Nov. 30, 1943. J. C. STEARNS 2,335,811

ELECTRIC SWITCH

Filed Dec. 1, 1941

Fig. 1.

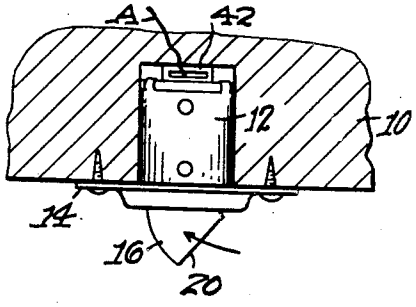


Fig. 2.

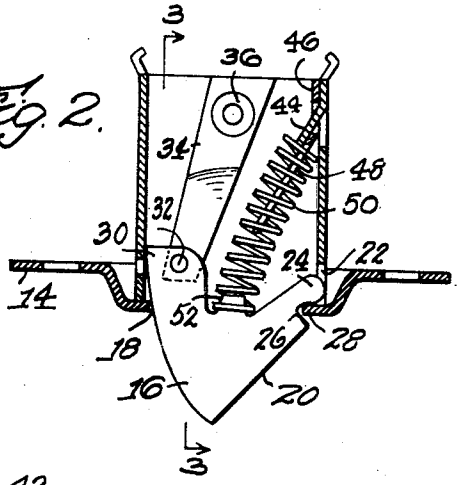
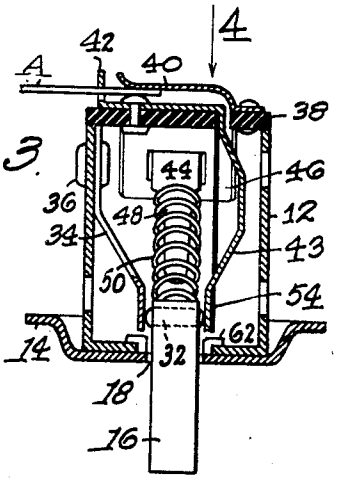


Fig. 3.



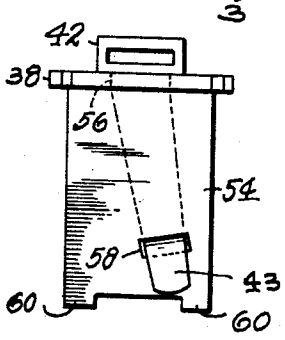


Fig. 6.

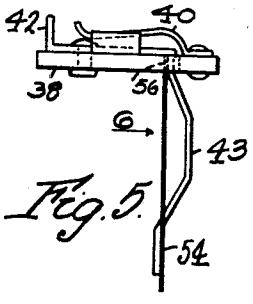
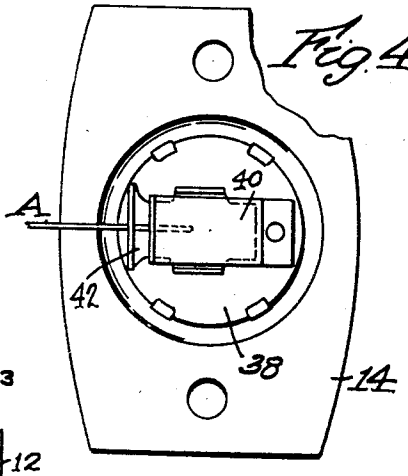


Fig. 5.

Fig. 4.



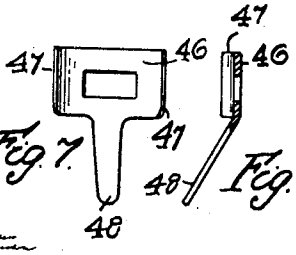


Fig. 7.

Fig. 8.

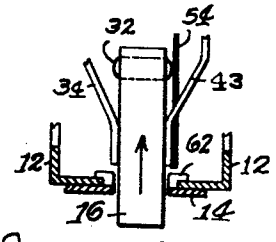


Fig. 9.

Inventor
Jason C. Stearns
By attorney
Charles R. Fay

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ELECTRIC SWITCH

Jason C. Stearns, Worcester, Mass.

Application December 1, 1941, Serial No. 421,095

9 Claims. (Cl. 200—54)

This invention relates in general to electric switches and more particularly to the type of switch which is normally held in circuit-open position by a door or other movable element, and which is provided with means for moving a contact to circuit-closed position upon opening of the door or removal of the movable element from the area of the switch actuator.

Objects of the invention include the provision of a switch of the class described embodying a pair of fixed contacts which are adapted to be connected by a current transmitting element on a switch actuator, the latter being pivoted to swing increasingly away from the door or other movable means as it is closed to disengage the current carrying element from the contacts to open the circuit; the provision of a switch of the character described in which a resilient element is arranged to normally project the pivoted switch actuators outwardly from the switch towards circuit-closed position thereof; the provision of a switch as above described in which the resilient element resists pivoting motion of the switch actuator towards circuit-open position, and in which the resilient element comprises a coil spring located substantially tangent to an arc of a circle of which the center of pivoting action of the switch actuator is the center, whereby the direction of the respective forces of the spring acts substantially linearly with respect to the pivotal motion of the switch actuator.

Other objects of the invention include the provision of a switch housing having means to loosely pivotally mount a switch actuator and having a projection spaced from said means for mounting one end of a compression spring, the other end of the spring abutting the switch actuator so that when the parts are assembled the spring normally resists pivoting of the switch actuator but holds it in the housing, there being no positive connections between the housing and switch actuator.

A further object of the invention resides in the provision of means insulating at least one of a pair of fixed contacts in a switch so that a spring for holding a switch actuator in extended position with relation to the switch housing may become loose and fall from its operative position without short circuiting the switch.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawing, in which

Fig. 1 is a side view in elevation of a complete switch shown mounted in a door jamb or the like;

Fig. 2 is a view in longitudinal section through the switch housing;

Fig. 3 is a view in section on line 3—3 of Fig. 2;

Fig. 4 is a plan view of the switch looking in the direction of arrow 4 in Fig. 3;

Fig. 5 is an edge view of one contact showing its insulative shield;

Fig. 6 is a view looking in the direction of arrow 6 in Fig. 5;

Figs. 7 and 8 are detail views of the spring anchor; and

Fig. 9 is a detail view showing the switch in open position.

In the drawing character 10 indicates a door jamb or other support for the housing 12 of the switch which comprises the present invention. Housing 12 is cylindrical in form and is located in a recess in the support 10. A plate 14 at the forward end of the housing may be provided with screw fasteners or the like for securing the housing to the support. A switch actuator 16, which is similar in form to a triangle, is mounted to extend out through a slot 18 in plate 14 at the forward end of the housing, and this switch actuator is provided with a cam surface 20 along one edge of the triangle and is arranged as shown in Fig. 1 to face the direction of closing movement of a door or other movable element, so that when the door is closed the switch actuator will be pivotally moved thereby to a position within the housing. A spring to be described exerts a pressure on the switch actuator so as to normally pivotally force it outwardly from the housing 12 whenever the door is opened.

Housing 12 and plate 14 may be secured together in any convenient manner and a slot 22 is provided in the forward end of the housing close to plate 14 for the reception of a lug 24 at one corner of the triangular switch actuator. Lug 24 is bounded by a recess 26 into which extends a projection 28 on plate 14. Another corner of the switch actuator as at 30 is formed to impinge on the side wall interiorly of the housing 12 diametrically opposite to slot 22; and it will be seen from this construction that the projection 28 cooperating with lug 24, and the corner 30 of the switch actuator 16, will prevent any further outward extent of the switch actuator than as shown in Figs. 1 and 2. A metallic rivet 32 is provided to extend through the switch actuator 16 adjacent its corner 30 and this rivet extends slightly outwardly beyond the sides of the switch actuator, see Fig. 3.

A metal conductor 34 is riveted or otherwise secured as at 36 to the wall of the housing adjacent its rear end. This contact is bent as shown in Fig. 3 so as to extend angularly away from the wall of the housing towards the interior thereof and forwardly toward the actuator 16 to form a spring finger for contacting one end of the rivet 32 when the switch actuator is in its outermost position as shown in Figs. 2 and 3. Contact 34 forms a ground connection for the switching system.

An insulative cap 38 closes the open rear end of the switch housing and is held thereto in any convenient manner as by means of the crimped fingers shown or by any other desired fasteners. On the side of the cap opposite from the housing there is a resilient electric contact 40 having a part 42 thereof which is fixed to and extends through the cap into the housing diametrically opposite to contact 34. Contact part 42 is bent towards contact 34 forwardly of the housing to form a spring finger 43 for contact with rivet 32 so that when the switch actuator 16 is in its outward position as shown in Figs. 2 and 3, rivet 32 will bridge contacts 34 and 42 to close the electric circuit to a lamp or other similar device. A lead A may be inserted in contact 40, 42 as shown in Figs. 3 and 4.

On the same side of the housing as slot 22 and aligned therewith, a projection 44 is struck up inwardly of the housing from a wall thereof and adjacent the cap 38, this projection extending in a direction towards the plate 14. A loose plate 46 having a slot which receives projection 44 is slipped over the latter so that it can be removed therefrom only by moving it forwardly of the housing towards the switch actuator. Plate 46 is considerably wider than projection 44 and is curved as at 47 to fit the interior wall of housing 12 so as to closely fit the same. A finger 48 projects forwardly from plate 46 at an angle thereto, this angle being substantially the same as that at which projection 44 extends from the wall of housing 12. A coil spring 50 surrounds finger 48 and this spring is compressed between an edge of plate 46 and the interior edge of switch actuator 16, the axis of the spring being maintained by the finger 48. The interior edge of spring actuator 16 is deeply recessed as shown in Fig. 2 and the bottom of the recess is provided with a lug 52 extending in a direction towards finger 48, and the latter and lug 52 hold the spring between them so that it cannot escape.

From the above it will be seen that as the switch actuator 16 is pivoted about its lug 24, the lug 52 will travel on an arc and the direction of the action of spring 50 will be substantially in line with the movement thereof between extended and retracted positions of the pivoted switch actuator 16. Plate 46 is not positively connected in any way to the housing, but it is held in position by the action of the spring against the forward edge of the plate and as projection 44 extends at an angle through the slot in plate 46 the latter will be hooked thereunder. Also the switch actuator itself is not positively mounted on the housing 12 or plate 14, and therefore if spring 50 is removed, bottom plate 46 and the switch actuator can be dropped out of the housing rearwardly thereof. On the other hand the spring cannot force the switch actuator out of the housing due to the impingement of the corner 30 on an interior wall of housing 12, and the spring will always pivot the switch actuator outwardly of the housing upon release of holding pressure from cam surface 20. Thus the switch actuator is spring pressed towards a position to close the circuit, but when pressure is exerted on cam surface 20 the switch actuator will be pivoted into the housing and rivet 32 will be positioned between the widely separated angled extensions of the contacts 34 and 43 so that the circuit will be open as long as the door is closed.

It will be seen that the above described switch presents a simple and inexpensive structure in which only contact 34 is permanently connected to the housing and in which the switch actuator, finger plate 46, and the spring are easily assembled and disassembled.

A thin sheet 54 of Bakelite or other insulating material is provided with a projection 56 extending into a slot in cap 38, and a slot 58 in the sheet in the opposite end thereof is provided for the reception of the free end of contact 43. It will be seen that the insulating sheet is located between contact 43 and the rest of the switch; also the free end of the contact extends through the sheet into operative relation with the switch actuator. If spring 50 or plate 46 should fall out of their operative relations to the rest of the switch the insulating sheet will prevent contact thereof with the contact 43 and thus no short circuit can occur even though the switch actuator should be no longer held so that its rivet 32 bridges contacts 34 and 42 to close the circuit. A pair of short legs 60 on the forward end of sheet 54 may be used to position the sheet at this end with respect to a fastening 62 securing plate 14 to housing 12.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. A switch comprising a housing, contacts in said housing, and means to selectively connect or disconnect said contacts, said means comprising an actuator, means mounting said actuator for movement in directions to and from contact connecting position, a compression spring engaging said actuator to normally urge it in one direction, a fixed projection on said housing, a plate having an aperture, said aperture receiving said projection, a tongue on the plate, and said spring surrounding said tongue and engaging said plate thereby resiliently urging it in a direction to prevent accidental removal thereof from the projection.

2. A switch comprising a housing, contacts in said housing, and movable means mounted in said housing for selectively connecting or disconnecting said contacts, a fixed projection in said housing spaced from said means and extending in a direction toward said means, a plate loosely mounted on said projection, a compression spring between said movable means and said plate, said spring urging said plate into close relation with said projection, and a tongue on the plate for locating and retaining the spring.

3. A switch as recited in claim 2 wherein said plate is provided with an aperture, the latter receiving said projection whereby said plate is wedgingly secured to said projection under compression of said spring.

4. A switch as recited in claim 2 wherein said movable means is pivotal, and said tongue and spring are arranged at an angle to said housing to directly resist the pivotal action of said movable means in one direction.

5. A switch as recited in claim 2 wherein said movable means is pivotally mounted in a wall of said housing and said tongue is disposed at an angle to said plate to point in the general direction of pivotal movement of said movable means.

6. A switch comprising a housing having opposite ends, a pair of spaced contacts therein, a movable contact connector, a spring adapted to urge said connector in one direction, and a sheet of insulative material mounted in said housing in a position to prevent a connection of said contacts except by said connector, one of said contacts having a portion thereof extending through said sheet into position to engage said connector, said sheet being fixed in position by said one contact.

7. A switch comprising a housing, a pair of spaced contacts in said housing, at least one contact being bent to extend towards the other, a movable make and break device between said contacts, a sheet of insulative material between said contacts, said one contact extending through said sheet at its closest extent towards the other contact, and a spring urging said device in a direction toward the position of closest approach of the spaced contacts.

8. A switch as recited in claim 7 wherein said spring is compressively mounted between said device and a wall of the housing.

9. A switch as recited in claim 7 including a plate loosely mounted on a wall of said housing, said spring being compressively mounted between said plate and said device and resiliently holding said plate in position.

JASON C. STEARNS.