July 14, 1942. C. J. WERNER 2,289,816

SWITCH

Filed Feb. 1, 1940

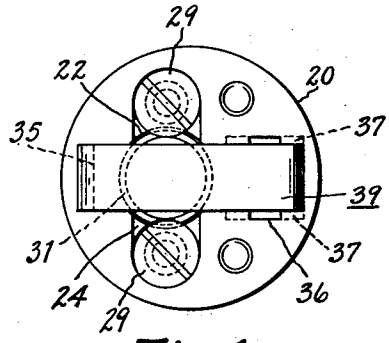


Fig. 1.

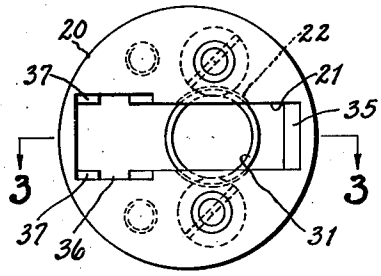


Fig. 2.

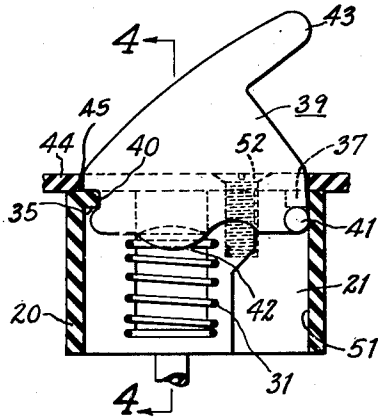


Fig. 3.

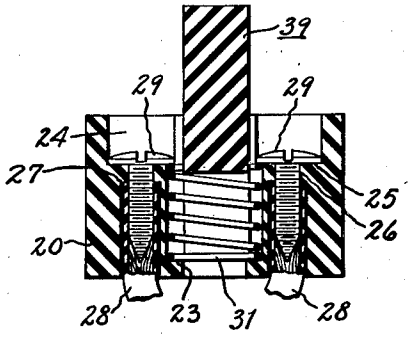


Fig. 4.

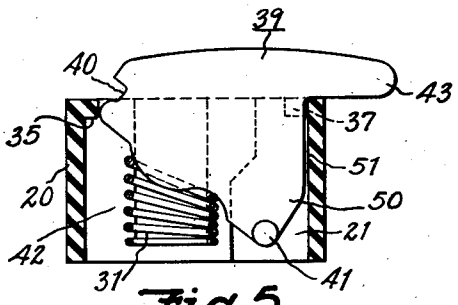


Fig. 5.

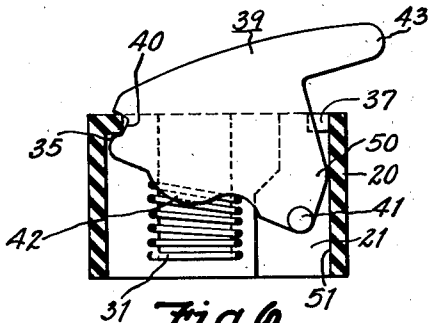


Fig. 6.

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SWITCH

Calvin J. Werner, Dayton, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application February 1, 1940, Serial No. 316,730

8 Claims. (Cl. 200—54)

This invention relates to electric switches and more particularly to switches adapted to be mounted in a compartment and actuated by a closure member for the compartment.

An object of the present invention is to construct and arrange the parts of the switch in such a manner as to facilitate rapid assembly of a switch actuator with a switch assembly without the use of tools.

More specifically, it is an object to provide a switch construction which comprises separate members including a novel one-piece molded base, stationary contacts, and a contact spring all of which can be readily assembled together by a simple tool such as a screw driver to provide a sub-assembly, and said sub-assembly being so constructed as to permit the assembly of the actuator with said sub-assembly without the use of tools, together with removable means for maintaining the actuator in assembled relationship to the switch and the switch to its support.

Another object of the invention is to reduce the number of parts and to simplify the structure of the individual parts so as to reduce the cost of production.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred embodiment of the present invention is clearly shown.

In the drawing:

Fig. 1 is a top plan view of the switch embodying the present invention.

Fig. 2 is a bottom plan view of the switch.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3.

Figs. 5 and 6 are views showing the manner of how easy the switch actuator can be assembled to the switch base.

Referring to the drawing 20 designates a molded insulating body or base, which can be easily inserted into a socket provided in a suitable support, not shown. The base 20 is formed with a substantially rectangular or elongated recess or opening 21 the opposite side walls of which are preferably provided with arcuate notches 22 of like depth and aligned with each other to provide a recess. The bottoms of the arcuate notches 22 form shoulders or flat portions 23 near the bottom of the base. The base is also formed with shallow recesses 24 extending laterally from the recesses 22, to provide platforms 25 that are in the same plane. The platforms 25 have apertures 26 which are counterbored to form internal shoulders 27. The counterbored portions of the apertures 26 are adapted to receive squared ends of cables 28. These cables are attached to the base by headed screws 29 the heads of which form the stationary contacts for the switch. The cables are attached to the base 20 by screwing the threaded shank of the screws 29 onto the conducting strands of the cables 28. As the shanks are threaded into the cable the insulation of the cable is forced firmly against the walls of the counterbored portions of the apertures 26. It will be noted that the heads 29 of the contact screws rest on the platform 25 and that a portion of each head extends over its respective recess.

Before the screws 29 and cables 28 are attached to the base a movable contact spring 31, preferably of phosphorus bronze, is inserted between the walls of the recess formed by the arcuate notches 22. Normally one end of the spring acts as a movable contact and engages the extending portions of the heads 29 while the other end of the spring rests against the shoulders 23.

Referring to Fig. 1, it will be noted that the elongated recess rectangular opening 21 is provided at one end with an overhanging portion or lug 35 and the other end of the opening 21 spaced from the recesses 22 is enlarged as at 36. This enlarged portion of the opening 21 is provided with spaced overhanging portions or lugs 37. The space between the lugs being equal to the width of the rectangular opening 21.

An actuator or lever 39 for the switch is of substantially triangular form and is molded from suitable insulating material. The lever 39 preferably consists of plane parallel sides spaced a distance less than the cross dimension between the stationary contacts 29. The lever 39 is provided at one end with a recess 40 which is adapted to receive the overhanging portion 35 and a pair of laterally extending bosses 41 at the other end. The recess 40 and the bosses 41 are spaced apart by an intermediate portion 42 adapted to rest or engage the upper end of the contact springs 31, see Fig. 3. It will be noted that that lower marginal wall of the notch 40 is rounded, said wall cooperating with the overhanging portion 35 to provide a fulcrum or pivot for the actuator 39. The bosses 41 cooperate with the spaced overhanging portions 37 to form a stop for the lever in one direction of its movement. The lever 39 is also provided with an extension 43 which cooperates with a plate 44 to limit the inward movement of the lever. This plate also provides the

means whereby the lever 39 cannot be disassembled from the base 20.

The assembly of the lever 39 to the base 20 will now be described. Referring to Fig. 5 the lever is tilted or placed in an abnormal position with respect to the body, or in other words, the lever is positioned so that the bosses 41 will enter the opening 21 between the overhanging portions 37 and the inner wall of the enlarged section provided by the opening. When the bosses 41 pass the overhanging portions 37 the lever is forced into the opening 21 against the tension of the spring 31 until the extension 43 engages the top surface of the base 20, see Fig. 5. When this occurs the notched end of the lever will be able to pass the overhanging portion 35. By moving the notched end of the lever in a counterclockwise direction, said end will be moved into the interior of the base so that when manual force is relieved the spring 31, due to being cocked, will urge the lever endwise or towards the right as viewed in Fig. 5, causing the cam portion 50, formed integral with the lever 39 to engage the inner wall 51 of the rectangular opening 21 and causing the notched portion of the lever to straddle the overhanging portion 35 which acts as the pivot for the lever. The spring then causes the rear portion of the lever to move in a counterclockwise direction until the bosses 41 engage the underside of the overhanging portion 37, see Fig. 3. The bosses 41 act as stops for the lever 39 for preventing removal of the lever from the body. When the lever 39 is in the position shown in Fig. 3 the lever is in its proper assembled relationship with the remainder of the switch structure.

This switch assembly is now ready to be inserted in a suitable recess provided by the door frame of a compartment not shown. Before the switch is finally positioned in the recess of the door frame, the switch is first attached to a retaining bracket 44. The bracket 44 has a rectangular opening 45 with the lever 39 projecting therethrough. The switch base 20 is attached to the bracket 44 by screws 52, as shown in dotted lines, see Fig. 3. After the free ends of the cables 28 are connected with a source of electrical energy, the retaining bracket 44, with the switch attached, is secured to the door frame in such a manner that when the door for the compartment is closed, the lever 39 is pressed inwardly, at which time the end of the bridging contact spring 31 is forced from the stationary contacts 29, 29 to open the circuit, while when the door is opened the lever 39 is urged outwardly under the influence of the spring 31 to bridge the stationary contacts 29, 29. It is to be stated here that the plate 44 operates to limit the inward movement of the lever 39 within the base 20 and thus the lever 39 cannot be disassembled from the retaining plate 41 until the plate 44 is first removed from the door frame.

When it is desired to disassemble the lever 39 from the base 20, the plate 44 is first removed from the door frame and the screws 52 removed. When the base 20 is free of the bracket 44, the lever 39 is moved in a clockwise direction into an abnormal position with respect to the body from the position shown in Fig. 3 to the position shown in Fig. 5. Referring to Fig. 5, it will be observed that the portion 43 rests against the top surface of the base 20. When this occurs the front end of the lever is unhooked or free of the overhanging portion 35. Thus by lifting the lever 39 on the vertical the lever can be easily removed from the base.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A switch comprising a non-conducting body, spaced stationary contacts mounted within the body, a resilient contact mounted within the body and normally biased into engagement with the stationary contacts, said body having an elongated recess opening to one face of the body and extending between the stationary contacts; a lever guided by the recess and operable to move the resilient contact away from the stationary contacts; cooperating means provided by the body and lever and biased toward engagement by the action of said resilient contact for preventing separation of the lever from the body, said means comprising sets of engageable lugs provided by the body and lever at the opposite ends of the recess to form stops for preventing removal of the lever from the body, one of said sets of engageable lugs providing a fulcrum for the lever as it operates to separate the resilient contact from the stationary contacts.

2. A switch comprising a non-conducting body, spaced stationary contacts mounted within the body, a resilient contact mounted within the body and normally biased into engagement with the stationary contacts, said body having an elongated recess opening to one face of the body and extending between the stationary contacts; a lever guided by the recess and operable to move the resilient contact away from the stationary contacts; cooperating means provided by the body and lever and biased toward engagement by the action of said resilient contact for preventing separation of the lever from the body, said means comprising sets of engageable lugs provided by the body and lever at the opposite ends of the recess to form stops for preventing removal of the lever from the body, one of said sets of engageable lugs providing a fulcrum for the lever as it operates to separate the resilient contact from the stationary contacts, the lugs of the lever being unhooked from the inside of the lugs of the body by tilting the lever into an abnormal position with respect to the body, whereby the lever is free to move out from the recess of the body.

3. A switch comprising a non-conducting body, spaced stationary contacts mounted within the body, a resilient contact mounted within the body and normally biased into engagement with the stationary contacts, said body having an elongated recess opening to one face of the body and extending between the stationary contacts; a lever guided by the recess and operable to move the resilient contact away from the stationary contacts; cooperating means provided by the body and lever and biased toward engagement by the action of said resilient contact for preventing separation of the lever from the body, said means comprising sets of engageable lugs provided by the body and lever at the opposite ends of the recess to form stops for preventing removal of the lever from the body, one of said sets of engageable lugs providing a fulcrum for the lever as it operates to separate the resilient contact from the stationary contacts, the lugs of the lever being unhooked from the inside of the lugs of the body by tilting the lever into an

abnormal position with respect to the body, whereby the lever is free to move out from the recess of the body; and means detachably secured to the body for preventing the tilting of the lever into said abnormal position.

4. A switch comprising a sub-assembly including a non-conducting body, a helical coil spring located within a recess of the body and bearing at one end against the body and providing at the other end a movable switch contact, and spaced stationary contacts mounted in said body and engaged by said movable contact provided by the spring, said spring being confined under compression between said contacts and said body, whereby the switch is normally closed; an operating member for compressing said spring beyond its normal compression in order to separate the movable contact from the stationary contacts, said operating member having plane parallel sides spaced a distance less than the space between the stationary contacts, said body providing a recess for receiving the member, said recess crossing the spring recess, said member and said body having, at opposite ends of said member-receiving-recess, interengaging provisions which serve to retain the member and body in assembled relation against the action of said spring, the member-engaging-provisions of the body being so spaced as to prevent withdrawal of the member from the body while the member is being moved through its normal range of movement from "switch-closed" to "switch-open" positions, and said member being so shaped with respect to the end walls of the member-receiving recess of the body that, in an abnormal position of the member further from switch-closed position than normal, the member can be shifted endwise to disengage the member from the body; and means attached to the body for preventing a movement of the member into an abnormal position.

5. A switch comprising, in combination a body of insulating material having an elongated recess opening to one face of the body; lugs carried by the body at said face and projecting into each end of the recess; spaced stationary contacts carried by the body; a resilient contact normally engaging the stationary contacts, said stationary contacts confining the resilient contact within the recess; a lever received by said recess and having abutments one at each end of the lever, said abutments being spaced so as to permit the insertion of the lever between the projecting means and into the recess against the action of the resilient contact when the lever is tilted, with respect to the body into a position which is abnormal, that is, out of the range of normal movement of the lever to separate the movable contact from the stationary contact, the expansion of said resilient contact causing one of the lever abutments to underlie one of the lugs of the body to form a pivot for the lever and the other abutment to underlie the other lug to form a stop limiting the outward movement of the lever relative to the body; and detachable means carried by the body cooperating with an extension of the lever to prevent the abnormal movement of the lever and thereby prevent removal of the lever from the recess.

6. A switch comprising a sub-assembly including a non-conducting body having a recess formed therein and opening to one side of the body, said body having overhanging portions at each end of the recess, stationary contacts carried by the body, a coil spring providing a movable contact within the recess normally engaging the stationary contacts, said stationary contacts holding the coil spring under compression and retaining the movable contact within the recess; a lever for compressing the coil spring beyond its normal compression in order to separate the movable contact from the stationary contacts, said lever having lug portions adapted to be located below the overhanging portions provided by the body, said overhanging portions of the body being spaced so as to provide assembly clearance for the lug portions of the lever when the lever is placed in a predetermined position relative to the body and is manually inserted in the recess by a movement substantially parallel to the axis of the spring, said lever having a surface engageable with the movable contact and inclined to the axis of the spring when the lever is so moved into the recess of the body whereby the spring portion nearest the lever is rendered oblique to the spring axis, said coil spring operating, upon manual release of the lever, to shift automatically the lever endwise within the recess thereby causing the lugs of lever to hook under the overhanging portions of the body to maintain the lever within the recess.

7. A switch comprising in combination, a molded insulating body, said body having an elongated recess, said body having a pair of notches provided in opposite walls of the recess and intermediate the ends thereof; overhanging portions provided by the body at each end of the recess; stationary contacts carried by the body and extending over the notches; a spring providing a movable contact received by said notches and engageable with the stationary contacts and having one end seated upon the body; a lever received by the recess and having a notch at one end to receive one of the overhanging portions of the body thereby providing a pivot for the lever, said lever having laterally extending bosses at the other end which cooperate with other overhanging portions of the body to provide a stop for the lever, said lever being movable against the action of the spring into such position that the notched end of the lever can be made free of its overhanging portion to remove the lever from the body.

8. A switch comprising in combination; a molded insulating body, said body having an elongated recess, said body having a pair of notches provided in opposite walls of the recess and intermediate the ends thereof; overhanging portions provided by the body at each end of the recess; stationary contacts carried by the body and extending over the notches; a spring providing a movable contact received by said notches and engageable with the stationary contacts and having one end seated upon the body; a lever received by the recess and having a notch at one end to receive one of the overhanging portions of the body thereby providing a pivot for the lever, said lever having an extension and spaced laterally extending bosses at the other end, said bosses cooperating with other overhanging portions of the body to provide a stop for the lever, said lever being movable against the action of the spring into such position that the notched end of the lever can be made free and a plate supported by the body cooperating with the extension of the lever to prevent disassembly of the lever from the body.

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