Dec. 30, 1969 R. H. ARTHUR 3,487,184

OVERTRAVEL MECHANISM FOR SNAP-ACTION SWITCH

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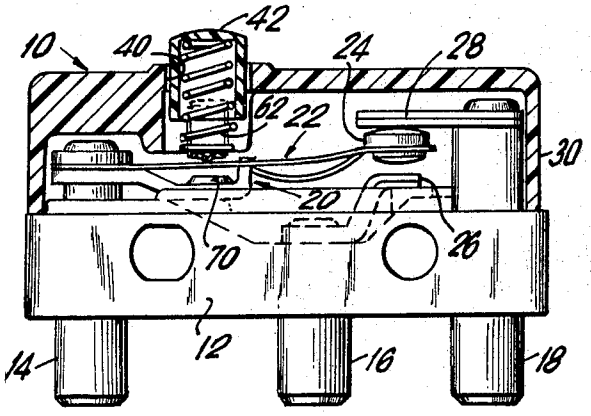



FIG. 1

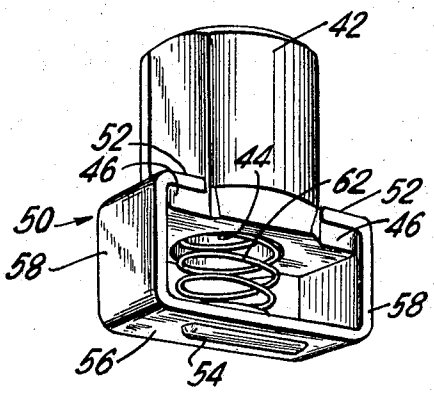



FIG. 4

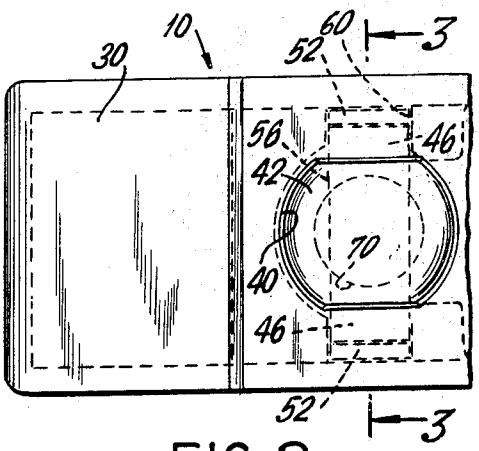



FIG. 2

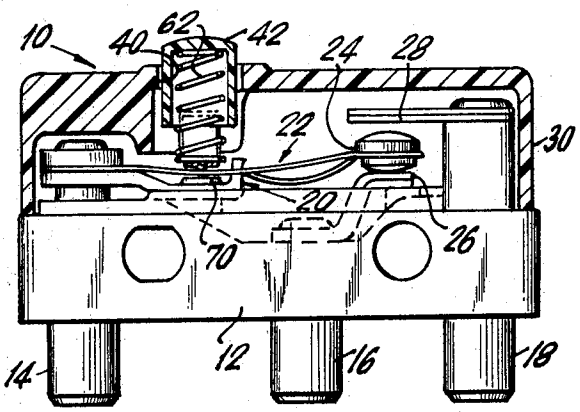



FIG. 5

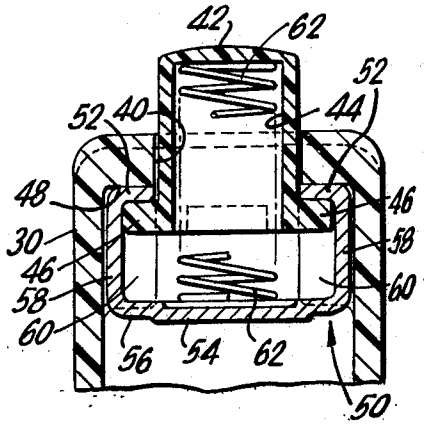



FIG. 3

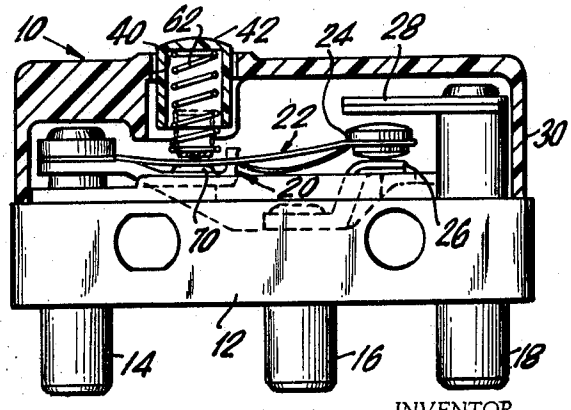



FIG. 6

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# OVERTRAVEL MECHANISM FOR SNAP-ACTION SWITCH

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U.S. Cl. 200—67 3 Claims

## ABSTRACT OF THE DISCLOSURE

In a snap acting electrical switch, a compact overtravel mechanism for the contact button includes a movable guide member that is resiliently coupled to an internal portion of the button. A spring member is disposed within the hollow button and acts on the guide member to permit additional overtravel of the external portion of the contact button after the snap acting switch is actuated by the initial movement of the contact button.

This invention relates generally to snap action switches and more particularly to an improved overtravel mechanism for the externally actuated contact button thereof.

In the snap acting switches it has often been found desirable to employ an overtravel mechanism for the externally actuated button thereof. Particularly in miniature snap action switches it has been found that the service life of the contact carrying arm, which is a leaf spring, is relatively short due to fatigue resulting from prolonged usage. By definition, overtravel is the movement in excess of that necessary to effect movement of the internal contact from a normally open to a normally closed position or vice versa. Advantageously the overtravel mechanism should allow the plunger button some limited movement after the switchblade has moved internally from its first position to its second position and its movement is arrested by the engagement with an internal stop member. The aforementioned overtravel movement should be accomplished with no change in overall envelope dimensions of the switch. The present invention provides a more compact overtravel mechanism for the plunger than was heretofore available.

Accordingly, it is an object of this invention to provide an improved overtravel actuating mechanism for a snap action electrical switch.

It is another object of this invention to provide the aforesaid overtravel mechanism without changing the envelope dimensions of the switch.

A particular object of this invention is to provide an improved overtravel actuating mechanism for a snap action electrical switch that may be adapted for use with existing switch dimensions and which does not require redesign of the switch.

Still another object is to provide an overtravel mechanism which may be utilized in snap action switches of the miniature type.

These and other features, objects and advantages of the invention will, in part, be pointed out with particularity and will, in part, become obvious from the following more detailed description of the invention, taken in conjunction with the accompanying drawing, which forms an integral part thereof.

In the various figures of the drawing line reference characters designate like parts.

In the drawing:

FIG. 1 is a side elevational view partly in section illustrating the overtravel mechanism of this invention acting in cooperation with a typical snap action switch mechanism;



FIG. 2 is a fragmentary plan view of the switch shown in FIG. 1;

FIG. 3 is a vertical, sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a perspective view in section of the overtravel mechanism removed from the switch housing;

FIG. 5 is a sectional view showing the external button depressed after having displaced the movable contact from one fixed contact to the other fixed contact; and

FIG. 6 is a sectional view similar to FIG. 5 illustrating further depression of the contact button and the extent of overtravel thereof.

Referring now to the drawing, a conventional snap action switch **10** is illustrated and is seen to comprise a molded plastic body portion **12** having external terminals **14**, **16** and **18** co-molded therewith. As is conventional in the art, for example in U.S. Patent 3,144,529, issued on Aug. 11, 1964 to J. J. Zemke et al., terminal **14** is an electrical contact with a pivot member **20** that supports and is electrically connected to a snap action leaf spring **22**. A contact button **24** is secured to the free end of the leaf spring and is movable between fixed contacts **26** and **28** that are electrically connected to terminals **16** and **18** respectively. A molded plastic cover member **30** is suitably secured to the top of the switch body in order to enclose the switch elements. The foregoing components are conventional in the art and are described herein for the purpose of explaining the relationship of the overtravel mechanism to the remainder of the device.

An aperture **40** is provided in switch cover **30** in order to permit free movement of a hollow button **42** therethrough. In cross section button **42** is substantially circular but is provided with two flat sides. The hole **40** in the cover is similarly shaped. In addition, the bottom end of button **42**, which has a chamber **44** therein, is provided with laterally extending feet **46**. The button is assembled from underneath and since the span of the feet is greater than the hole in the cover the button cannot be expelled from the switch housing.

A U-shaped button guide **50** is secured to the feet **46** of the button by means of inwardly turned tabs **52**. A transverse rib **54** is formed on central portion **56** that connects upstanding legs **58** of the button guide. Tabs **52** are formed at the free end of the legs **58**. Slots **60**, formed in each of the opposed, downwardly depending side walls of the cover member **30**, retain the button guide **50** and permit axial movement thereof but, in combination with button feet **46** and tabs **52** prevent rotation of the button. Prior to assembling the button guide to the button as described above, a spring member **62** is disposed in the hollow chamber **44** of the button and is arranged to abut the inside surface of central portion **56** of the button guide.

In its nonoperating position the transverse rib is spaced a short distance from the top surface of the snap action leaf spring. When the button is depressed, the transverse rib contacts the leaf spring at the appropriate position intermediate the two spaced supports therefor and transfers the movable contact from one fixed contact to the other (FIG. 5). The spring precompression is such that normal pressure on the button will cause it to move axially as a unit to deflect the snap action leaf spring until the leaf spring contacts a fixed stop member **70** integral with pivot member **20**. However, when continued force is applied to the button, the spring member **62** will collapse within the button **42** and the button will continue to move relative to the button guide. This overtravel action avoids excessive forces being exerted on the leaf spring and therefore, materially adds to the life of the spring.

It will be noted that the present invention comprising the combination of the button, the button guide and the spring, are readily adaptable for use in conventional and existing snap action switches without changing the envelope size thereof. Positive action of the push button is maintained and yet some additional overtravel of the button is still permitted. Excessive deflection of the leaf spring is prevented by its engagement with the fixed internal stop member after the contact button is actuated. The preload of the spring contained in the hollow contact button need only be sufficient to assure that the button assembly will move as a unit until the leaf spring engages the fixed overtravel stop. Thereafter the spring in the button will yield to permit additional inward movement of the contact button.

There has been disclosed heretofore the best embodiment of the invention presently contemplated. It is to be understood however, that various changes and modifications may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

**1.** A unitary switch operator and overtravel mechanism for a switch having an elongated, snap-acting leaf spring contact carrier comprising a housing provided with a non-circular aperture, said switch operator being a hollow button and having a portion correspondingly-shaped to said aperture for movement through the latter, said hollow button having feet laterally extending from said non-circular portions at one end of said hollow button, a substantially U-shaped guide member having portions thereof inteurned adjacent to the upper surfaces of said feet, a helical spring in said switch operator having one end engaging said hollow button and the other end engaging said guide member whereby the pressure of said helical spring maintains said inturned portions of the guide member in engagement with the upper surfaces of said feet, and upon the application of a force on the external exposed end portion of said button said guide member deflects the leaf spring, said button being permitted limited axial movement thereafter against the urging of said helical spring without further movement of said guide member in a direction toward the leaf spring.



**2.** The mechanism in accordance with claim **1**, including means integral with said housing for engaging said botton and preventing angular movement thereof.

**3.** The mechanism in accordance with claim **1**, wherein the web connecting the spaced apart legs of said U-shaped member includes a rib extending transversely of and towards the leaf spring.


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