Nov. 4, 1952 L. BEEMAN 2,616,996

SNAP SWITCH

Filed Dec. 6, 1947

FIG. 1.

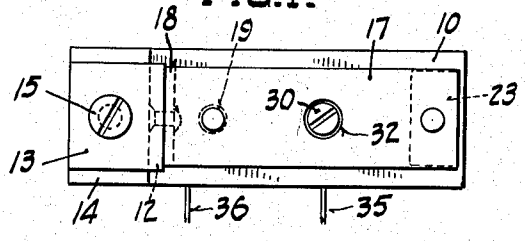


FIG. 2.

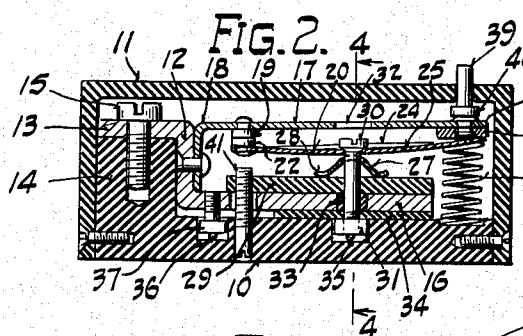


FIG. 4.

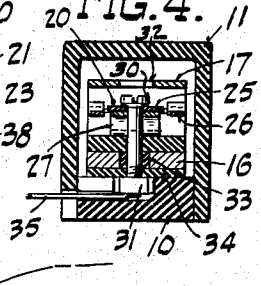


FIG. 3.

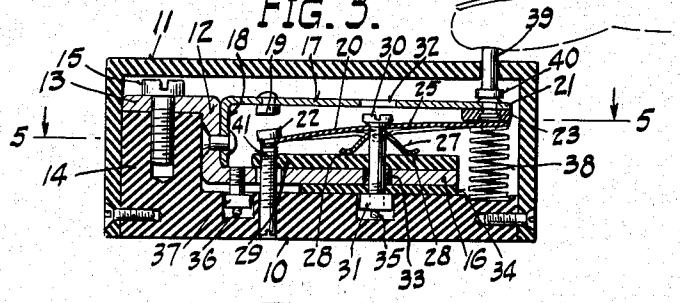


FIG. 5.

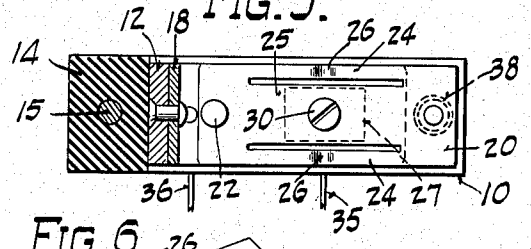
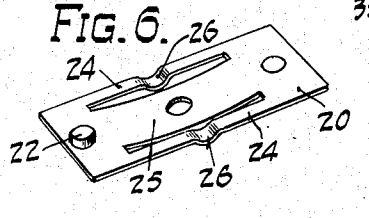


FIG. 6.



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SNAP SWITCH

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1 Claim. (Cl. 200—67)

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This invention relates to snap switches.

One object of the present invention is to simplify and otherwise improve the construction and operation of snap switches.

A more specific object is to provide a snap switch in which adequate pressures are maintained between the switch contacts until the instant that snap action occurs. This characteristic is of importance particularly in mechanically controlled switches in that it avoids arcing and consequent pitting of the contacts which commonly result from lack of contact pressures during slow opening movement of the switch actuator in snap switches heretofore designed.

Another object is to provide in a snap switch a simple and reliable means for modifying the switch action so as to regulate the point at which snap action occurs.

Another object is to provide a reliable snap switch of simple inexpensive design.

Other objects and advantages will appear, expressed or implied, from the following description of an illustrative embodiment of this invention.

In the accompanying drawing:

Figure 1 is a top plan view of a snap switch constructed in accordance with this invention, with the housing cover removed.

Figs. 2 and 3 are longitudinal sectional views, showing the switch in closed and open positions, respectively.

Fig. 4 is a transverse sectional view taken substantially along the line 4—4 of Fig. 2.

Fig. 5 is a horizontal sectional view taken along the line 5—5 of Fig. 3, cover removed; and

Fig. 6 is a perspective view of the snap-action element shown in the other views.

The switch selected for illustration is shown mounted on a block 10 of insulating material and contained within a suitable housing cover 11 in which the block 10 is fitted and to which it is removably attached.

A metal bar 12 extending lengthwise of the block provides support for the several operating parts of the switch mechanism. This bar is shown bent to provide an elevated portion 13 seated upon a shoulder 14 at one end of the block and secured thereto by a screw 15 in such manner as to support a depressed portion 16 of the bar in a position immediately above the block.

A metal strip 17, securely anchored at one end 18 to the bar 12, overlies the depressed portion 16 of the bar, and provides support for a switch contact 19 mounted against the under face of the strip adjacent the anchored end thereof. The strip 17 also functions as an actuator for a resilient snap-action element 20, to be later described. In this instance one end of the element 20 is shown anchored to the free end 21 of the strip 17, while the other end of the element carries a movable switch contact 22 in position to cooperate with contact 19. The free end 21 of the strip 17 is insulated from the element 20 by suitable material 23.

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Although the snap action-element 20 may assume various forms, that shown particularly in Figs. 5 and 6 comprises a strip of resilient metal longitudinally slotted to form a pair of side straps 24 and an intermediate strap 25, all interconnected at each end of the strip. The side straps 24 are crimped, as at 26, to foreshorten and thereby tension them and render them lengthwise resilient, and to thereby set up compression forces in the intermediate strap 25. Because of these forces, the strap 25 normally assumes the slightly bowed or cambered shape shown.

The snap-action element 20 is rockably supported intermediate its ends upon a suitable fulcrum member 27, preferably vertically adjustable. The fulcrum member shown comprises a resilient metal strip bent into inverted V-shape and having spaced feet 28 which seat upon a suitable pad 29 of insulating material fixed on the depressed portion 16 of the supporting bar. The intermediate strap 25 of the snap-action element 20 rests upon the apex of this fulcrum and is retained thereon by the head of a vertical screw 30. The screw extends through the strap 25, the fulcrum 27, and the bar portion 16 and is retained by a stationary nut 31 threaded on the lower end thereof. The fulcrum 27 is sufficiently stiff to sustain any normal load imposed thereon by the element 20, but is normally compressed by the screw 30, the height of the fulcrum apex is regulated and controlled by rotation of the screw 30 in the nut 31. A suitable aperture 32 in the strip 17 provides access to the screw 30 for purposes of adjustment. The screw 30 is insulated from the bar portion 16 by an insulating sleeve 33 and pad 34.

A suitable lead wire 35 is electrically connected to the movable switch contact 22 through the nut 31, screw 30, and strap 25; while the other contact 19 is electrically connected to a second lead 36 through the strip 17, bar 12, and screw 37 carried by the bar.

An appropriate spring 38 seated on the block 10 reacts on the free end of the strip 17 to yieldably sustain the same in the upper position shown in Fig. 2, in which position the bowed strap 25 of the snap-action element 20 reacts on the ful-

crum 27 to hold the contact 22 against contact 19. The free end of the strip 17 may be depressed in a manner to separate the contacts 22 and 19 by any suitable means, such as a vertical pin 39 projecting through and guided in the housing cover 11. The pin 39 is shown equipped at its lower end with a head 40 seated on the strip 17.

It will be noted that with the switch in the closed position of Fig. 2, the tensioned side straps 24 of the snap-action element 20 are disposed above the point where the intermediate strap 25 rests on the fulcrum 27, and the strap 25 assumes a downward camber.

However, whenever the free end 21 of the strip 17 is depressed by the switch-opening thrust of the pin 39, the connected end of the element 20 lowers correspondingly, carrying with it the side tension straps 24 until the latter pass through a dead center position, whereupon the intermediate compression strap 25 snaps into a position of upward camber, causing the contact 22 to suddenly withdraw from contact 19 with a snap action. It will also be noted that, during the downward thrust of the pin 39, and until the snap action actually occurs, the element 20 functions as a simple lever reacting on the fulcrum and converting this downward thrust into an upward thrust of the contact 22 against contact 19, thereby actually increasing the contact pressure between the contacts. This pressure continues until relieved by the ultimate snap-action movement of contact 22 away from contact 19.

It will be understood of course that upon release of the thrust pin 39, the strip 17 is returned by the spring 38 to the upper position of Fig. 2 causing the snap-action element 20 and the contact 22 to resume the positions therein shown.

It will be further understood that the action of the switch may be modified by adjusting the screw 30 so as to elevate or depress the fulcrum point of the element 20. By thus elevating the fulcrum point the switch opens at a point earlier in the down stroke of the pin 39 and the switch closing action is retarded, and when the fulcrum point is depressed the switch opens later and closes earlier.

Provision is also preferably made for adjusting the point at which closing of the switch occurs without affecting the point at which opening of the switch occurs. In the device shown this is accomplished by the use of an adjustable stop by

which the open position of the switch contact 22 may be regulated and determined, the stop shown comprising the end 41 of a screw in threaded engagement with the insulating plate 29. By elevating the stop 41 the open position of the contact 22 is correspondingly elevated toward the level of the fulcrum point of the element 20, causing the latter to snap into switch closing position at an earlier point in the down stroke of the pin 39; and by depressing the stop 41 the switch will close at a later point in the down stroke of the pin 39.

Various changes may be made in the embodiment of the invention hereinabove specifically described without departing from or sacrificing the advantages of the invention as defined in the appended claim.

I claim:

In a snap switch the combination of a yieldable fulcrum member, a resilient snap-action element rockably supported intermediate its ends on said fulcrum member, a switch contact, a second contact on one end of said element movable into and out of engagement with said first named contact in response to snap-action movements of the latter, means operable on the other end of said element to effect snap-action movements of the latter, and a screw extending through said element and said fulcrum for adjusting the latter and thereby vary the switch action.

LYLE BEEMAN.

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