Sept. 14, 1948. R. J. DOMONKAS 2,449,109

QUICK ACTION SWITCH

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Fig. 1.

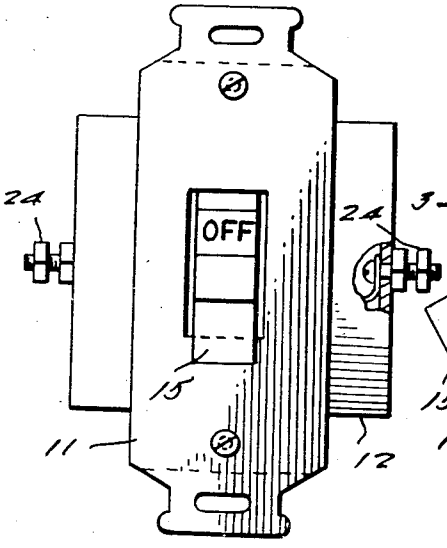


Fig. 2.

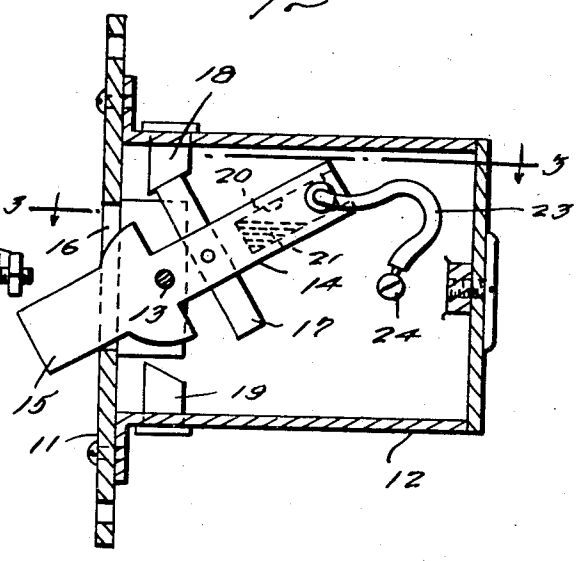


Fig. 3.

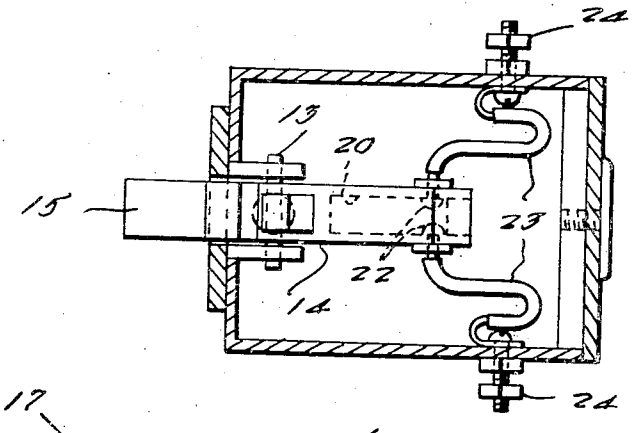
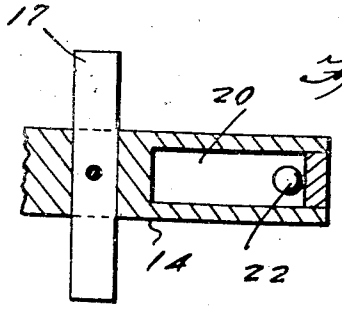


Fig. 4.



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Fig. 5.

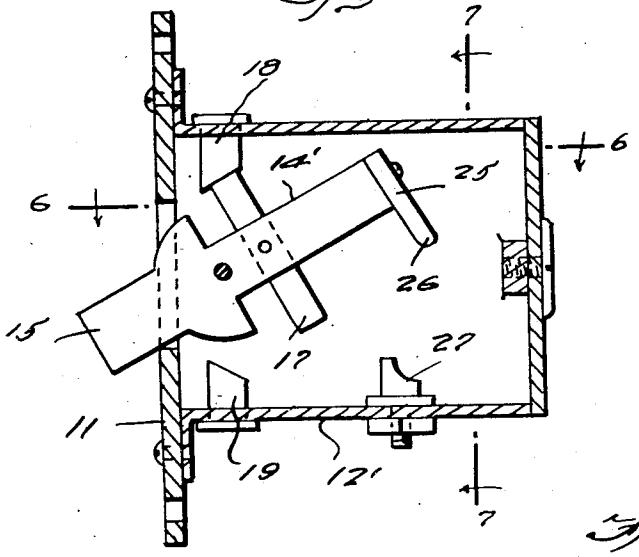
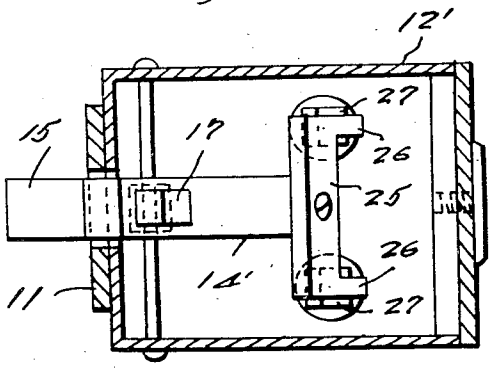


Fig. 7.

Fig. 6.



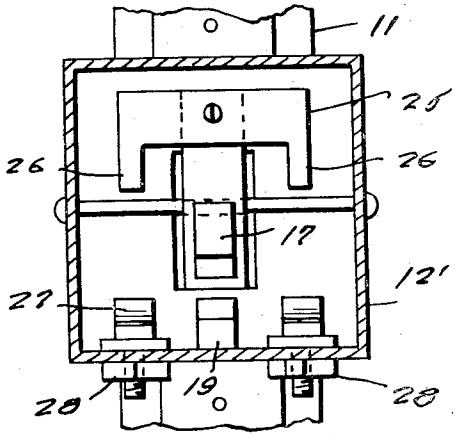
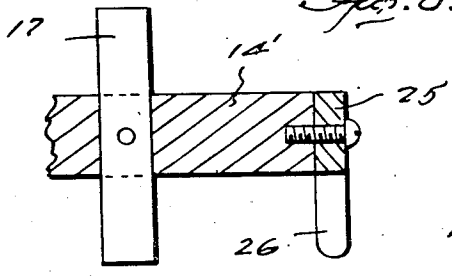


Fig. 8.



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Patented Sept. 14, 1948 2,449,109

UNITED STATES PATENT OFFICE

2,449,109

QUICK ACTION SWITCH

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Application February 5, 1946, Serial No. 645,587

2 Claims. (Cl. 200—154)

1

This invention relates to switches, and more particularly to switches having snap action.

A main object of the invention is to provide a novel and improved switch structure of very simple construction and which is positive in operation.

A further object of the invention is to provide an improved switch structure of the snap action type wherein magnets are employed to provide a clean break-away from one position of the switch arm and a quick closure of the switch contacts for the other position of said switch arm, the structure being inexpensive to manufacture and being very reliable in performance.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a front elevational view of a switch structure constructed in accordance with the present invention.

Figure 2 is a vertical cross-sectional view taken through the switch structure of Figure 1.

Figure 3 is a cross-sectional view taken on line 3—3 of Figure 2.

Figure 4 is a detail vertical cross-sectional view of the inner end portion of the switch arm employed in the structure of Figure 1.

Figure 5 is a vertical cross-sectional view of a modified switch structure according to the present invention.

Figure 6 is a cross-sectional view taken on line 6—6 of Figure 5.

Figure 7 is a cross-sectional view taken on line 7—7 of Figure 5.

Figure 8 is a detail vertical cross-sectional view of the inner end portion of the switch arm employed in the structure of Figure 5.

Snap switches for electric lighting and other circuits customarily employ springs to provide the snap action. These springs become fatigued after a period of use and result in ineffective snap action for the switch arm. This reduces the positiveness of the switch action and tends to cause destructive arcing between the stationary contacts and the contacts carried by the switch arm during the operation of the switch. The present invention aims to eliminate such deterioration in snap action by eliminating the use of springs and employing instead permanent magnet members to provide a clean break-away for the switch arm when moved from one position and rapid motion toward its second position, as is highly desirable in snap action switches.

Referring to the drawings, and more particularly to Figures 1 to 4, illustrating a first embodiment of my invention, 11 designates a conventional switch plate to which is secured a housing 12. Parts 11 and 12 may be made of plastic or other suitable insulating material. Pivotally mounted on a transverse pin 13 in housing 12 is a switch arm 14 of plastic or the like, having a head portion 15 which protrudes through a suitable rectangular opening 16 formed in plate 11, for manual actuation of the switch arm. Secured rigidly in switch arm 14 and extending above and below said switch arm is a permanent magnet bar 17 preferably of Alnico or similar strongly magnetized material. Secured in the top wall of housing 12 and positioned so as to cooperate with the upper pole of magnet bar 17 is a first stationary magnetic member 18 of soft iron or the like. Positioned in the lower wall of housing 12 and arranged to cooperate with the lower pole of bar 17 when switch arm 14 is in its lower position is a second magnetic member 19, also of soft iron or the like. It may be readily seen that as switch arm 14 is rotated from its upper position to its lower position or vice versa, a well defined snap action is obtained, a clean and sharp break-away being afforded at the magnet pole which is being moved away from its stationary magnetic member, caused by the sudden collapse of the magnetic flux at that pole, and a rapid movement of the other pole toward its magnetic member being obtained, caused by the building up of the magnetic flux as said other pole approaches its magnetic member.

The inner end of switch arm 14 is formed with a cavity 20 which contains a quantity of mercury 21. A pair of contacts 22, 22 are provided in the side walls of cavity 20, said contacts being connected by flexible conductors 23, 23 to terminals 24, 24 secured in the side walls of housing 12 and adapted to be connected to the circuit to be controlled.

When the inner end of switch 14 is in its upper, "off" position, as shown in Figure 2, the mercury 21 is positioned in the lower front corner of cavity 20 and does not contact the elements 22, 22. The circuit is therefore open. When switch arm 14 is moved to its "on" position by rotating head 15 to its upper position, mercury 21 moves by gravity to the lower rear corner of cavity 20 and bridges the contact elements 22, 22 thereby closing the circuit. Since a very effective snap action is obtained by the cooperation of magnet bar 17 with its magnetic members 18 and 19, there will be a minimum of arcing, and

the snap action will not deteriorate during the life of the switch.

Referring to Figures 5 to 8, a modification of the switch structure is disclosed which employs mechanical contact members instead of mercury. In this modification the switch arm 14' carries at its inner end a transversely extending metal contact bar 25 formed at its ends with depending contact fingers 26, 26. Secured in the bottom wall of housing 12' are a pair of contact elements 27, 27 arranged to be engaged respectively by the contact fingers 26, 26 when the inner end of switch arm 14' is in its lower position. The external circuit connections are made to terminals 28, 28, integrally connected respectively to the contact elements 27, 27. When the inner end of switch arm 14' is in its upper position the circuit is open. When the switch arm is rotated so that the inner end thereof is in its lowered position, contact elements 27, 27 are bridged by bar 25 and the circuit is closed.

In the embodiment of Figures 5 to 8, positive snap action is provided by magnet bar 17 and cooperating magnetic members 18 and 19 as in the embodiment of Figures 1 to 4. However to allow for wear at contact elements 27, 27, a small air gap should be provided between the lower pole of magnet bar 17 and lower magnetic member 19 when the switch arm is in the "on" position.

While certain specific embodiments of a snap action switch structure have been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore it is intended that no limitations be placed on the invention other than as defined by the scope of the appended claims.

What is claimed is:

1. In a manually operated snap switch, a switch bar, a support, means extending at right angles to said bar intermediate its ends and pivotally connecting said bar to said support, one end of said bar providing an actuating handle, a contact movable with said bar and carried by the other end of said bar, spaced contacts fixed to said support and adapted to be bridged by said first contact when said bar is pivoted in one direction, a permanent bar magnet fixed to said bar intermediate said means and one end of said bar and extending at right angles thereto and to said means, and a pair of fixed elements adapted for magnetic attraction carried by said support, one of said elements being positioned to attract one pole of said magnet and said other element being positioned to attract the other pole of said magnet, whereby to actuate said bar with a snap action when the same is manually moved on said means past a dead center.

2. In a manually operated snap switch, a switch bar, a support, means extending at right angles to said bar intermediate its ends and pivotally connecting said bar to said support, one end of said bar providing an actuating handle, a contact movable with said bar and carried by the other end of said bar, spaced contacts fixed to said support and adapted to be bridged by said first contact when said bar is pivoted in one direction, a permanent bar magnet fixed to said bar intermediate said means and one end of said bar and extending at right angles thereto and to said means, and a pair of fixed elements adapted for magnetic attraction carried by said support, one of said elements being positioned to attract one pole of said magnet and said other element being positioned to attract the other pole of said magnet, whereby to actuate said bar with a snap action when the same is manually moved on said means past a dead center, one of said elements being operative to hold said bar in a contact bridging position, and said last-named element being positioned to provide an air gap between the same and the attracted pole of said magnet when said contacts are bridged.

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