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ROCKER SWITCH CENTERED BY CIRCULAR LOOP SPRING MEMBERS
COILED IN COMPRESSION
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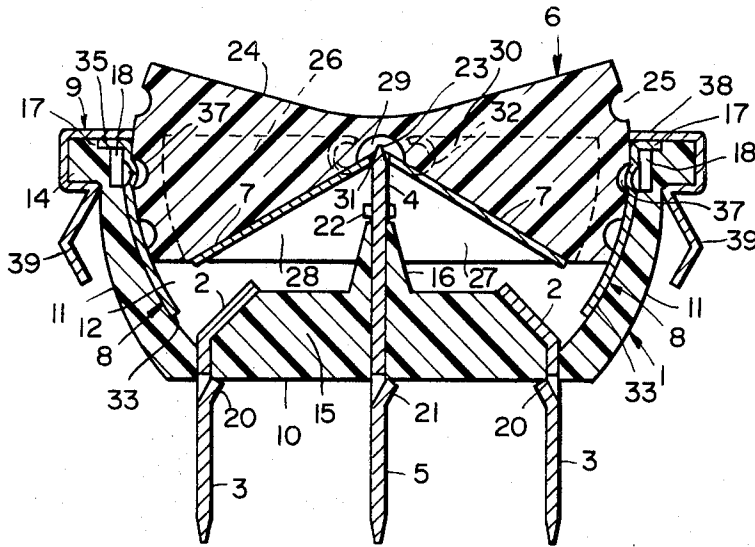


FIG. 1

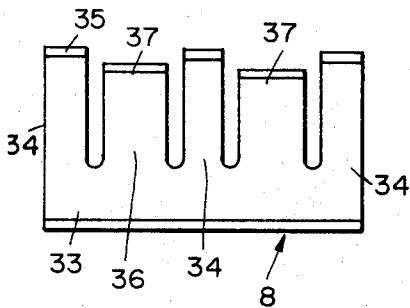


FIG. 2

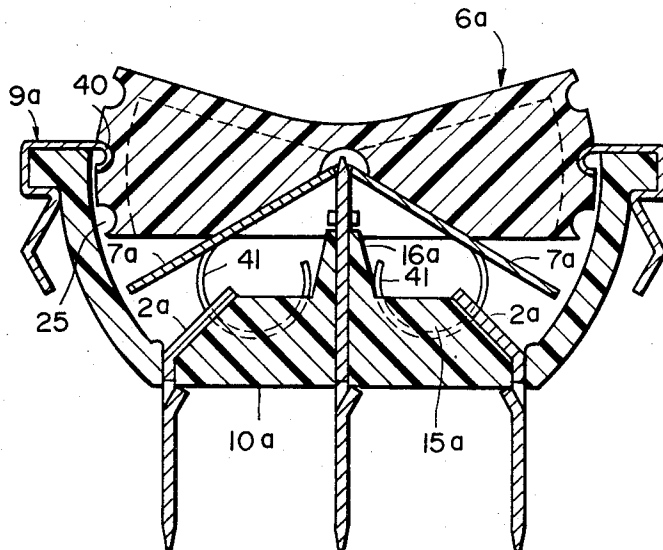


FIG. 3

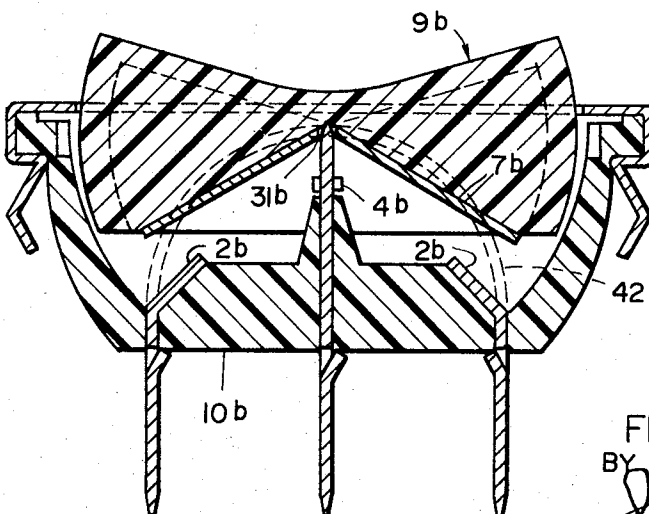


FIG. 4

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3 Claims

ABSTRACT OF THE DISCLOSURE

A switch housing has three, spaced stationary contacts seated in the base thereof. The fixed contacts are connected to three terminals extending through the housing bottom, two of which are output terminals, the other being a common supply terminal. An actuating rocker arm is pivotally mounted in the housing. Movable contacts are pivotally mounted on the common stationary contact and are either secured to or biased against the undersurface of the rocker arm, whereby one of the control circuits is completed by pivotal movement of the rocker arm to a selected position with respect to the housing. In certain embodiments the switch includes means for fixedly maintaining it in the off or on positions when the rocker arm is released. Means for snappingly seating the switch in an apertured support are also provided. Spring members integrally connected to said moveable contacts, are in the form of generally circular loops, and bias the moveable contacts against the undersurface of the actuating rocker arm.

BACKGROUND OF THE INVENTION

Switches of the type disclosed herein are widely used in the automotive, appliance and data processing industries, for example, to remotely control the raising and lowering of power driven windows in an automobile. Often the switches are mounted in banks on an instrument panel, control panel or the door arm rest in the specific example mentioned above. The reader will appreciate that in these highly competitive industries cost and selling price of comparable products have become such all important factors in the maintenance of a competitive position that savings of even fractions of pennies in procurement and labor costs are of extreme importance. The primary objective of the invention is, therefore, to provide an inexpensive, efficient switch embodying a minimum number of component parts which practically fall together during assembly and means for rapidly, positively securing the assembled switch to a supporting panel or chassis.

The prior art abounds with switches designed to perform the function of the present invention. Many of them employ a spring-loaded plunger mounted in a bore at the underside of the switch actuating lever or a yoke which is pinned to the lever to deflect pivotally mounted movable contacts into circuit establishing positions. In some instances the plunger itself acts as a movable contact. The present invention eliminates such relatively sophisticated components by pivotally mounting a simple sheet metal stamping which forms the movable contacts on the supply contact and against the underside of the operating lever or rocker arm whereby the contacts move directly with the operating lever as the latter is rotated. Substantial savings in assembly time are accrued as a result of this improvement.

In another aspect of the invention a stamped, sheet metal bezel, which acts as a cover holding the operating lever in assembly with the switch housing, is provided with integral legs which nappedly engage the edges of an

apertured panel for rapid installation of the switch in a vehicle or appliance or subassembly thereof. Conversely, the prior art devices must be bolted or screwed to a supporting member which increases installation time and the costs for labor and material incident thereto.

A number of the known switches embody separate coil or leaf springs which urge the movable contacts away from the stationary contacts when the operating lever is released, particularly in switches of the momentary type, whereas the spring members which perform this function in the present invention are an integral part of the movable contacts per se.

Finally, the maintained switches of the prior art usually employ spring-loaded balls and cooperating sockets or even more sophisticated means for holding the switch operating lever in the switch on and neutral positions whereas the present invention utilizes a plurality of notches formed in the ends of the operating lever and a simple, spring metal detent which in certain embodiments is part of a separate sheet metal stamping and in others is an integral part of the bezel heretofore mentioned.

Thus, in summary, invention is seen to reside in a switch including an insulative switch housing, a plurality of stationary contacts positioned in the base of the housing and connected to terminals extending beyond the housing, at least one of the stationary contacts being connected to a common supply terminal, a nonconductive operating lever pivotally mounted on said housing and retained thereon by a sheet metal bezel acting as a switch cover, and a plurality of movable contacts disposed immediately adjacent the undersurface of the operating lever and connected to the supply contact, whereby the movable contacts are selectively brought into engagement with one of the other stationary contacts responsive directly to pivotal movement of the operating lever for completing one of the circuits controlled by the switch, the bezel also including means for snappingly securing the switch in an apertured panel or other supporting member. Additional novel features would include spring means integral with the movable contacts which in certain embodiments urge the latter away from the fixed output contacts when the operating lever is released or rotated to the neutral position, and a detent which cooperates with a plurality of notches formed in the operating lever to positively maintain the latter in selected positions in certain embodiments of the invention.

The reader will further appreciate the invention's contribution to the field by having reference to the detailed description which follows in conjunction with a viewing of the accompanying drawing.

FIG. 1 is a longitudinal cross-sectional elevation of a first embodiment of the invention;

FIG. 2 is a plan view of the sheet metal detent shown in section in FIG. 1;

FIG. 3 is a sectional elevation similar to FIG. 1 of a second embodiment of the invention; and

FIG. 4 is a sectional elevation of a third form of the invention.

Referring specifically to the embodiment of the invention depicted in FIG. 1, the switch components include a molded, plastic housing 1, a pair of stationary contacts 2 which are integrally connected to output terminals 3, a single stationary contact 4 connected to common supply terminal 5, a switch operating lever 6, a pair of movable contacts 7, a pair of sheet metal stampings 8, and a sheet metal bezel 9 which acts as a switch cover.

The switch housing 1, which is hollow and open at the top, includes a generally flat base 10, arcuate ends 11 and parallel sides 12, an outwardly extending lip 14 at the upper edge of each end 11, a raised generally trapezoidal platform 15 extending upwardly from the base 2,

a trapezoidal post 16 extending from the platform 15 toward the open top of the housing and laterally beyond the long sides of the platform, a pair of shallow notches 17, and a pair of deeper notches 18 formed in the internal walls of the ends 11 immediately adjacent and below the notches 17. A pair of through, relatively narrow openings are formed in the base 10 adjacent the ends 11 and a central, relatively narrow opening extends through the base 10, platform 15 and post 16. A pair of shallow, semicircular recesses (not shown) are formed at the center of the upper edges of the parallel sides 12.

The stationary output contacts 2 are press fitted in the narrow outboard openings in the base such that the contacts lie against the angular faces of the platform 15 and the terminals 3 extend beyond the bottom of the base 10. Spring tabs 20 cooperate with the contacts 2 to positively maintain said components in assembly with the housing. The supply contact 4 is press fitted in the aligned openings in base 10, platform 15 and post 16 and retained therein by the spring tab 21 on terminal 5 and the lugs 22 which lie against the upper end of post 16. The end of contact 4 has a narrow projection 23 thereon the purpose of which will be further described hereinafter.

The switch operating lever 6 is of molded plastic, for example, nylon construction. The upper surface of the solid top 24 is dished to provide a rocker arm effect. The ends of the lever are generally arcuate and each has a plurality of spaced, semicircular notches 25 formed therein. The undersurface of the lever has a pair of relatively deep recesses 26 formed adjacent the parallel sides 27 and a somewhat shallow, obtusely angled recess 28 formed between the recesses 26 and communicating at its apex with a semicircular notch 29 immediately adjacent the underside of the top 24. Four spaced notches disposed in opposed pairs and lying generally perpendicular to the notch 29 are formed in the body 30 of the lever immediately below the top 24. A pair of short circular studs (not shown) extend outwardly from the sides 27 adjacent the center of the top 24.

The movable contacts 7 are part of an obtusely angled, sheet metal stamping having an opening 31 formed centrally in its apex and four arced spring tabs 32 bent upwardly in opposed pairs from its opposite sides. The contacts 7 are rapidly secured to the lever 6 by pressing the tabs 32 into the opposed notches in the body 30 of the lever described above. Thus the contacts 7 are tightly retained against the angular undersurfaces of the body 30 defining the recess 28.

The sheet metal stampings 8 include an arced base 33, central and outboard retaining fingers 34 having right-angulantly bent terminal ends 35 and inboard spring fingers 36 having arced detents 37 which normally lie forward of the general plane of the base 33. The stampings 8 are positioned against the internal walls of the ends 11 of the housing such that the terminal ends 35 of the retaining fingers 34 seat in the shallow notches 17 and the detents 37 lie opposite the deeper notches 18.

Once the stampings 8 are positioned in the housing, the subassembly of lever 6 and movable contacts 7 is emplaced such that the tab 23 on stationary contact 4 extends through the narrow slot 31 in the apex of the stamping forming contacts 7 and into the semicircular recess 29 in the lever 6. In addition the previously mentioned short circular lugs on the lever 6 seat in the shallow semicircular recesses of the central upper edges of the sides 27 of the housing. Thus, the lever 6 is pivotal within the housing and the contacts 7 are pivotally connected supply contact 4. The detents 37 snap into cooperating notches 25 on opposite sides of the lever to maintain same in a fixed neutral position with respect to the housing. The top 24 of the lever 6 extends through the open top of the housing for easy manual actuation of the lever.

The last component in the assembled switch is the spring metal bezel 9 which snaps over the lips 14 on the

housing 1. The bezel has an apertured rim 38 through which the top portion 24 of the lever 6 extends. The rim 38 overlies the top of the sides 12 and ends 11 of the housing to retain the aforementioned circular lugs on the lever in the semicircular recesses at the top of the housing sides 12 and also retains the terminal ends 35 of the retaining fingers 37 in the shallow notches 17. The bezel also includes a pair of integral snap lugs 39 which lie opposite the ends 11 of the housing and provide for snap seating of the switch in an apertured support or chassis.

The switch described above is of the maintain type in that pivotal rotation of the operating lever 6 in either a clockwise or counterclockwise direction will cause the detents 37 to seat in the upper and lower notches 25 on opposite sides of the lever to maintain one of the contacts 7 in engagement with one of the output contacts 2 until the lever is counterrotated to the neutral position.

The structure of the switch depicted in FIG. 3 is basically the same as the switch described above. However, the stampings 8 are eliminated and the snap acting detents 40 are in the form of turned-down lips on the inner edges of the bezel 9a. Further, the stamping forming the movable contacts 7a is modified to include four opposed spring loops 41 (only two of which are shown in the FIG. 3 section). The spring loops 41 are integrally joined to the side edges of the contacts and each opposed pair lies against the base 10a and the post 16a both in front and in back of the platform 15a (which is narrower than the platform 15 of FIG. 1) to bias the contacts 7a against the underside of the body of lever 6a. The loops are thus insulated by the platform 15a against accidental engagement with the contacts 2a to prevent shorting or unintentional completion of one of the circuits controlled by the switch. When the lever 6a is pivoted, the pair of spring loops 41 on one side of the post 16a are coiled up in compression against the post and the base 10a and thereafter cause immediate separation of the movable and fixed output contacts when the lever is counterrotated to prevent arcing across the contacts which often occurs during a slow break in switches of this type. While the switch of FIG. 3 is also depicted as a maintain type primarily to illustrate the integral detent-bezel construction, the reader will appreciate that it might readily be converted to a momentary type by eliminating the detents 40 and/or the notches 25a on the actuating lever. Were these changes made, the spring loops 41 would cause a break of the contacts 7a, 2a as soon as the lever was released by an operator and thereafter return the lever to the horizontal or neutral position.

The switch depicted in FIG. 4 is also of the same basic construction as those described earlier but it is definitely of the momentary type in that the detents and cooperating notches on the lever are absent. The springs 42 which bias the contacts 7b against the lever 9b and cause a contact break upon release of the lever have a convex configuration and are integrally connected to the contacts 7b by a thin web (not shown) adjacent the slot 31b in the apex of the stamping forming the movable contacts. The springs 42 are four in number and the free end of each is tensioned against the base 10b of the housing, adjacent but spaced from the output contacts 2b. When the lever is rotated to establish one of the controlled circuits, the pair of springs on one side of the contact 4b are flattened and placed in greater tension, and thereafter cause an immediate contact circuit break when the lever is released.

From the foregoing detailed description the reader will appreciate that the improvements over the prior art devices set forth earlier have been realized by the present invention and further that the specifically described forms of the invention might be additionally modified or altered without departing from the scope of the invention which is best defined by the following claims.

5

I claim:

1. A switch comprising an insulative, nonconductive housing, a plurality of stationary contacts mounted in the base of said housing and connected to terminals extending outwardly from said housing, at least one of said stationary contacts being a common input contact, the remaining stationary contacts being output contacts an operating lever of nonconductive material pivotally mounted in the housing, at least one movable contact mounted against the undersurface of said operating lever and supported by said stationary common contact, said movable contact being biased against the undersurface of said operating lever by a spring member which is integrally connected to said movable contacts and bears against the base of said housing, said movable contact being pivotable about said stationary common contact responsive to pivotal movement of said operating lever in said housing whereby said movable contact engages one of said stationary output contacts for completion of a circuit controlled by the switch, said spring member being in the form of a generally circular loop which is coiled up in compression when said operating lever is pivoted into circuit completing position.

2. A switch according to claim 1 including cooperating stop means provided by a resilient detent mounted in said housing and a detent receiving notch formed in said

6

operating lever whereby said movable contact may be maintained in neutral and selected circuit completing positions.

3. A switch according to claim 2 including a sheet metal cover which retains said operating lever in said housing, said resilient detent being integrally connected to said cover.

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