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2,811,617

ELECTRIC SWITCH

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Fig. 1.

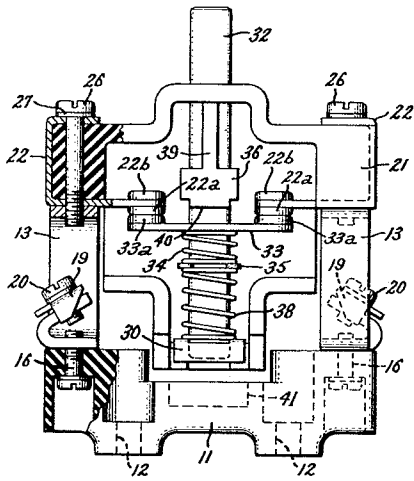


Fig. 2.

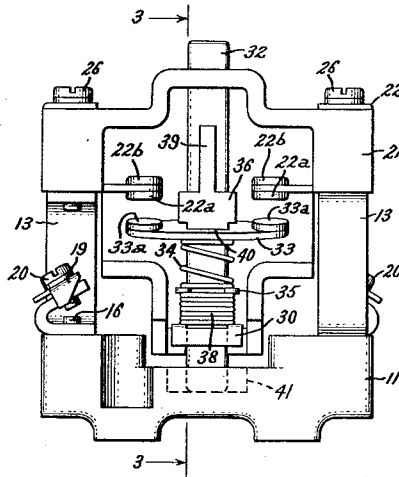


Fig. 3.

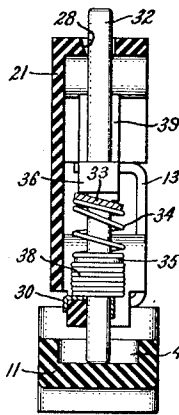


Fig. 4.

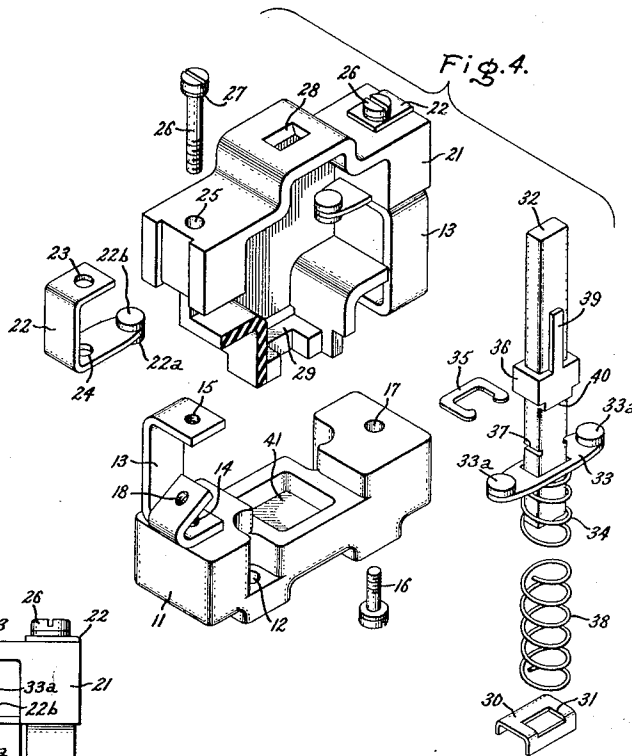
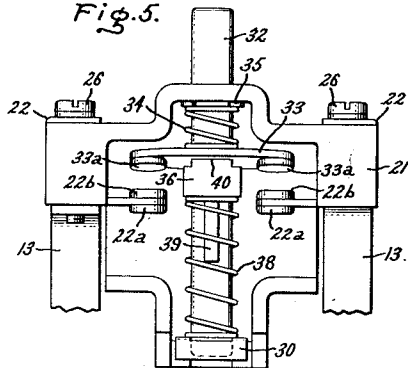


Fig. 5.



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**ELECTRIC SWITCH**

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5 Claims. (Cl. 200—166)

This invention relates to electric switches, and more particularly to a single pole single-throw double-break type switch suitable for use either as a normally open or as a normally closed circuit controlling device. A general object of this invention is the provision of an improved and inexpensive electric switch of the type described wherein the normal contact arrangement, whether open or closed, can be readily reversed with optimum convenience and simplicity.

In carrying out my invention in one form, I provide a movable contact assembly comprising a reversible plunger having identical opposite end portions and an intermediate pair of spaced apart stops. A bridging contact element is carried on the plunger between the stops. An open-face housing having a pair of spaced apart guides is provided for the movable contact assembly. The guides, one of which is removable, provide slidable support for the opposite end portions of the plunger. A pair of fixed contacts having back-to-back contact surfaces is mounted in the housing in cooperating relationship with the bridging contact element. Suitable spring means disposed between the removable guide and one of said stops provides a resilient force to retain the guide in place in the housing and also to bias the movable contact assembly to a normally closed switching position. The movable contact assembly can be removed from the housing and reversed end-for-end, and with the spring means disposed between the removable guide and the other stop, the assembly will now be biased to a normally open switching position.

My invention will be better understood and further objects and advantages will be apparent from the following description taken in conjunction with the accompanying drawing in which Fig. 1 is a front elevational view of an electric switch which embodies my invention and which is arranged for normally closed contacts; Fig. 2 is a front elevational view of the switch of Fig. 1 after the contacts have been opened; Fig. 3 is a sectional view taken along lines 3—3 of Fig. 2; Fig 4 is an "exploded" perspective view of the switch of Fig. 1; and Fig. 5 is a partial front elevational view of the switch arranged for normally opened contacts in accordance with my invention.

As can be seen in Fig. 1, my improved electric switch includes a base member 11 which is made of molded electrical insulating material and which is provided with a pair of holes 12 suitable for anchor bolts, not shown. The base 11 can be mounted in any desired permanent location by means of the anchor bolts. A pair of electrical conducting supporting straps 13 are disposed for mounting on base 11. Each strap 13 has a U-shaped portion with tapped holes 14 and 15 in opposite arms thereof. By inserting a bolt 16 through a suitable hole 17 in base 11, and by threading this bolt into a tapped hole 14, each strap 13 is securely fastened in spaced apart relationship on base 11. A portion of each strap 13 is formed by an angular projection therefrom and includes another tapped pole 18. By using a wiring clip 19 together with a clamping bolt 20 in connection with each tapped hole

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18, as can be seen in Fig. 1, a pair of terminals are formed for the termination of electric conductors which interconnect the switch and a remote circuit to be controlled. The electric conductors and the remote circuit have not been shown. The supporting straps 13 face opposite directions, as shown in Fig. 1, whereby the above described terminals will each face outwardly from opposite sides of the switch.

A supporting member or open-face housing 21 is mounted on supporting straps 13. This housing is irregularly shaped and formed of molded insulating material. Each of a pair of U-shaped contact members 22 fits over a thickened portion of housing 21, and a pair of holes 23 and 24 in opposite arms of each member 22 axially align with a corresponding hole 25 through housing 21. Suitable bolts 26 are inserted through holes 23, 25 and 24, and these bolts are threaded into tapped holes 15 of straps 13. By tightening bolts 26, housing 21 is firmly clamped to supporting straps 13 and good electrical contact is made between each contact member 22 and the associated electrical conducting strap 13. Lock washers 27 are provided to secure bolts 26 once tightened. As is clearly shown in Fig. 1, the contact members 22 extend internally from opposite sides of housing 21 and terminate in back-to-back contact surfaces 22a and 22b.

An aperture or fixed guide 28 is included in the top end of housing 21 as viewed in the drawing. For purposes of the illustrated embodiment of my invention, this aperture preferably has a substantially rectangular cross section. The bottom end of housing 21 is open, and a vertically slotted neck 29 extends transversely across this open end. A removable channel-shaped guide member 30 is adapted to be inserted over neck 29. Guide member 30 has a substantially rectangularly shaped hole in its web which lines up with the slot in neck 29 and which also is in axially alignment with guide 28. This construction is illustrated in Figs. 3 and 4. The guides 28 and 30 provide slidable support for a movable contact assembly which will now be described.

As is clearly shown in Fig. 4, the movable contact assembly comprises an elongated operating rod or plunger 32, a bridging contact element 33, a helical spring 34 for supplying contact pressure, and a stop member 35. In the illustrated embodiment of my invention, plunger 32 has a generally rectangular cross section. Plunger 32 has identical end portions, i. e., the opposite ends of this member have the same cross sectional configuration, and either end portion slides freely within guide 28 or 30. A central or intermediate portion 36 of plunger 32 is enlarged and thus forms a stop which will not slide through aperture 28 or guide member 30. The bridging contact element 33 has a centrally disposed rectangular aperture which permits one end portion of plunger 32 to be inserted therethrough. Element 33 slides freely in a longitudinal direction over this end of plunger 32, but it can not move beyond the stop 36. Spring 34 is placed over the same end of plunger 32, and stop member 35 is then inserted in cooperating grooves 37 disposed on opposite sides of plunger 32. The stop 35 is a U-shaped member having resilient side arms which engage the cooperating grooves 37. Bridging contact element 33 and spring 34 are captured on plunger 32 between the stops 36 and 35.

Another helical spring 38 is provided to bias the movable contact assembly toward the end of housing 21 containing aperture 28. This spring, as can be seen in Figs. 2 and 3, also retains guide member 30 in place on neck 29. The bridging contact element 33 of the movable contact assembly is provided with a pair of spaced apart contact surfaces 33a, and these surfaces face in the direction of the central portion of plunger 32 and are disposed in cooperating relationship with respect to the contact surfaces of fixed contact members 22. Whether the movable contact assembly is biased by spring 38 to a

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normally open or a normally closed switching position depends upon the relative positions of the opposite ends of plunger 32 with respect to guides 28 and 30. Because of the improved structure of my switch, the normal contact position can be readily reversed. Fig. 1 illustrates the switch arranged for normally closed contacts. The end of plunger 32 which carries bridging contact member 33 slides within guide member 30, while the opposite end of plunger 32 is slidably supported by fixed guide 28. Bias spring 38 applies pressure at stop 35 which urges plunger 32 upward, as viewed in the drawing, and as a result the contact surfaces 33a of bridging element 33 normally engage the lower contact surfaces 22a of fixed contact arms 22. Upward movement of plunger 32 is stopped by interference between the upper end of housing 21 and an extension 39 of the central enlarged portion 36 of plunger 32. Contact pressure is maintained by spring 34, as can be seen in Fig. 1. To open the contacts of my switch, plunger 32 is moved into housing 21 by suitable means, not shown. After plunger 32 is moved a short distance, a projection 40 of central portion 36 engages one side only of bridging contact element 33. This causes a tilting movement of element 33 which aids in breaking open the contacts. Plunger 32 can be depressed until its lower end bottoms in a cavity 41 of base 11 at which point the bridging contact element 33 has completely separated from fixed contacts 22, as can be seen in Fig. 2.

To reverse the contact arrangement of my switch from normally closed to normally open, guide member 30 is lifted from its fixed position over neck 29 after compressing spring 38, and the lower end of the movable contact assembly is tilted out of housing 21 through its open face. The upper end of plunger 32 can now be extracted from guide 28. The movable contact assembly is then turned end-for-end, and the end of plunger 32 which carries bridging contact member 33 is inserted into fixed guide 28. Bias spring 38 is placed over the opposite end of plunger 30 followed by guide member 30, and the guide member 30 is then reinserted over neck 29. In addition to retaining guide member 30 in place on neck 29, bias spring 38 will now apply pressure at stop 36 to urge plunger 32 upward, as viewed in the drawing. Upward movement of plunger 32 is stopped by interference between the upper end of housing 21 and stop 35. As is clearly shown in Fig. 5, the contact surfaces 33a of bridging element 33 are now normally separated from the upper contact surfaces 22b of fixed contact arms 22. By moving plunger 32 against the force of bias spring 38, the contact surfaces 33a are carried into engagement with the upper contact surfaces 22b of fixed contact members arms 22. Plunger 32 can be depressed until its lower end bottoms in cavity 41 of base 11. Upon releasing plunger 32, the projection 40 of central portion 36 causes bridging contact element 33 to tilt, thus aiding the opening process of the contacts.

The contact arrangement of my switch can be similarly changed from normally open to normally closed by again reversing end-to-end the position of the movable contact assembly in the manner described above. It has thus been shown that by employing the particular construction described above, the contact arrangement of my electric switch can be readily and conveniently reversed from normally open to normally closed and vice versa.

While I have shown and described a preferred form of my invention by way of illustration, many modifications will occur to those skilled in the art. I therefore contemplate by the appended claims to cover all such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an electric switch, a housing having an aperture in one end, a removable guide member disposed in a fixed

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position at the opposite end of said housing, a fixed contact mounted in said housing on one side thereof, an elongated movable contact assembly disposed for cooperating switching movement with respect to said fixed contact within said housing, said movable contact assembly having similar end portions which are slidably supported by means of said aperture and guide member, and spring means for biasing said movable contact assembly to a predetermined switching position, said predetermined switching position being changeable by reversing said movable contact assembly end-to-end with respect to said housing.

2. In an electric switch, a housing open at one end and having an aperture in the opposite end, a removable guide member supported by said housing in a fixed position at the open end thereof, a pair of spaced apart fixed contacts mounted in said housing on opposite sides thereof, a movable contact assembly comprising a reversible plunger having identical opposite end portions and an enlarged intermediate portion, said aperture and said guide member providing means for slidably supporting the opposite end portions of said plunger, a bridging contact element disposed in longitudinally movable relationship on a predetermined one of said end portions for cooperative switching with said fixed contacts, and contact pressure spring means disposed to urge said bridging element toward said enlarged intermediate portion, and spring means for biasing said movable contact assembly to a predetermined switching position, said predetermined switching position being determined by the relative position of said predetermined one end portion of said plunger with respect to said aperture and said guide member.

3. In an electric switch, a supporting member having a fixed guide in one end, an insertable guide member removably disposed in a fixed position at the opposite end of said supporting member, an elongated movable contact assembly having similar opposite end portions which are slidably supported by means of said guides, a stationary contact element mounted on said supporting member in cooperating relationship with said movable contact assembly, and spring means for biasing said movable contact assembly to a selectable switching position and for retaining said removable guide member in said fixed position, whereby said selectable switching position can be changed by removing said guide member and withdrawing said movable contact assembly from said supporting member, by turning said assembly end-to-end, and by returning said assembly to said supporting member and reinserting said guide member.

4. In an electric switch, a movable contact assembly comprising a reversible plunger having a pair of spaced apart stops intermediate its ends, a bridging contact element slidably disposed on said plunger between said stops, and spring means urging said bridging contact element toward one of said stops, an open-face housing for said movable contact assembly, said housing including fixed and removable spaced apart guides each adapted to receive either end of said plunger, a pair of fixed contacts mounted on opposite sides of said housing in cooperating relationship with said bridging contact element, each of said fixed contacts having two contact surfaces facing in opposite directions, and spring means for biasing said movable contact assembly in a direction toward said fixed guide and for retaining said removable guide in said housing, whereby the normal position of said bridging contact element with respect to said fixed contacts can be changed by reversing the position of said plunger in said housing.

5. An electric switch comprising, a movable contact carrying rod provided intermediate its ends with first and second spaced apart stops, a movable contact slidably mounted on said rod between said stops, a first spring surrounding said rod and captured between said movable

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contact and said first stop, a supporting member provided with first and second spaced apart guides each adopted to receive either end of said rod, a stationary contact mounted on said supporting member in the path of said movable contact, a second spring surrounding said rod between said first guide and said first stop for biasing said rod in a direction to move said movable contact into engagement with said stationary contact, and means providing removal of said rod from said guides to permit end-for-end reversal of said rod in said guides with said sec-

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ond spring surrounding said rod between said first guide and said second stop for biasing said rod in a direction to move said movable contact away from engagement with said stationary contact.

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