the hollow hemispherical portion 29 which has a universal bearing within the casing and desirably cooperating with the internal shoulder 2. Axially of the bearing member

27 the walls of the hemispherical portion 29 are continued to form a tubular shank portion 30 through which the operating rod 25 passes. The rod 25 is thus movable longitudinally in the bearing member 27 and a shoulder 31 on the rod limits movement thereof in the bearing member outwardly of the casing. Interposed between the bearing member 27 and an abutment on the rod within the casing, in the present case formed by the head 26, I have shown resilient means such as the compression coil spring 32 urging the rod 25 against the bridging plate 21. Since the hemispherical portion 29 of the bearing member 27 is shown hollow, the spring may be received in this hollow portion and thus conservation of space effected.

By manual operation of the outer end 33 of the operating rod 25, which provides a handle, the head 26 may be moved to any point within the area of a circle described on the face of the insulating insert 24, the parts being so arranged that said circle is spaced from the metallic portion of the plate 21, so that the rod 25 is always insulated therefrom. So constructed and arranged, the plate 21 may be tilted on the contact 12 and into engagement with one of the circumferentially disposed contacts to form an electrical bridge between one of these and the central contact 12. Thus the switch may have four operative positions, three "on" positions of the switch being provided when the plate 21 is tilted to engage the central contact 12 and one of the contacts 9, 10 and 11, and the fourth or "off" position of the switch being provided when the plate 21 is tilted to engage the contact 12 and the abutment 19 similar to the contacts 9, 10 and 11, but integral with the contact 12 and therefore discontinuing a circuit therethrough.

In order to conveniently establish these four operative positions of the switch, the margin 34 of the open end 28 of the casing 1 may have four arcuate notches 35 thereabout, each of which by receiving the shank 30 of the bearing member 27 determines one of the operative positions as described.

The spring 32 assists in yieldingly retaining the bearing member 27 in engagement with one of these notches, so that the operation of the switch is rendered desirably positive, since when the bearing member is so located, it must be moved out of the notch by manipulation of the rod 25, against the force of the spring 32. Obviously, since the rod 25 is movable longitudinally in the bearing member 27, the spring 32 not only serves to urge the head 26 of the rod against the plate 21, but also serves to urge the bearing member 27 in the opposite direction and into engagement with the inner wall of the casing surrounding the opening 28.

Also since the rod 25 is freely movable longitudinally in the bearing member 27, the snap action of the switch is enhanced when the rod is swung laterally to tilt the plate 21 as described, the rod being permitted to move inwardly of the casing as a unit to compensate for varying distances between the inner end of the shank 30 and head 26 of the rod.

So constructed and arranged the rod 25 provides integrally a handle upon the exterior of the casing and an actuator within the casing, thus effecting simplicity of construction and positive operation.

Having described an embodiment of my invention, I claim:

1. A switch comprising a casing; a bearing member having bearing relation with the inner wall of the casing; an operating rod carried by the bearing member, said rod passing through the bearing member and movable longitudinally therein; an abutment on said rod within the casing; and a spring carried by the rod and interposed between the bearing member and said abutment to urge the rod inwardly of the casing.

2. A switch comprising an open end casing; a bearing member having a spheroidal surface closing the end of the casing and having a universal bearing on the inner wall of the casing; an operating rod carried by the bearing member, said rod passing axially through the bearing member and movable longitudinally therein; a head on said rod within the casing; and a spring carried by the rod and interposed between the bearing member and said head to urge the rod inwardly of the casing.

3. A switch comprising a metallic casing open at both ends; a bearing member having a spheroidal portion closing one end of the casing and having a universal bearing on the inner wall of the casing; an operating rod carried by the bearing member, said rod passing axially through the bearing member and movable longitudinally therein; a head on said rod within the casing; a coil spring carried by the rod and interposed between the bearing member and said head to urge the rod inwardly of the casing; a closure for the other end of the casing, said closure carrying a plurality of insulated contacts; and a metallic bridge plate pivoted on one of the contacts and tiltable by said rod into engagement with another contact.

4. A switch comprising a cylindrical casing having an open end; a hollow bearing member having a hemispherical portion bearing upon the inner wall of the casing about said open end; a tubular shank extension of the bearing member arranged centrally of the hemispherical portion and extending outwardly of the casing; an operating rod passing snugly through said shank and movable longitudinally therein; a shoulder on the rod limiting movement of

the rod outwardly of the shank; a head at the inner end of the rod; and a coil spring carried by the rod and interposed between the bearing member and the said head, said spring being received within the hollow hemispherical portion of the bearing member.

5. A switch comprising a metallic casing open at both ends; a bearing member having a spheroidal portion closing one end of the casing and having a universal bearing on the inner wall of the casing; an operating rod carried by the bearing member and movable longitudinally therein, said rod passing axially through the bearing member; a head on said rod within the casing; a coil spring carried by the rod and interposed between the bearing member and said head to urge the rod inwardly of the casing; an insulating closure for the other end of the casing, said closure carrying a central contact and a plurality of circumferentially disposed complemental contacts; a metallic plate universally pivoted on the central contact and tiltable by said rod into engagement selectively with the circumferentially disposed contacts.

6. A switch comprising a metallic casing open at both ends; a bearing member having a spheroidal portion closing one end of the casing and having a universal bearing on the inner wall of the casing; a metallic operating rod carried by the bearing member and movable longitudinally therein; a head on said rod within the casing; a coil spring carried by the rod and interposed between the bearing member and said head to urge the rod inwardly of the casing; an insulating closure for the other end of the casing, said closure carrying a plurality of contacts; a metallic bridge plate pivoted on one of the contacts and tiltable by said rod into engagement with another contact, said plate carrying an insulating insert against which the head of the rod bears.

7. The structure of claim 6 wherein the casing is exteriorly screw threaded and carries a pair of clamping nuts thereon.

8. A switch comprising a cylindrical metallic casing open at both ends and having an internal shoulder; a bearing member having a spheroidal portion closing one end of the casing and having a universal bearing on the inner shoulder of the casing; a metallic operating rod carried by the bearing member and movable longitudinally therein; a head on said rod within the casing; a coil spring carried by the rod and interposed between the bearing member and said head to urge the rod inwardly of the casing; prongs extending from the other end of the casing and equally spaced thereabout; a cruciform insulating closure for said other end clamped to the casing by said prongs; metallic contacts carried by the closure, said contacts embodying contact bars passing through the closure; one of said contacts terminating within the casing in a dome-shaped contact centrally disposed and the other contacts being circumferentially disposed about the dome-shaped contact; a metallic bridge plate having a central shallow cup portion universally pivoted on the dome-shaped contacts and carrying an insulating insert on its opposite face engageable by the rod head.

9. The structure of claim 8 wherein the insulating closure embodies two separable layers of insulating material between which the contact bars are clamped.

10. The structure of claim 8 wherein the insulating closure embodies two separable layers of insulating material between which the contact bars are clamped and wherein the contact bars terminate upon the outside of the casing in wire binding screw means.

In witness whereof, I hereunto subscribe my name.

HARRY A. DOUGLAS.