

[54] SEESAW SWITCH

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[58] Field of Search.....200/67 R, 67 G, 68, 168 C

[56] References Cited

UNITED STATES PATENTS

2,769,050 10/1956 Bourne200/67 G

FOREIGN PATENTS OR APPLICATIONS

1,439,998 4/1966 France.....200/67 G

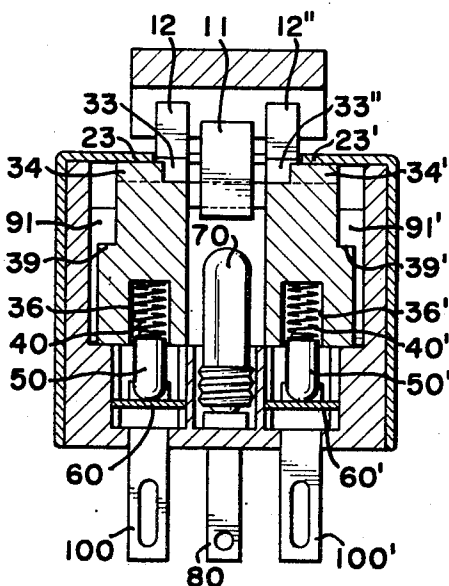
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[57] ABSTRACT

A seesaw switch comprises a rocking mechanism which includes concavely curved shoulders provided on both inner sides of the box of the switch, and a pushing rod carrier having convexly curved sliders at both sides of its lower part and fulcrum projections at both sides of its upper part. The pushing rod carrier is incorporated into the switch box so that the convexly curved slides seat on the concavely curved shoulders of the switch box and the fulcrum projections abut against the receiving stoppers of the frame of the switch. The vertically extending pieces of a button latch onto the upper part of the pushing rod carrier.

7 Claims, 7 Drawing Figures



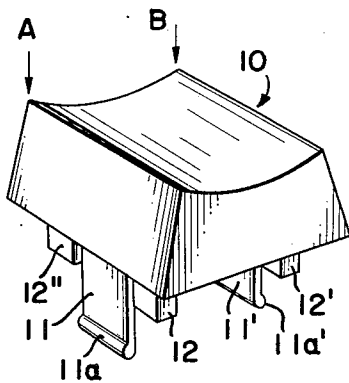


FIG. 1

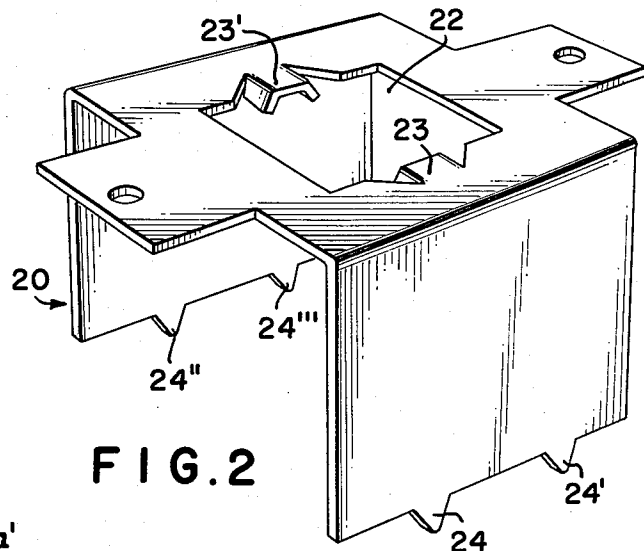


FIG. 2

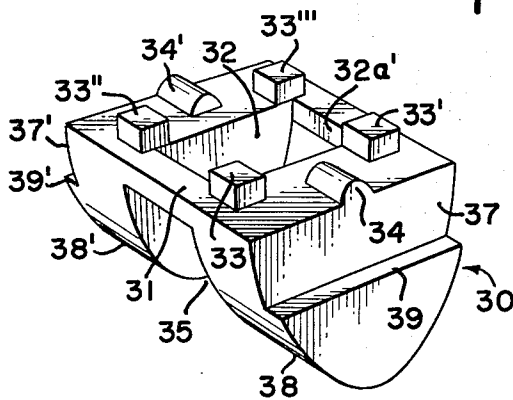


FIG. 3

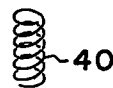
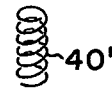


FIG. 4



FIG. 5

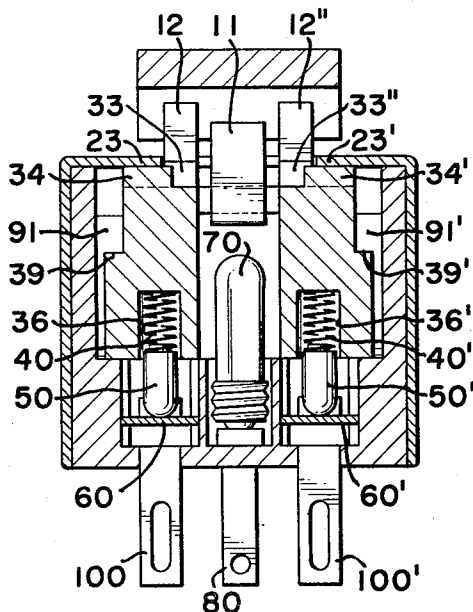


FIG. 7

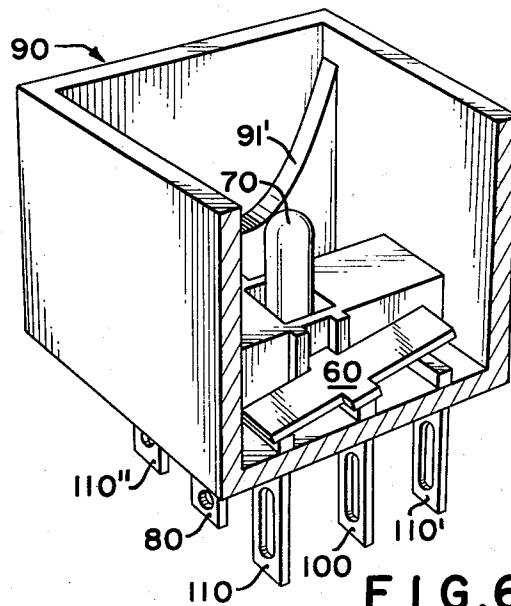


FIG. 6

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SEESAW SWITCH

BACKGROUND OF THE INVENTION

Conventional seesaw switches have a rocking mechanism in which the button of the switch is provided with an axle and the axle is latched into the circular opening as provided in the frame of the switch. Other conventional seesaw switches have a rocking mechanism in which a bearing member is provided in a case containing a contacting mechanism and the axle of a button is mounted on said bearing member. In these seesaw switches, if the axle of the button is thin, there is a great possibility that the axle will be broken when a large load is applied to the button. Such broken axle would make it impossible to actuate the switch. Moreover, if the axle is broken when the switch is electrically energized, a dangerous accident might occur. Other conventional seesaw switches have a different rocking mechanism in which the button and the frame are provided with an aperture and an axle is inserted into the apertures. These seesaw switches have the disadvantage that a number of processes in fabricating the switch are required, for example, piercing processes for the button and the frame and a calking process for the axle are required.

It is an object of the present invention to provide a seesaw switch eliminating the above-mentioned disadvantages.

SUMMARY OF THE INVENTION

This invention relates to a seesaw switch comprising a novel rocking mechanism.

According to this invention, a seesaw switch comprises a rocking mechanism which includes concavely curved shoulders provided on both inner sides of the box of the switch, and a pushing rod carrier having convexly curved sliders at both sides of its lower part and fulcrum projections at both sides of its upper part, said pushing rod carrier being incorporated into the switch box so that the convexly curved sliders seat on the concavely curved shoulders of the switch box and the fulcrum projections abut against the receiving stoppers of the frame of the switch, the vertically extending pieces of a button latching onto the upper part of said pushing rod carrier.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages of this invention will be apparent from a study of the written description and the drawings in which:

FIG. 1 is a perspective view of the button of an embodiment of the seesaw switch according to this invention;

FIG. 2 is a perspective view of the frame of the switch;

FIG. 3 is a perspective view of the pushing rod carrier of the switch;

FIG. 4 is a perspective view of the springs of the switch;

FIG. 5 is a perspective view of the pushing rods of the switch;

FIG. 6 is a perspective view of the switch box with the frame and the right side wall portion of the box removed for the purpose of showing the internal structure of the box; and

FIG. 7 is a longitudinally sectional view of an assembly consisting of the parts as shown in FIGS. 1 to 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the accompanying drawing, a button is generally designated 10 (FIG. 1). A frame is generally designated 20 (FIG. 2). A pushing rod carrier is generally designated 30 (FIG. 3). 40 and 40' are springs (FIG. 4) and 50 and 50' are pushing rods (FIG. 5). 60 and 60' are movable contacts (The contact 60' is not shown in FIG. 6). 70 is a lamp (FIG. 6). 80 and 80' are lamp terminals (The terminal 80' is not shown in FIG. 6). A switch box is generally designated 90. 100 and 100' are common terminals (The terminal 100' is not shown in FIG. 6). 110, 110', 110'' and 110''' are terminals (The terminal 110''' is not shown in FIG. 6). The movable contact 60 as not shown in the drawings is arranged in a symmetrical relation with the movable contact 60'. The lamp terminal 80' as not shown in the drawing is in a symmetrical relation with the lamp terminal 80. The common terminal 100' is located in a symmetrical relation with the common terminal 100. The terminal 110''' as not shown in the drawing is in a symmetrical relation with the terminal 110''.

The button 10 (FIG. 1) is provided on its bottom with vertically extending pieces of resilient material 11 and 11' opposed to each other. The vertically extending pieces 11 and 11' are provided at their lower end with latching members 11a and 11a' respectively. In assembling of the switch, the latching members 11a and 11a' pass through the top window 22 of the frame 20 (FIG. 2) to abut resiliently against side edges 32a and 32a', respectively, of the opening portion 32 of the pushing rod carrier 30 (The side edge 32a is opposed to the side edge 32a', but not shown in FIG. 3).

Legs 12 and 12'' are arranged at both sides of the vertically extending piece 11 to extend vertically. Similarly, legs 12' and 12''' are arranged at both sides of the vertically extending piece 11' to extend vertically (The leg 12''' is not shown in FIG. 1, but in a symmetrical relation with the leg 12'). These four legs 12, 12', 12'' and 12''' are adapted to pass through the top window 22 of the frame 20 to abut against the square posts 33, 33', 33'' and 33''' respectively, provided on the top surface of the pushing rod carrier 30 (FIG. 3).

Receiving stoppers 23 and 23' are formed on the opposite sides of the top window 22 of the frame 20 (FIG. 2). The receiving stoppers 23 and 23' are downwardly bent at both sides thereof. The stoppers 23 and 23' serve to prevent the pushing rod carrier 30 from laterally moving when the pushing rod carrier 30 rocks together with the button 10.

As mentioned above, the pushing rod carrier 30 (FIG. 3) has a central opening portion 32 in its main body 31 and four square posts 33, 33', 33'' and 33''' provided one at the four corners of the central opening portion 32. Furthermore, a semi-circular projection 34 is formed at a central position between the square posts 33 and 33' and similarly a semi-circular projection 34' is formed at a central position between the square posts 33'' and 33'''. In assembling of the switch, the semi-circular projections 34 and 34' are received into the receiving stoppers 23 and 23' respectively, of the frame 20 from its bottom. The main body 31 is provided in its

lower central portion with a cavity 35. Both side walls of the cavity 35a are defined by legs 37 and 37'. The lower portions of the legs 37 and 37' constitute convexly curved sliders 38 and 38', and have holes 36 and 36' (FIG. 7) which open downwardly. Springs 40 and 40' (FIG. 4) and pushing rods 50 and 50' (FIG. 5) are inserted into and mounted in the holes 36 and 36' respectively. Shoulders 39 and 39' are formed in a central portion of the outer surface of the legs 37 and 37' so that the curved sliders 38 and 38' are made somewhat thicker. The curved sliders 38 and 38' are adapted to seat on concavely curved shoulders 91 and 91' respectively, provided in the opposite inner sides of the switch box 90 (FIG. 6). The curved shoulder 91 is opposed to the curved shoulder 91', but not shown in FIG. 6.

The movable contacts 60 and 60', the lamp 70, the lamp terminals 80 and 80', the common terminals 100 and 100', and the terminals 110, 110', 110'' and 110''' are suitably mounted on the switch box 90 (FIG. 6), and claws 24, 24', 24'' and 24''' of the frame 20 are bent to latch onto the switch box 90 for completion of assembling.

The switch which has been described herein is of the double-pole type. Thus, a pair of identical switching mechanisms are juxtaposed in front and the rear in FIG. 6, or right and left in FIG. 7. But this invention is not to be construed as limited to such double-pole type switch.

In operation, the button 10 is pushed in the direction indicated by an arrow A in FIG. 1. The square posts 33 and 33'' are pushed by the legs 12 and 12'', and thus the button 10 rotates anticlockwise about a fulcrum as formed by the semi-circular projections 34 and 34' being received into the stoppers 23 and 23' of the frame 20, and simultaneously the curved sliders 38 and 38' of the pushing rod carrier 30 slides on the curved shoulders 91 and 91' of the switch box 90 in a circular motion. The button and pushing rod carrier are thereby tilted to the left and a switch circuit is completed through the springs 40 and 40', pushing rods 50 and 50', and movable contacts 60 and 60'. Next, when the button 10 is pushed in the direction indicated by an arrow B, the switch is reversely actuated in a manner similar to that mentioned above, and the switch circuit is completed through the opposite terminals.

As is apparent from the foregoing descriptions, according to this invention, an axle supporting member is not formed by a button and a frame, and a bearing is not formed by the bearing member of a case and the axle of a button, the structure of this invention thereby differing from conventional seesaw switches. According to this invention, the convexly curved sliders formed by the thicker lower portions of the pushing rod carrier seat on the concavely curved shoulders provided on the inner sides of the switch box so that the sliders can slide on the shoulders when the button is rocked. If a larger load is applied to the button, the large load is imparted to the pushing rod carrier and is supported by a larger area of the curved shoulders of the switch box. Therefore, there is little possibility that the switch will be broken. Thus, the present seesaw switch has an advantage that it can always reliably

switch a switch circuit.

We claim:

1. A seesaw switch comprising a rocking mechanism wherein the opposed, vertically extending, resilient pieces 11 and 11' of a button 10 pass through the window 22 of a frame 20 to abut resiliently against the side edges of the opening portion 32 of a pushing rod carrier 30, the projections 34 and 34' of the pushing rod carrier 30 being received under the receiving stoppers 23 and 23' of the frame 20 to form a fulcrum, legs 37 and 37' being provided at both sides of the cavity 35 in the lower portions of the pushing rod carrier 30, the lower parts of the legs 37 and 37' constituting convexly curved sliders 38 and 38', said sliders seating on the concavely curved shoulders 91 and 91' provided on the inner side walls of a switch box 90, whereby said pushing rod carrier slides along a circular arc.

2. A seesaw switch as claimed in claim 1 wherein the vertically extending pieces 11 and 11' are provided at their lower end with latching members 11a and 11a', said members being adapted to abut resiliently against the side edges of the opening portion 32 of the pushing rod carrier 30.

3. A see saw switch as claimed in claim 1 wherein legs 12 and 12'', and 12' and 12'' are provided at both sides each of the vertically extending pieces 11 and 11' of the button 10, square posts 33, 33', 33'' and 33''' being provided at the four corners of the top surface of the pushing rod carrier 30, said legs 12, 12', 12'' and 12''' being adapted to abut against said square posts 33, 33', 33'' and 33''' respectively.

4. A seesaw switch as claimed in claim 1 wherein a central opening 32 is provided in the main body 31 of the pushing rod carrier, square posts 33, 33', 33'' and 33''' being provided adjacent the four corners of said central opening 32, semi-circular projections 34 and 34' being provided in a central position between said posts 33 and 33', and between said posts 33'' and 33''' respectively, a cavity 35 being provided in a central area of the lower part of said main body 31, legs 37 and 37' being defined by both sides of said cavity 35, the lower parts of said legs 37 and 37' constituting convexly curved sliders 38 and 38', and having holes 36 and 36' which open downwardly.

5. A seesaw switch as claimed in claim 1 wherein the receiving stoppers 23 and 23' of the frame 20 are defined by downwardly projecting bent portions provided in a central position of the side edges of the window 22 of the frame.

6. A seesaw switch as claimed in claim 1 wherein semi-circular projections are provided on both sides of the top of the body of the pushing rod carrier 30, said projections being adapted to contact the lower surface of the frame 20 to form a fulcrum for rocking of the pushing rod carrier.

7. A seesaw switch as claimed in claim 1 wherein the sliders 38 and 38' of the pushing rod carrier 30 are provided with holes 36 and 36' which open downwardly, springs 40 and 40' being inserted into and mounted in said holes 36 and 36' respectively, pushing rods 50 and 50' being inserted into and mounted in said holes 36 and 36' with said springs being compressed.

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