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ELECTRIC SWITCH

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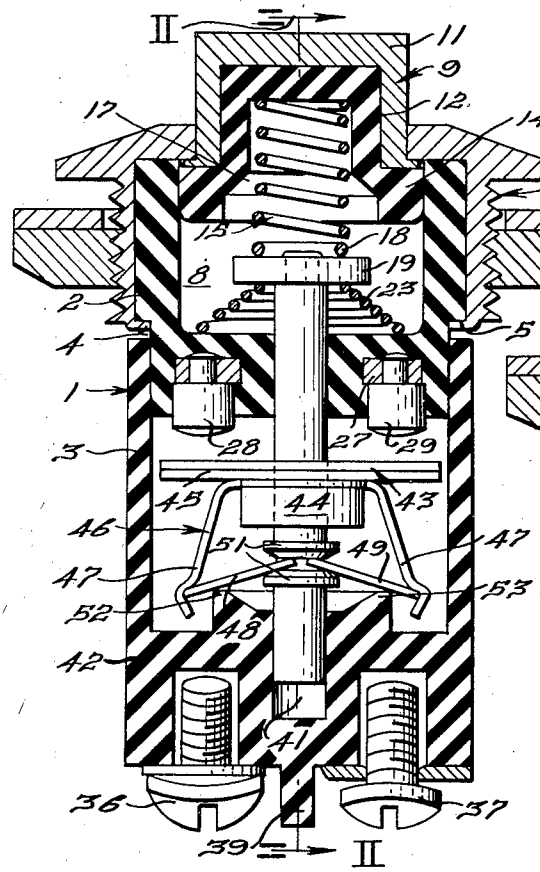


Fig. 1.

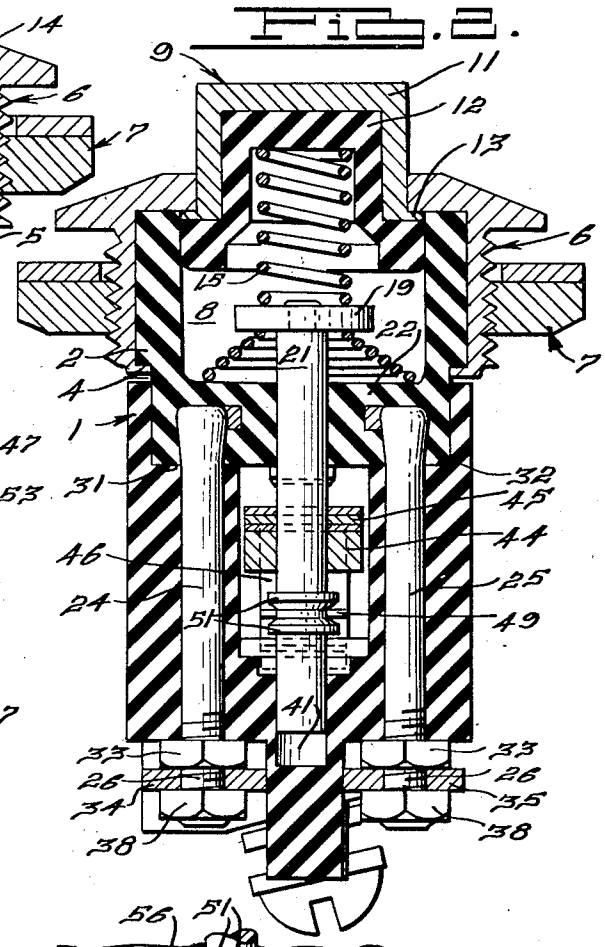


Fig. 2.

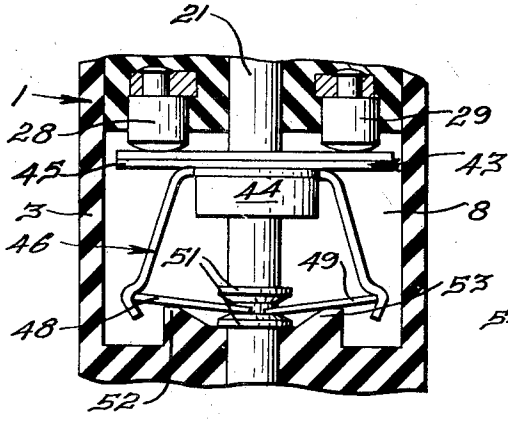


Fig. 3.

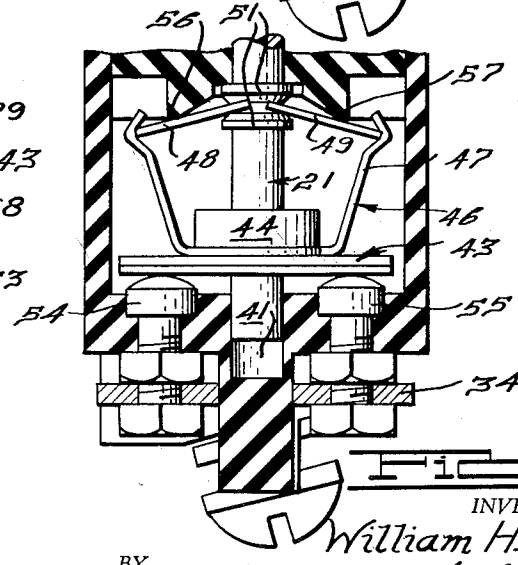


Fig. 4.

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ELECTRIC SWITCH

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5 Claims. (Cl. 200—76)

This invention relates to devices for making and breaking electrical circuits and more particularly to electric switches of the snap acting type.

An object of the present invention is the provision of an economical and simple switch structure of the snap-acting type having relatively few parts of small size and which operates in a highly efficient manner.

Other objects and features of this invention will be readily apparent to those skilled in the art from the specification and appended drawing illustrating certain preferred embodiments in which:

Figure 1 is a vertical sectional view of an electric switch according to the present invention showing the movable contacts as being normally in disengaged position.

Figure 2 is a sectional view taken on the line II—II of Figure 1.

Figure 3 is a cut-away view of the switch of Figure 1 but with the movable contacts shown in engaged position.

Figure 4 is a cut-away sectional view showing a modified construction of the invention in which the movable contacts are normally held in engaged position.

The electric switch illustrated in the drawing comprises an enclosing body portion 1 which includes a pair of cylindrical cup-shaped housing members 2 and 3 disposed one partially within the other, and which members may be comprised of molded insulating material. The upper member 2 has a necked portion 4 thereby effecting a ledge 5 on the member and carries a mounting bushing 6 having an opening therethrough. The bushing 6 is permanently secured to the member 2 by rolling the lower edge or rim of the bushing so as to embrace the ledge 5. A lock nut 7 is carried by the mounting bushing 6 to aid in securing the electric switch in a desired location. Slidably disposed within a chamber 8 provided in member 2 and extending through the opening in the bushing 6 to the exterior of the switch is an actuator or operator 9 for manually effecting operation of the switch. The actuator 9 comprises a pair of interfitting cup-shaped members 11 and 12, the member 11 being of metallic composition and adapted to receive the cup-member 12 which is formed of molded insulating material; each of the members 11 and 12 is provided with, respectively, a projecting ledge 13 and 14. The members 11 and 12 are disposed within the chamber 8 before the mounting bushing 6 is secured to the member 2 so that they may extend through the opening in the bushing 6 in position to be manually moved, but ledge 13 of member 11 being engageable with the bottom face of the bushing 6 prevents the members 11 and 12 being removed through this opening.

A spring 15 is contained within chamber 8 and has one end extending into a recess 17 provided by the cup-shaped member 12 and bears against the base thereof. The opposite end 18 of the spring 15 is disposed upon the upper face of a member 19 carried by an actuating rod 21. Spring 15 thus disposed exerts its bias to maintain the member 12 within member 11 and to maintain the both of them in their uppermost position within chamber 8, carrying ledge 13 of the member 11 into engagement with the under surface of bushing 6.

Disposed between the under-face of the member 19 and the bottom of base 22 of the housing member 2 is a second spring 23 which serves as a return spring, effecting return movement of the member 19 and the actuator 9 to the position of Figure 1 after manual actuation and release thereof.

Molded into the upper housing member 2 are a pair of conducting members 24 and 25, the lower ends 26 of which are threaded and the upper ends of which are bent over and flattened as at 27 and have riveted thereto stationary contact members 28 and 29. The upper housing member 2 is received by the housing member 3 and is supported upon ledges 31 and 32 therein. The ledges 31 and 32 are provided with openings therethrough, through which openings pass the conducting members 24 and 25 so that the threaded ends 26 thereof are disposed at the exterior of the switch. Nuts 33 are then fitted upon these threaded ends to hold the upper and lower housings 2 and 3 in assembly. Terminal members 34 and 35 carrying terminal studs 36 and 37 for securing lead wires (not shown) thereto are disposed upon the threaded ends 26 of the conducting members 24 and 25 and are held thereon by nuts 38. An insulating barrier 39 provided upon the under surface of the housing 3 extends between the terminal studs 36 and 37.

The actuating rod 21 extends through an opening in the base 22 of the upper housing member 2 and into an aligned recess 41 provided within the base 42 of the lower housing member 3 to thus center the rod and permit the rod to be moved only rectilinearly. Slidably mounted upon the actuating rod 21 for movement lengthwise thereof is a switch member 43 comprising a movable supporting member 44 which carries a conducting or contact plate 45 adapted to bridge the

stationary contacts 28 and 29. To provide for snap movement of the movable contact 45, an inverted U-shaped member 46 of spring material is also carried by the member 44 having the extremities of its arms 47 bent to form seats which receive one end of the flat plate-like members or links 48 and 49, the other ends of which are received by a groove provided between peripheral ledges 51 formed upon the actuating rod 21. Engaging the flat members 48 and 49 between the extremities thereof to effect rotative movement of these members in a manner and for a purpose to be hereinafter described are a pair of opposing ledges 52 and 53 extending upwardly from the base 42 of the housing 3. In the assembly of the switch, the spring 15 disposed between the base of recess 17 and the member 19 exerts a bias to normally hold the second spring 23 in a slightly compressed position and to move the actuating rod 21 to a position where the movable contact 45 will normally be out of engagement with the stationary contacts 28 and 29.

In the operation of the switch, the actuator or operator 9 is depressed into the chamber 8 to effect a compression of the spring 15 and spring 23. The actuating rod 21 is not immediately moved upon depression of the actuator 9, but upon continued depressing of the actuator 9 sufficient force will eventually be transmitted by the spring 15 to the actuating rod 21, after the lost motion is taken up, to effect a downward movement thereof.

In this downward movement, the rod 21, through the ledges 51, carries the ends of the flat members 48 and 49 disposed therebetween also downwardly to rotate these members about the fulcrums provided by the ledges 52 and 53. This rotation of the links 48 and 49 upon the fulcrums 52 and 53 first presses the arms 47 of the U-shaped member 46 outwardly and when the moving ends are carried through the dead center line of the links, the U-shaped member 46 will snap upwardly, due to the resiliency of the U-shaped member 46, to carry the supporting member 44 and the movable contact 45 also upwardly to effect a bridging of the stationary contacts 28 and 29. After engagement of the contacts has been effected, the actuator 9 may be further depressed against the bias of spring 23 to thus provide a substantial overtravel. Upon release of the actuator 9, the return spring 23 will expand to move the actuating rod 21 and member 19 upwardly to the normal position of Figure 1 and spring 15 will also be moved upwardly and will expand to thereby move the actuator 9 to its uppermost position. In this upward movement of rod 21, links 48 and 49 will pass overcenter in the reverse direction to snap the movable contact 45 into open position.

In the modification of Figure 4, the contacts are shown as normally engaged. This is effected by mounting stationary contact members 54 and 55 in the base 42 of the housing member 3 and by inverting the supporting member 4, the movable contact 45 and the U-shaped member 46. Ledges 56 and 57 are then formed upon the under surface of base 22 of the housing 2 to provide fulcrums for the link members 48 and 49. The peripheral ledges 51 in the modification which engage the ends of the link members 48 and 49 are located at a higher level upon the actuating rod 21 to properly position the links 48 and 49 with respect to the ledges 56 and 57. The operation of the modification is similar to the operation of the preferred embodiment except that the movable contact 45 moves to disengaged position instead of to engaged position as in the preferred embodiment upon depression of the actuator 9.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. In an electric switch, an insulating enclosure, a stationary contact disposed therein, an actuating member, a movable contact slidably mounted on said actuating member, snap-acting means for effecting quick movement of said movable contact into and out of engagement with said stationary contact, said snap-acting means comprising a resilient member and a pair of pivotal link members having operative engagement therewith, raised portions on the base of said insulating enclosure providing fulcrums for said link members, said link members turning upon said fulcrums upon movement of said actuating member to thereby effect a quick movement of said resilient member and of said movable contact, said fulcrum and link member engagement lessening the movement of said actuating member necessary to effect movement of the movable contact.

2. In an electric switch, an insulating enclosure, a stationary contact disposed therein, an actuating member, a movable contact slidably mounted on said actuating member for cooperation with said stationary contact, snap-acting means for effecting quick movement of said movable contact and comprising a resilient member and a pair of plate-like members, the ends of said members being supported, one by said resilient member and the other by said actuating member, raised portions on the base of said insulating enclosure and engageable with said plate-like member intermediate the ends thereof, said plate-like members pivoting upon said raised portions upon movement of said actuating member in a first direction to effect a quick movement of said resilient member and of said movable contact in the reverse direction, movement of said plate-like members about said raised portions lessening movement of said actuating member necessary to effect movement of the movable contact.

3. In an electric switch, an insulating enclosure, stationary contacts disposed therein, a rectilinearly movable contact slidably mounted on said rectilinearly movable member for engaging said stationary contacts to complete an electrical circuit therethrough, a manually movable operating member for effecting movement of said rectilinearly movable member, snap-acting means for actuating said movable contact, said snap-acting means comprising a resilient member and a pair of pivotally mounted link members raised portions on the base of said insulating member engageable with said link members to effect quick movement of said snap-acting means to move the movable contact upon movement of said rectilinearly movable member in a first direction by said manual operator, engagement of said raised portions and link members lessening the movement of said rectilinearly movable member necessary to effect movement of the movable contact, and means for effecting movement of said operating

member and said rectilinearly movable member in the reverse direction to return to their initial position upon release of the operating member after manual operation.

4. In an electric switch, an insulating enclosure, stationary contacts disposed therein, a rectilinearly movable member, a rectilinearly movable contact slidably mounted on said rectilinearly movable member for engaging said stationary contacts to complete an electrical circuit therethrough, a manually movable operating member, a resilient force applying means disposed between said operating member and said rectilinearly movable member whereby the former may move the latter, snap-acting means for actuating said movable contact, said snap-acting means being slidably carried by said rectilinearly movable member, said snap-acting means comprising a resilient member and a pair of pivotally mounted link members raised portions on the base of said insulating member engageable with said link members to effect quick movement of said snap-acting means to move the movable contact upon movement of said rectilinearly movable member in a first direction by said manual operator, engagement of said raised portions and link members lessening the movement of said rectilinearly movable member necessary to effect movement of the movable contact, and means for effecting movement of said operating member and said rectilinearly movable member in the reverse direction to return to their initial position upon release of the operating member after manual operation.

5. In an electric switch, an insulating enclosure, a stationary contact disposed therein, a rectilinearly movable actuating member, a movable contact slidably mounted on said actuating member, snap-acting means for effecting quick movement of said movable contact into and out of engagement with said stationary contact, said snap-acting means comprising a resilient member and a pair of rigid link members each having a pivotal engagement with said rectilinearly movable actuating member, raised portions on the base of said insulating enclosure providing fulcrums for said link members, whereby upon movement of said rectilinearly movable actuating member said link members engage said fulcrums to cause said snap-acting means to be moved relative to said base to carry the line of action of said resilient means through said pivots of said link members to effect a quick movement of said resilient member and of said movable contact, engagement of said fulcrums and link members lessening the movement of said actuating member necessary to effect movement of said movable contact.

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