

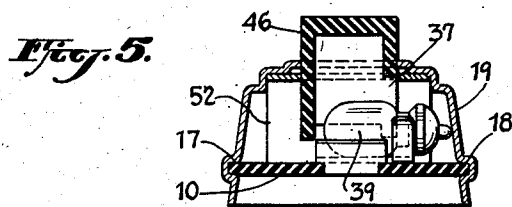
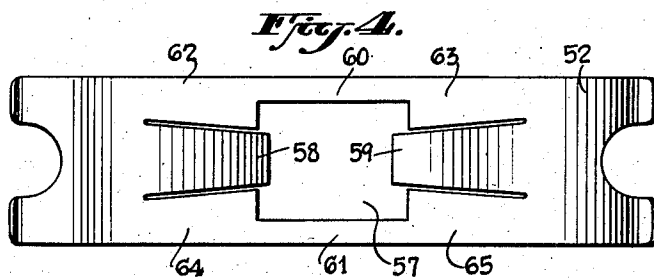
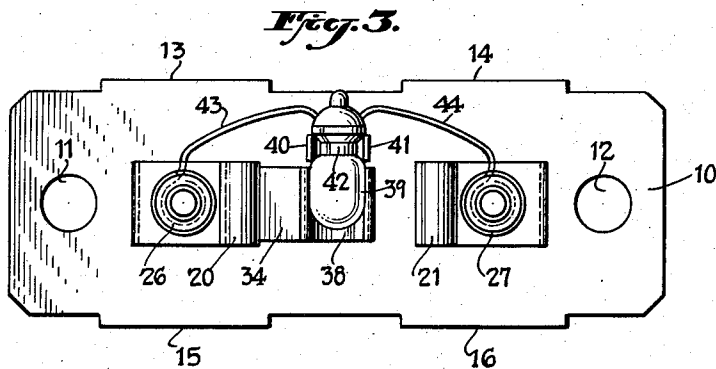
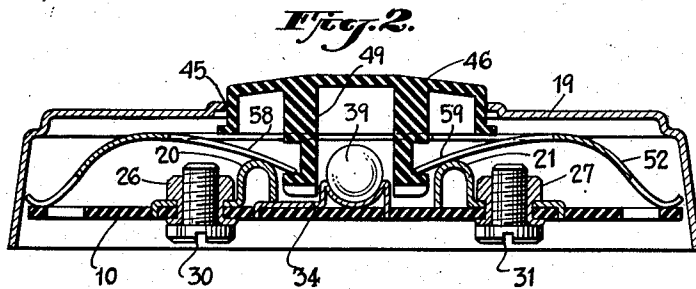
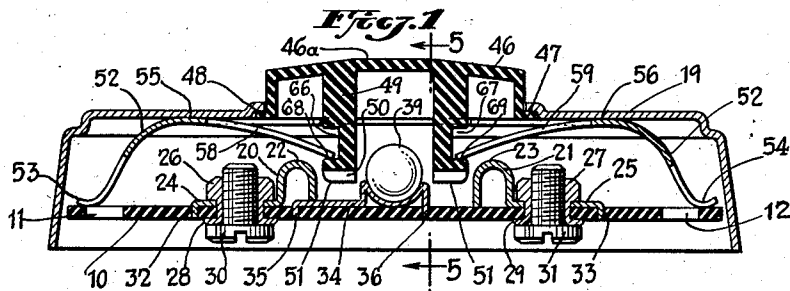
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2,802,082

ELECTRIC SWITCH

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2,802,082

ELECTRIC SWITCH

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11 Claims. (Cl. 200—159)

This invention relates to electric switches and in particular, to doorbell switches.

In the manufacture of switches, and particularly doorbell switches, it is desirable to employ a minimum number of switch parts which are simple and inexpensive to manufacture. However, the switch must still be reliable and have a pleasing appearance.

The switch of my invention is reliable and has a pleasing appearance and, in addition, it has a small number of simple and inexpensive parts which may be readily assembled. In the preferred form thereof a single spring member is employed which serves not only to return the switch push button but also to complete an electrical circuit when the button is depressed. The spring member preferably includes a pair of contact fingers which are not engaged by the push button and which are flexible and movable with respect to the remainder of the spring member and the push button. With the preferred construction there is little possibility that the fingers will be bent beyond their elastic limit during use of the switch and the push button may be depressed beyond the point required to cause the fingers to engage contacts associated therewith without damage to the fingers. Furthermore, the push button may be stopped in its fully depressed position independently of the fingers and contacts, and further movement of the button after the fingers have engaged their associated contacts has substantially no effect on the circuit or circuits connected to the contacts.

In the preferred embodiment of the invention, the push button is provided with slots into which the free ends of the above-mentioned fingers extend, the slots being of sufficient size to permit movement of the ends of the fingers with respect to the button. However, the slots have walls across one end thereof which limit the movement of the fingers with respect thereto so that the fingers are positively disengaged from their associated contacts when the push button is in its released position.

Also, in the preferred embodiment of the invention, a lamp is mounted in a light reflecting holder between the contacts and at least a portion of the push button is made translucent so as to permit light from the lamp to illuminate the button and pass through the button. The energizing leads of the lamp are connected to the contacts.

Other objects and advantages of the invention will be apparent from the following detailed description of a preferred embodiment thereof, which description should be considered in connection with the accompanying drawing in which:

Figs. 1 and 2 are enlarged, cross-sectional, side elevation views of the preferred embodiment of the invention showing the movable parts thereof in two different positions;

Fig. 3 is a plan view of the base portion of the embodiment shown in the preceding figures;

Fig. 4 is a bottom view of the spring member forming part of the embodiment shown in the preceding figures; and

Fig. 5 is a cross-sectional view of the embodiment

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shown in Fig. 1 and is taken along the line 5—5 indicated in Fig. 1.

The embodiment of the switch of the invention shown in the drawing comprises a base plate 10 made of an insulating material such as fiber or fiber impregnated with a phenolic resin and which has a pair of holes 11 and 12 in the opposite ends thereof for receiving mounting screws (not shown). Four ears 13—16 extend from the sides of the plate 10 and are received in slots 17 and 18 in a cover 19 when the base plate 10 is pressed into the cover 19. The cover 19 preferably is made of a relatively thin material such as sheet brass and the side walls thereof, having the slots 17—18 therein, spring apart as the plate 10 is forced into the cover 19. However, when the plate 10 is in the positions shown in Figs. 1, 2 and 5, the side walls of the cover 19 return approximately to their normal positions engaging the ears 13—16 and hold the plate 10 therein.

Preferably, the base plate 10 is relatively long and narrow as shown in the drawing and a pair of contacts 20 and 21 are mounted on the plate 10 in longitudinally spaced relation. The contacts 20—21 are made of conductive material such as metal and preferably are made of brass. Contacts 20—21 may be identical in shape and each has a contact-making face 22 and 23 which is raised above the upper surface of the plate 10. Each of the contacts 20 and 21 also comprises an apertured portion 24 and 25 through which threaded terminal bushings 26 and 27 extend. The terminal bushings 26 and 27 also extend through apertures in the plate 10 and are turned over as indicated at 28—29, clamping the contacts 20 and 21 against the plate 10. Terminal screws 30 and 31 fit into the bushings 26 and 27 and hold the connecting wires (not shown) of the circuits with which the switch is associated. The portions 24 and 25 are provided with downwardly extending tails 32 and 33 which fit into apertures or slots in the plate 10 and which prevent rotation of the terminals 20 and 21 around the bushings 26 and 27.

A lamp holder 34 is mounted between the terminals 20 and 21 and is provided with a pair of downwardly extending portions 35 and 36 which fit into slots or apertures in the plate 10, preventing sidewise movement of the holder. The holder 34 is held against the upper surface of the plate 10 by the end of the terminal 20 which bears against the upper surface of the holder 34.

The holder 34 preferably is made of metal and may, for example, be made of stainless steel for the purposes hereinafter described. The holder 34 has a lamp receiving surface 38 which is arcuate as viewed in cross section and which engages one side of a lamp 39. If the holder 34 is made of stainless steel, the surface 38 preferably is polished and mirror-like so as to provide a mirror-like reflecting surface which directs light from the lamp 39 upwardly. Alternatively, the surface 38 may be silvered or otherwise given a good light-reflecting surface so as to direct light from the lamp 39 upwardly.

As shown in Fig. 3, the holder 34 also comprises a pair of fingers 40 and 41 which are spring-like and which engage the neck 42 of the lamp 39. The fingers 40 and 41 extend more than half way around the neck 42 so that when the lamp 39 is positioned as shown, the fingers 40 and 41 must be forced apart in order to remove the lamp 39.

The lamp 39 has a pair of energizing leads 43 and 44 which are clamped under the portions 24 and 25 of the contacts 20 and 21 thereby conductively connecting the leads 43 and 44 to the terminal bushings 26 and 27 and to the contacts 20 and 21. The lamp is thereby connected in series with the external circuit so that when the push button, hereinafter described, is released the lamp is energized and when the push button is depressed, the lamp is shunted.

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The cover 19 extends over the plate 10 and has a centrally disposed aperture 45 therein which is disposed above the lamp 39. The aperture 45 is adapted to receive a push button or switch actuating member 46 at least the central portion 46a of which is translucent. Preferably, the entire button 46 is made of a translucent material such as polystyrene and the button is movably mounted in the aperture 45. The button 46 is shown in its released position in Fig. 1 and the button 46 has outwardly extending portions 47 and 48 which engage adjacent portions of the cover 19 in the released position of the button 46 and prevent removal of the button 46. The button 46 also comprises a hollow, downwardly extending portion 49 which has a lamp holder bridging slot 50 therein. In the fully depressed position of the button 46, the bottom 51 of the portion 49 strikes against the upper surface of the plate 10 and provides a positive, lower stop for the button 46.

As shown in Fig. 5, one wall of the portion 49 is cut away to provide an opening 37 for receiving the lamp 39 and its holder 34.

A spring member 52 is mounted between the cover 19 and the plate 10. Preferably, the spring member 52 is made of metal and may, for example, be made of phosphor bronze. For simplicity in construction and assembly, the ends 53 and 54 of the spring member 52 merely bear against the upper surface of the plate 10 although it will be understood that such ends may be pivotally connected to the plate 10 in other known manners. When the plate 10 is in the assembled position shown in Figs. 1, 2 and 5, the upper portion of the spring member 52 bears against the inner surface of the upper wall of the cover 19, such as at the portions designated by the numerals 55 and 56.

As indicated in Fig. 4, the spring member 52 has a centrally disposed aperture 57 therein which, when the spring 52 is positioned as shown in Figs. 1 and 2, is disposed above the lamp 39. The spring member 52 has integral therewith, a pair of longitudinally extending contact fingers 58 and 59 which extend from adjacent the ends of the member 52 into the aperture 57. The free ends of the fingers 58 and 59 are spaced from each other and are on opposite sides of the aperture 57. The member 52 has portions 60 and 61 on opposite sides of the aperture 57 and portions 62-65 which extend on opposite sides of the fingers 58 and 59, all of said portions being spaced from the fingers 58 and 59. The free ends of the fingers 58 and 59 are movable with respect to said portions, it being noted that the member 52 is made of resilient and flexible material.

As shown in Figs. 1 and 2, the free ends of the fingers 58 and 59 are normally disposed downwardly with respect to the portions 60-65 of the member 52. Also, as shown in Figs. 1 and 2, the button 46 is in contact with portions 62-65 and, as the button 46 is depressed, the portions 62-65 are moved downwardly as indicated in Fig. 2. Such downward movement of portions 62-65 causes the fingers 58 and 59 to move downwardly, even though the button 46 does not directly apply a downward force to the fingers 58 and 59. As indicated in Fig. 2, after the button 46 has been moved downwardly, a short distance, the fingers 58 and 59 strike and electrically interconnect the contacts 20 and 21. After the fingers 58 and 59 strike the contacts 20 and 21, there is no further downward movement of the fingers 58 and 59 even though the button 46 is further depressed. However, due to the flexible and resilient nature of the fingers 58 and 59, the fingers 58 and 59 are not damaged because the portion 51 of the button 46 strikes the plate 10 before the fingers 58 and 59 have been bent beyond their elastic limit.

The free ends of the fingers 58 and 59 extend into slots 66 and 67 in the sides of the portions 49 of the button 46 and are free to move in said slots 66 and 67 when the button 46 is depressed. However, the slots 66 and

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67 are of such length that when the button 46 is in its released position, shown in Fig. 1, the end walls 68 and 69 of the slots 66 and 67 engage the undersides of the free ends of the fingers 58 and 59 and positively disconnect the fingers 58 and 59 from the contacts 20 and 21. Furthermore, in order to prevent any looseness between the button 46 and the member 52, the walls 68 and 69 are preferably so positioned that the free ends of the fingers 58 and 59 are prevented from assuming their normal positions, i. e., the fingers 58 and 59 are held under tension by the walls 68 and 69. Of course, it will be understood that the walls 68 and 69 may be omitted with the accompanying loss of their function. If the walls 68 and 69 are omitted, the normal positions of the fingers 58 and 59, when the button 46 is released, will be substantially as shown in Fig. 1 and will be such that the fingers 58 and 59 are out of contact with the contacts 20 and 21.

It will be apparent from the above that when the push button 46 is in its released position, shown in Fig. 1, and the terminals 26 and 27 are connected to an external circuit which is to be completed, the lamp 39 is energized from the external circuit, illuminating the push button 46 and projecting light through the portion 46a. The lamp 39, having a resistance which is high as compared to the resistance between the contacts 20 and 21 when the button 46 is depressed, does not permit the flow of current sufficient to energize apparatus connected to the external circuit. When the button 46 is depressed the fingers 58 and 59 strike contacts 20 and 21, providing a low resistance path from the spring member 52 and between the contacts 20 and 21 and effectively shunting the lamp 39, causing it to extinguish. In addition, the shunt provided by the member 52 between the contacts 20 and 21 permits sufficient current to flow in the external circuit to actuate the apparatus therein.

If desired, the lamp 39 and its holder 34 may be omitted and the switch may be employed as a conventional single-pole, single-throw switch.

Having thus described my invention with particular reference to the preferred form thereof and having shown and described certain modifications it will be obvious to those skilled in the art to which the invention pertains, after understanding my invention, that various changes and other modifications may be made therein without departing from the spirit and scope of my invention, as defined by the claims appended thereto.

What is claimed as new and desired to be secured by Letters Patent is:

1. In an electric switch, a first member pivotally mounted substantially at its opposite ends, a finger member pivotally mounted substantially at one end thereof adjacent one end of said first member and with its pivot axis substantially parallel to the pivot axis of said one end of said first member, the other end of said finger member being a free end spaced from said first member and disposed, with respect to said one end of said first member, in the direction of the other end of said first member and said finger member having a contact engaging portion spaced from said one end thereof, a contact mounted adjacent said contact engaging portion and engageable with said portion, at least one of said members being flexible and resilient and said members having a driving connection therebetween at portions spaced from said contact engaging portion for providing a flexible and resilient driving connection between said first member and said contact engaging portion and causing movement of said finger member with said first member by means of said connection, whereby said contact engaging portion is movable into and out of engagement with said contact, and actuating means engageable with a portion of said first member spaced from said opposite ends thereof for moving both said first member and said finger member.

2. In an electric switch, a first member pivotally

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mounted substantially at its opposite ends, a finger member pivotally mounted substantially at one end thereof adjacent one end of said first member and with its pivot axis substantially parallel to the pivot axis of said one end of said first member, the other end of said finger member being a free end laterally spaced from said first member in the direction of said pivot axis and disposed, with respect to said one end of said first member, in the direction of the other end of said first member and said finger member having a contact engaging portion spaced from said one end thereof, a contact mounted adjacent said contact engaging portion and engageable with said portion, at least one of said members being flexible and resilient and said members having a driving connection therebetween at portions spaced from said contact engaging portion for providing a flexible and resilient driving connection between said first member and said contact engaging portion and causing movement of said finger member with said first member by means of said connection, whereby said contact engaging portion is movable into and out of engagement with said contact, and actuating means engageable with a portion of said first member spaced from said opposite ends thereof for moving both said first member and said finger member.

3. In an electric switch, a contact, a first member having its opposite ends pivotally mounted, said member having an aperture therein, a contact engaging member connected to said first member for movement therewith and extending at least part way across said aperture, said contact engaging member also being movable with respect to said first member and being spaced on at least two sides thereof from said first member, and actuating means engageable with a peripheral portion of said first member intermediate the ends thereof for actuating said members.

4. An electric switch comprising a base plate, a pair of contacts mounted in spaced relation on said plate, a first member having its ends pivotally supported by said plate, said member having a centrally disposed aperture therein and having integral therewith a contact engaging member extending at least part way across said aperture, said contact engaging member being movable with respect to said first member and being spaced on at least two sides thereof from said first member, a movably mounted push button, said contact engaging member being movable with respect to said button, and said button having a portion engageable with the peripheral portion of said first member intermediate the ends thereof for actuating said members.

5. An electric switch comprising a base plate, a pair of contacts mounted in spaced relation on said plate, a spring member having its ends pivotally supported by said plate, said member having a centrally disposed aperture therein and having integral therewith a pair of longitudinally extending contact fingers which extend from adjacent the ends of said member into said aperture and which are spaced on three sides thereof from the peripheral portion of said member, a movably mounted push button, said fingers being movable with respect to said button, and said button having a portion engageable with said peripheral portion of said member and spaced from said fingers for actuating said member and said fingers.

6. An electric switch comprising a base plate, a pair of contacts mounted in spaced relation on said plate, a spring member having its ends in pivotal engagement with said plate and said member having a centrally disposed aperture therein and having integral therewith a pair of longitudinally extending contact fingers which extend from adjacent the ends of said member into said aperture, the ends of said fingers being spaced from each other and on opposite sides of said aperture and said fingers having portions engageable with said contacts, a movably mounted push button, said button having a portion engageable with said member and spaced from said fingers for actuating said member and said fingers when said button is moved toward its depressed position.

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7. An electric switch comprising a base plate, a pair of contacts mounted in spaced relation on said plate, a cover secured to said plate and extending thereover, said cover having a centrally disposed aperture therein for receiving a push button, a spring member mounted between said cover and said plate, the ends of said spring member bearing against the ends of said plate and said member having a centrally disposed aperture therein which is aligned with said aperture in said cover and having integral therewith a pair of longitudinally extending contact fingers which extend from adjacent the ends of said member into said aperture, the free ends of said fingers being spaced from each other and on opposite sides of said aperture and said fingers having portions engageable with said contacts, a push button movably mounted in said aperture in said cover, said ends of said fingers being movable with respect to said button, said button having released and depressed positions and said button in both said positions being spaced from said fingers and having a portion engageable with said member for actuating said member and said fingers when said button is moved toward its depressed position.

8. An electric switch comprising a relatively long and narrow base plate, a pair of contacts mounted in longitudinally spaced relation on said plate, said contacts extending above said plate, a cover secured to said plate and extending thereover, said cover having an aperture therein for receiving a push button, a spring member mounted between said cover and said plate, the ends of said spring member pivotally engaging said plate and said member having an aperture therein which is aligned with said aperture in said cover and having integral therewith a pair of longitudinally extending contact fingers which extend from adjacent the ends of said member into said aperture, the ends of said fingers being spaced from each other and on opposite sides of said aperture and said fingers having portions engageable with said contacts, a push button movably mounted in said aperture in said cover and having a portion extending through said aperture in said member, said portion having slots therein, said ends of said fingers extending into said slots and being movable therein, said button having released and depressed positions and said button having a portion engageable with said member and spaced from said fingers for actuating said member and said fingers when said button is moved toward its depressed position and having a portion engageable with said plate in said depressed position.

9. An electric switch comprising a relatively long and narrow base plate, a pair of contacts mounted in longitudinally spaced relation on said plate, said contacts extending above said plate, a cover secured to said plate and extending thereover, said cover having a centrally disposed aperture therein for receiving a push button, a spring member mounted between said cover and said plate, the ends of said spring member bearing against the ends of said plate and said member having a centrally disposed aperture therein which is aligned with said aperture in said cover and having integral therewith a pair of longitudinally extending contact fingers which extend from adjacent the ends of said member into said aperture, the ends of said fingers being spaced from each other and on opposite sides of said aperture and being engageable with said contacts, a push button movably mounted in said aperture in said cover and having a portion extending through said aperture in said member, said portion having slots therein, said ends of said fingers extending into said slots and being movable therein, said button having released and depressed positions and said button having a portion engageable with said cover in said released position to prevent removal of said button, having a portion engageable with said member and spaced from said fingers for actuating said member and said fingers when said button is moved toward its depressed position and having a portion engageable with the ends

of said fingers prior to return to said released position for positively disengaging said fingers from said contacts and said button having a portion engageable with said plate in said depressed position.

10. An electric switch comprising a relatively long and narrow base plate, a pair of contacts mounted in longitudinally spaced relation on said plate, said contacts extending above said plate, a lamp holder mounted on said plate between said contacts, a lamp mounted in said holder, said lamp having a pair of energizing leads, one of said leads being connected to one of said contacts and the other of said leads being connected to the other of said contacts, a cover secured to said plate and extending thereover, said cover having a centrally disposed aperture therein for receiving a push button and said aperture being disposed above said lamp, a spring member mounted between said cover and said plate, the ends of said spring member bearing against the ends of said plate and said member having a centrally disposed aperture therein which is disposed above said lamp and having integral therewith a pair of longitudinally extending contact fingers which extend from adjacent the ends of said member into said aperture, the free ends of said fingers being spaced from each other and on opposite sides of said aperture and being engageable with said contacts, a push button having a translucent portion, said button being movably mounted in said aperture in said cover and having a portion extending through said aperture in said member, said last-mentioned portion having slots therein having a length in the direction of movement of said button which is greater than the thickness of the ends of said fingers, said ends of said fingers extending into said slots and being movable therein said button having released and depressed positions and said button having a portion engageable with said cover in said released position to prevent removal of said button, having a portion engaged with said member and spaced from said fingers for actuating said member and said fingers when said button is moved toward its depressed position and having a portion engageable with the ends of said fingers prior to return to said released position for positively disengaging said fingers from said contacts and said button having a portion engageable with said plate in said depressed position.

11. An electric switch comprising a relatively long and narrow base plate, a pair of contacts mounted in

longitudinally spaced relation on said plate, said contacts extending above said plate and having terminals connected thereto, a lamp holder mounted on said plate between said contacts, said holder having a lamp-engaging, light reflecting surface facing away from said plate, a lamp mounted in said holder, said lamp having a pair of energizing leads, one of said leads being connected to one of said contacts and the other of said leads being connected to the other of said contacts, a cover secured to said plate and extending thereover, said cover having a centrally disposed aperture therein for receiving a push button and said aperture being disposed above said lamp, a conductive spring member mounted between said cover and said plate, the ends of said spring member bearing against the ends of said plate and said member having a centrally disposed aperture therein which is disposed above said lamp and having integral therewith a pair of longitudinally extending contact fingers which extend from adjacent the ends of said member into said aperture, the free ends of said fingers being spaced from each other and on opposite sides of said aperture and being engageable with said contacts, a translucent push button movably mounted in said aperture in said cover and having a portion extending through said aperture in said member, said portion having slots therein having a length in the direction of movement of said button which is greater than the thickness of the ends of said fingers, said ends of said fingers extending into said slots and being movable therein, said button having released and depressed positions and said button having a portion engageable with said cover in said released position to prevent removal of said button, having a portion engaged with said member and spaced from said fingers for actuating said member and said fingers when said button is moved toward its depressed position and having a portion engageable with the ends of said fingers prior to return to said released position for positively disengaging said fingers from said contacts and said button having a portion engageable with said plate in said depressed position.

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