May 7, 1968 W. L. CHERRY ET AL 3,382,332

MULTIPOSITION SNAP-ACTION SWITCH BLADE

Filed Feb. 13, 1967

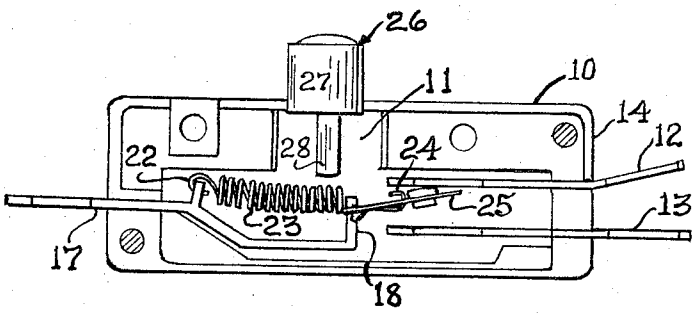


Fig. 1.

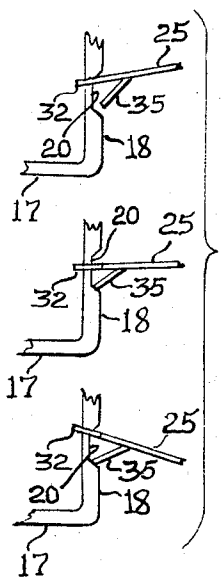


Fig. 6.

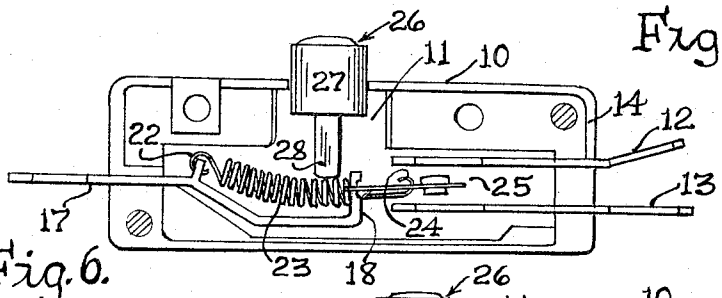


Fig. 2.

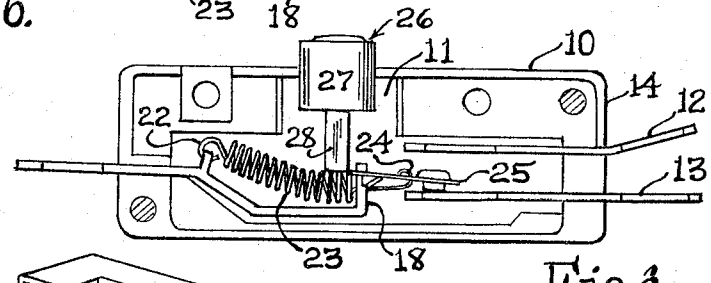


Fig. 3.

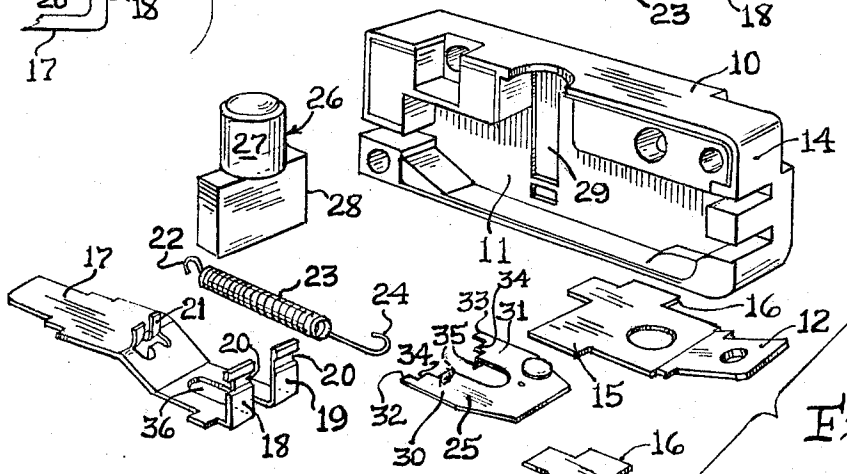


Fig. 4.

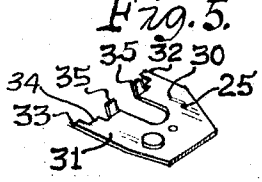
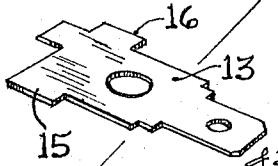


Fig. 5.



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MULTIPOSITION SNAP-ACTION SWITCH BLADE

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ABSTRACT OF THE DISCLOSURE

A snap action switch having a coiled spring over-centering mechanism for pivotally moving a switch blade through a multitude of positions. The switch blade includes angularly positioned tab members normally in contact with a pair of pivot posts to which a switch blade is pivotally connected by the coil spring of the over-centering mechanism with the tab members momentarily restricting the free pivotal movement of the switch blade between engagement with circuit making contacts so as to provide a multitude of positions of the switch blade directly related to the actuation of the over-centering mechanism.

Field of invention

The multiposition snap action switch comprises an improvement over the snap action switch shown and described in United States Letters Patent No. 3,073,923, dated Jan. 15, 1963, and issued to Cherry Electrical Products Corporation, assignee of this application. It relates to electrical apparatuses defined in Class 200, Subclass 67 and includes a pivotal mounting for a movable switch blade adapted to be pivoted by an over-centering mechanism consisting in part of a coil spring which is connected to the movable blade and functions to pivot the same relative to the pivotal mounting. The switch blade is further defined as providing means in the form of yieldable tab members which as the switch blade is pivoted by the over-centering mechanism, engage and yieldably and momentarily resist free continuing movement of the switch blade through a multitude of positions.

This invention consists in the novel combination and arrangement of cooperative parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

FIG. 1 is a side elevational view of the switch structure of this invention at rest or in its first position within a switch housing having the side cover thereof removed;

FIG. 2 is a side elevational view similar to FIG. 1, but showing the parts of the switch in a second or equilibrium position;

FIG. 3 is a side elevational view similar to FIG. 1, but showing the parts of the invention in their third or fully actuated position;

FIG. 4 is an exploded view of the component parts of this invention;

FIG. 5 is a perspective view of the underside of the switch blade of this invention; and

FIG. 6 is an enlarged fragmentary view showing the position of the switch blade during its pivotal switching movement.

The function and operation and arrangement of certain of the switching mechanisms of this invention are identical to those shown and described in the aforementioned patent. As such, the present invention as shown by the drawings, particularly FIG. 1, is adapted to be housed in one section **10** of a suitable switch housing as shown, with the section **10** providing a cavity **11** containing the switch components.

The switch components comprise fixed contact-bearing terminals **12** and **13** which extend through suitable slots formed in the rear wall **14** of the section **10**. These contact-bearing terminals **12** and **13** are provided with means **15** and **16** whereby they are fixedly positioned within the cavity **11** of the section **10** of switch housing. A base terminal plate **17** provides a pair of spaced apart vertically extending fingers **18** and **19** each of which has its opposite outer edges as well as one face notched and recessed as at **20** for a purpose hereinafter made apparent. The base terminal plate **28** also provides a substantially vertically extending lug **21** to which is adapted to be connected one end **22** of a coil spring **23**. The coil spring **23** will extend between the fingers **18** and **19** and have its other end **24** connected to a switch blade **25**, as shown in FIGS. 1, 2 and 3.

A switch actuator **26** comprises an exposed circular body portion **27** which normally projects upwardly from the switch housing through a suitable opening formed in the top wall thereof. This switch actuator **26** includes an elongated rectangularly shaped lower body portion **28** which is of a longitudinal length slightly greater than the distance between the inner confronting faces of the sections and comprise the switch housing one of which is shown as at **10**. This enlarged rectangular shaped body portion **28** of the actuator is adapted to be guided in its movement through the cavity **11** by recessed guides **29** formed in the inner confronting faces of the sections of the switch housing. All of these specifically referred to components are shown and described in the aforementioned United States Letters Patent and have identical function, operation and cooperation as therein described and claimed.

The specific embodiment of the present invention is found in the switch blade **25**. As shown in FIGS. 4 and 5, the preferred form of the switch blade **25** comprises a generally U-shaped member having spaced apart legs **30** and **31**. However, it should be noted that a substantially rectangularly shaped blade embodying the improvements described will come within the concept of this invention. The outer corner edge portions of the legs **30** and **31** of the switch blade **25** provide shoulders **32** and **33** which set into the sides of the notches **20** formed in the vertically extending fingers **18** and **19** provided by the base terminal plate **17**. By this arrangement the blade **25** is held is pivotal contact on the fingers **18** and **19** by the coil spring **23**.

The switch blade **25** adjacent to and inwardly of the shoulders **32** and **33** is provided with pivot edges **34** which, when the blade **25** is in its first, or rest position, bear against the recesses **20** formed in the faces of the pivot fingers **18** and **19**. The innermost portions of the outer ends of the switch blade legs **30** and **31** provides secondary pivotal means **35** which functions to cooperate with the action of the over-centering mechanism to pivot the switch blade **25** in its equilibrium and third position. The secondary pivotal means **34** comprise tab members which are normally bent out of the longitudinal plane of the switch blade **25** and, as shown in the drawings, in a substantially acute downward direction relative thereto.

By the specific arrangement of the components of the over-centering mechanism, as shown in FIG. 1, the coil spring **23** will cause switch blade **25** to lie in an upward angular position relative to the pivot fingers **18** and **19** with its pivot edges **34** in bearing contact with the recesses **20**, as seen in FIG. 1 and the first view of FIG. 6. The free end of blade **25** is in contact with the contact-bearing terminal **12** and as such is in its first, or rest position. As the actuator **26** is caused to move through a pre-travel distance by any suitable force, the spring **23**

will be displaced longitudinally with respect to the point of pivotal connection of the pivot edges **34** of the switch blade **25** with the recesses **20** formed in the pivot fingers **18** and **19** to effect a snap action movement of the switch blade **25** out of its first, or rest position, into its second or equilibrium position, such as is shown in FIG. 2, and in the second view of FIG. 6.

In the condition of the switching mechanism, as shown in FIG. 2, the switch blade **25** has pivotal contact with pivot fingers **18** and **19** through the pivot edges **34** as well as the tab members **35** which, through the movement of the switch blade **25**, have been brought into contact with a portion of the recesses **20** formed in the pivot fingers **18** and **19**. Contact of the ends of the tabs **35** within the recesses **20** formed in the pivot fingers **18** and **19** effectuates a stop of the pivotal movement of the blade **25** about its pivot edges **34**. In this condition the switch blade **25** may be either returned to its first position or be further pivoted with a snap action into its third, or circuit-making position, as seen in FIG. 3.

In the event the external moving force is removed from the actuator **26**, the switch blade **25** will return to its first, or rest position, as seen in FIG. 1. However, if the external force is continuously applied to the actuator **26**, a further displacement of the coil spring **23** to a point below the point of contact of the tab members **35** with the pivot fingers **18** and **19** will effect pivoting of the blade **25** about the tabs **35** so the blade will again move with a second snap action into its third, or circuit-making position, as seen in FIG. 3. A reciprocal action will take place the removal of the external force from the actuator **26**.

From the foregoing description of the components of the switching mechanism, as employed in this switch, the movement of the coil spring **23** can be measured from a rest position, which is that shown in FIG. 1, to a pre-travel position, which is that shown in FIG. 2, wherein the switch blade **25** is in the equilibrium position and onto an operating point in which the components have moved to the positions shown in FIG. 3, wherein an electrical circuit has been established through the terminal **13**. Notwithstanding that the distance of travel of the switch blade **25** for effecting a switching operation is determinable, a provision is made for some over-travel of the actuator and coil spring **23** by providing an elongated slot **36** formed in the body portion of the base terminal plate **17** through which the spring **23** and actuator may move.

From the foregoing it is readily determined that the utility of this invention is found in the structural means permitting the distinct three positions of the switch blade **25**. The utilization of a switch of this construction eliminates the additional cost of installation of a second switch in a circuit demanding the function and operation accomplished by the structure of the present invention.

While we have illustrated and described the preferred form of construction for carrying out invention into effect, this is capable of variation and modification without departing from the spirit of the invention. We, therefore, do not wish to be limited to precise details of construction set forth, but desire to avail ourselves of such variations and modifications as come within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to protect by Letters Patent is:

1. A switch blade for a snap action switch having a fixed member supporting the blade so that one end may be pivotally moved through a first, equilibrium and third positions, a coil spring connected to and extending between the blade and the supporting member pivotally mounting the blade to the member, an actuator in contact with the spring and reciprocally movable through a plane perpendicular to the coil spring for overcentering the same relative to the pivotal connection between the blade and the supporting member to move the blade with a snap action, wherein the improvement comprises:

(a) a substantially flat elongated switch blade providing at one end first pivot means extending transversely of the longitudinal length of the blade and in contact with the supporting member when said blade is in its first position,

(b) and second pivotal means extending out of the longitudinal plane of the switch blade and angularly with respect to said first pivot means, said second pivotal means movable into contact with the supporting member when the switch blade is pivoted about said first pivot means out of its first position into its equilibrium position so as to provide a pivoting point of contact between the switch blade and the supporting member when the blade is pivoted by the spring out of its equilibrium position and into its third position.

2. A snap action switch blade as defined by claim **1** wherein said first pivot means comprise aligned edges lying in a plane normal to the plane of the switch blade.

3. A snap action switch blade as defined by claim **1** wherein said second pivotal means comprise tab members extending in a parallel relation with respect to each other, and movable into contact with the supporting member when the switch blade is pivoted about said first pivot means out of its first position and into its equilibrium position.

4. A snap action switch blade as defined by claim **3** wherein said first pivot means comprise aligned edges lying in a plane normal to the plane of the switch blade.

5. A snap action switch blade as defined by claim **1** wherein said first pivot means comprise aligned edges and said second pivotal means comprise depending tab members offset with respect to said aligned edges through the longitudinal length of the switch blade with said tab members normally out of contact with said supporting member when said switch blade has its aligned edges in pivotal contact with said supporting member and is in its first position, said tab members movable into pivoting contact with said supporting member by pivotal movement of said switch blade about its aligned edges and out of its first position and into its equilibrium position and are arresting further initial pivotal movement of the switch blade about said aligned edges, and with the switch blade pivoting about the points of contact of said tab members with said supporting member for moving with a snap action out of its equilibrium position and into its third position by further displacement of the coil spring under movement of the actuator.

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