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PUSH BUTTON SWITCH CONSTRUCTION

Filed March 6, 1964

2 Sheets-Sheet 1

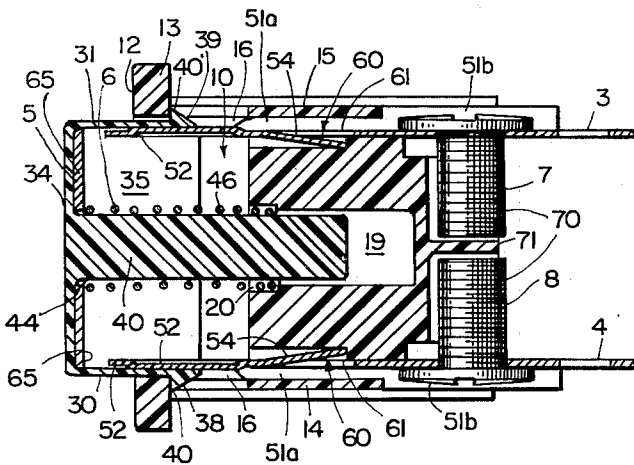
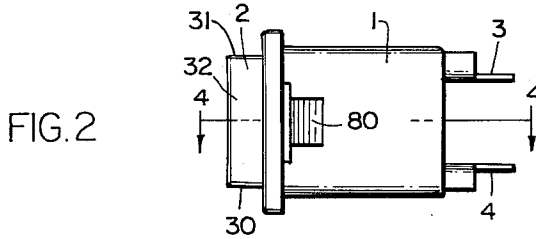
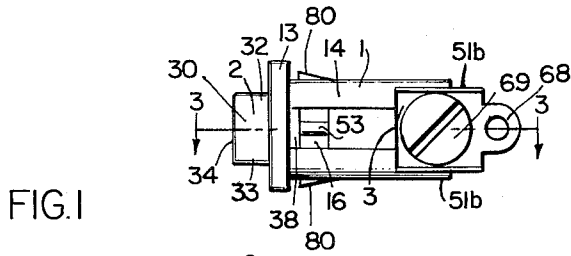


FIG. 3

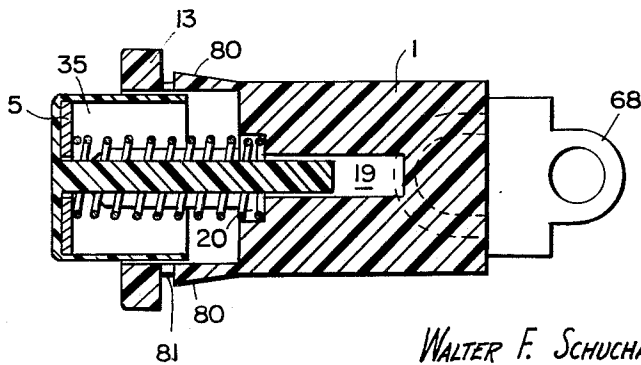


FIG. 4

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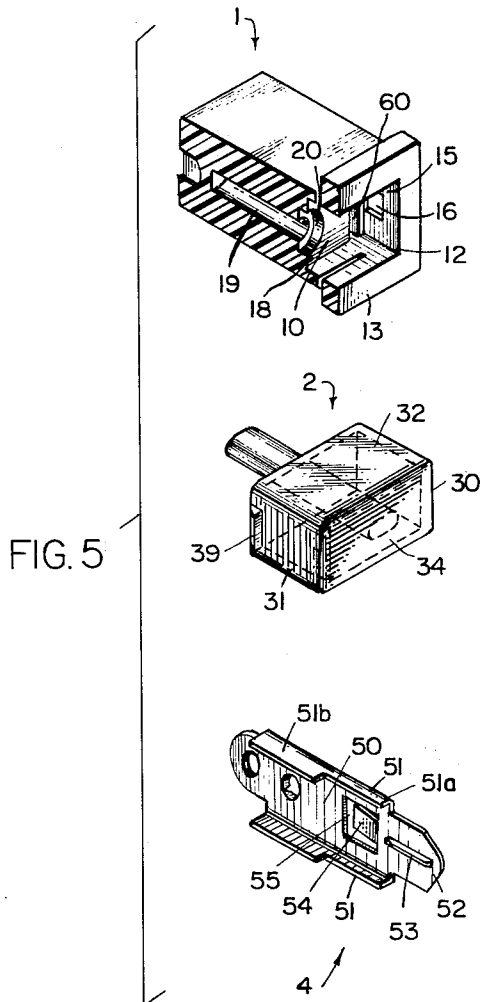
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2 Sheets-Sheet 2



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**PUSH BUTTON SWITCH CONSTRUCTION**

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9 Claims. (Cl. 200-159)

The present invention relates to a push button switch and more particularly to a switch of the momentary push-button type adapted to momentarily close a circuit.

There is a continuing need for push buttons adapted to momentarily close a circuit which are easy to manufacture, relatively inexpensive in cost, attractive in design and reliable in operation. It is therefore an object of this invention to provide a push button which has one or more of these advantages over any momentary push buttons heretofore developed.

The present invention provides a switch which may be formed of two pieces of insulating material adapted to be assembled by snap fitting these components into a permanent interrelationship. These components support and secure various conductive elements that form the electrical circuit of the switch. The present invention also provides a momentary push button construction made solely of two insulating elements adapted to be formed of injection molded plastic, and metal elements which include a spring, metal contact plate and two terminal elements each in turn consisting of a simple die-stamping and screw. Thus push buttons made in accordance with this invention may be readily assembled by hand without the use of jigs, or alternately is adapted to be assembled by automatic machinery.

A still further object of the present invention provides a design for push buttons of various sizes, but in particular for use in low voltage push buttons usually found on instrument panels, doors, hand signaling devices, etc.

In the present invention a housing secures a button in a snap fit for movement in opposite directions over a limited distance. The housing also supports a pair of contact terminals which have portions adapted to engage a contact plate, in turn supported and secured within a recess in the button. The terminals are electrically contacted by the plate on movement of the button in one direction and are electrically disconnected upon movement of the button under spring tension in an opposite direction. All of these elements snap fit together to form an integral unit.

These and other objects and advantages of the present invention will be more clearly understood when considered in conjunction with the accompanying drawings, in which:

FIG. 1 is a side plan view of a push button switch embodying the invention;

FIG. 2 is a top plan view of the switch shown in FIG. 1;

FIG. 3 is a cross sectional view taken substantially along the line 3-3 of FIG. 1;

FIG. 4 is a cross sectional view taken substantially along the line 4-4 of FIG. 2, and

FIG. 5 is a partially cross sectioned exploded view of a switch embodying the invention.

The preferred embodiment of this invention comprises a one-piece housing 1 formed of a dielectric material, preferably an injection molded plastic such as nylon. A push button 2 is secured in snap fitting relation to the housing 1 and is preferably formed of a single injection molded piece of insulating material such as nylon or the like. A pair of contact terminals 3 and 4 are secured to opposite sides of the housing 1 and are adapted to be momentarily interengaged through a contact plate 5 (FIGS. 3 and 4).

A spring 6 supported internally of the switch normally tensions the button 2 outwardly of the housing 1. The only other components of this preferred embodiment comprise a pair of screws 7 and 8 threaded respectively through the terminals 3 and 4 for the purpose of securing leads to the contact terminals. The housing 1 has means forming a recess 10 for receiving the push button 2 and within which it is secured for reciprocal movement over a limited distance. This recess is substantially rectangular in form and is open at the forward end 12 of the housing. The forward end 12 is bordered by a peripheral rectangular flange 13. The opposite side walls 14 and 15 (FIGS. 1 and 5) which partially define this recess 10, are each provided with apertures 16 which open into the recess 10. Also extending axially from the rear wall 18 of the recess is an elongated hole 19 (FIGS. 3 and 5) with a shoulder section 20 adjacent the rear wall 18.

The push button 2 (FIG. 5) which is formed preferably of an insulating plastic that has some degree of resiliency comprises a body having side walls 30 and 31, upper and lower walls 32 and 33, and a forward wall 34 integral with one another to form a rectangular shape and to define a recess 35 (FIGS. 3 and 4) within the side and top walls. The side walls 30 and 31 are also provided with barbs 38 and 39 respectively at their rearward edges. Barbs 38 and 39 have a width smaller than the width of apertures 16 in the side walls 14 and 15.

Push button 2 is locked within the housing 1 for reciprocal movement in the recess 10. The push button 2 is locked in the recess 10 by barbs 38 and 39 which extend into recesses or apertures 16. The push button 2 may slide longitudinally guided and limited by barbs 38 and 39 within the recesses. The barbs 38 and 39 are flared forwardly so that the forward edges 40' are adapted to engage the peripheral flange 13 to limit forward movement of the push button 2. The beveled surface of the barbs 38 and 39 permit the push button to be assembled in interlocking relationship with the housing 1 by forcing the somewhat resilient button 2 into the recess 10. Axially extending from the forward wall 34 through the recess 35 and rearwardly into the hole 19, is a shaft 40 which is integral with the walls of the button 2. The shaft 40 is preferably rectangular or oval in cross section to correspond with the cross section of hole 19 and is adapted to guide the push button 2 in reciprocal longitudinal movement from a forward to a rearward position within recess 10.

Contact plate 5 is positioned within the recess 35 and is provided with an aperture 44 through which the shaft 40 projects. The contact plate 5 may be formed of any suitable conducting material, such as copper. The contacting plate is held flush against the inner surface of the forward wall 34 by a spring 46 which is coaxially mounted on the shaft 40 with one end engaging the rearward surface of the contact plate 5 and the other end as indicated at 46 positioned within the shoulder section 20 of the hole 19. This spring functions to secure the contact plate in its flush position against the rear surface of wall 34 and in addition functions to normally tension the push button 2 in a forward direction which is limited by the interengagement of the barbs 38 and 39 with the peripheral flange 13.

The contact terminals 3 and 4 are similar in construction. Each terminal is preferably formed of a single metal stamping, and is preferably a copper stamping having a base 50, flared at its sides to form lips 51. The forward portions 51a of the lips 51 are shorter in height than the rear portions 51b. The forward portions 51a serve as guide rails for sliding the contact terminals into a snap fit lock with the housing, while the rear portions

51b of the lips also function as a stop. The forward end of the contact terminal is provided with a tongue 52 having an elongated boss section 53 to strengthen it. Rearward of the tongue 52 is a stamped barb 54 which is formed from an opening 55 and is flared inwardly in the same direction as the lips 51. Each contact terminal is assembled in the housing by sliding it forwardly into a recess 60 until the contact terminal snap locks into a fixed relationship with the housing. A pair of these recesses 60 are formed on opposite sides of the housing. The recesses 60 within which the contact terminals are positioned are flat elongated slots positioned rearwardly of the apertures 16. Each slot is formed with a recessed shoulder section 61 (FIG. 3) which is adapted to engage the rear edge of the barb 54 on forward movement of the contact terminals when they are slid into position so as to securely lock these contact terminals into permanent relationship with the housing. In this position each tongue 52 projects forwardly through recess 10 and into the recess 35 of the button 2, and is adapted to engage the contact plate 5 at 65 on rearward movement of the button. The rear portion of the contact terminals is formed with tabs 68 having openings through which a lead wire may be threaded and an opening through which screws 7 and 8 may be threaded to secure the exposed tip of the lead wire which is attached to the terminal. The screws 7 and 8 of the opposed contact terminals 3 and 4 are aligned with one another at the rear of the housing 1. The housing may be formed with scalloped rear portions 70 adapted to permit the tightening of the screws to the contact terminals. An intermediate shelf 71 of insulating material extends rearwardly between the adjacent ends of the screws 69 to insulate them one from the other.

Opposite outer surfaces of the housing 1 may be provided with barbs 80 flared forwardly toward the peripheral flange 13 with the wider portions of the barbs 80 spaced uniformly from the rear edge of the flange 13, leaving recesses 81 between the barbs and the flange 13. These barbs and flange 13 may thereby be used to secure the entire push button switch assembly in an instrument panel or the like having an aperture sized to receive the housing and through which the push button switch assembly may be pressed until the barbs 80 are positioned on the inside of the panel and the flange 13 is positioned on the outer side of the panel.

What is claimed is:

1. A momentary push button switch comprising,
  - a non-conductive housing having means forming a recess for receiving a push button and securing it for reciprocal movement over a limited distance,
  - means for receiving and securing a pair of conductive contact terminals in parallel spaced coextensive relation with one end of each terminal contained within said housing and the other projecting therefrom,
  - a non-conductive push button having means for locking said housing and push button together and means for guiding said push button for reciprocal sliding movement with respect to said housing when positioned within said recess,
  - means forming a recess in said button within which said one end of each terminal projects, said housing and said button thereby forming a non-conductive enclosure for said one end of each terminal,
  - said recess having opposed sidewall portions, said sidewall portions carrying said means for slidably interlocking said push button with said housing,
  - means forming a conductive member within said push button recess adapted to engage said one end of said terminals on movement of said push button in one of said directions or reciprocal movements, and
  - means normally tensing said push button in the other direction of reciprocal movement.
2. A momentary push button switch as set forth in claim 1 wherein said push button comprises,

integrally connected sidewalls forming said opposed sidewall portions and a forward wall defining said recess in said button and,

a non-conductive shaft integrally formed with and extending rearwardly from said forward wall into a hole within said housing and forming therewith said means for guiding said push button.

3. A momentary push button switch as set forth in claim 2 wherein said means normally tensioning said push button comprises a helical spring coaxially mounted on said shaft with one end engaging said housing and the other end engaging said conductive member.

4. A momentary push button switch as set forth in claim 3 wherein said housing is formed with apertures on opposite sides thereof and wherein said means for locking said push button comprises a pair of barbs formed on opposite sidewalls and extending one each into said apertures to guide and limit said push button with respect to said housing.

5. A momentary push button switch as set forth in claim 2, wherein said housing is formed with a pair of elongated recesses extending lengthwise of said housing within which said contact terminals are positioned, said elongated recesses each having a pair of opposite open ends through which said contact terminal extends with one end of said recess opening into said recess for receiving a push button and the other end opens rearwardly of said housing.

6. A momentary push button switch as set forth in claim 5 wherein said elongated recesses are each formed with a forwardly facing shoulder section and said contact terminals are each formed with a rearwardly extending barb being resiliently flared from said contact terminal to interengage with said forwardly facing shoulder section when said terminal is positioned within said elongated recess and thereby permanently restrict rearward movement of said contact terminal with respect to said housing.

7. A momentary push button switch as set forth in claim 6 wherein each of said contact terminals is formed of a unitary flat metal member having a base with lips extending longitudinally thereof, said lips having portions projecting to different levels and adapted to engage projecting portions of said housing whereby forward movement of said contact terminal within said elongated recess is limited.

8. A momentary push button switch as set forth in claim 1 wherein said housing is formed with a flange extending outwardly of said housing at the forward end thereof, and a plurality of forwardly facing barbs on the outer surface of said housing and spaced rearwardly and uniformly from the rear edge of said outwardly extending flange and adapted to cooperate therewith to secure said switch within a panel aperture.

9. A momentary push button switch comprising,
 

- a housing having integral side walls defining a recess at the forward end of said housing with a pair of opposite apertures through side walls and opening into said recess, said housing also having a pair of elongated recesses extending lengthwise of said housing with each elongated recess having a pair of opposite open ends with one end opening into said recess at the forward end of said housing and the other end open rearwardly of said housing, said elongated recesses each being formed with forwardly facing shoulder sections, said housing also having a rear wall in part defining said recess at the forward end of said housing with means extending rearwardly from said housing rear wall defining an elongated hole opening into said recess at the forward end,
- a push button having integrally connected side walls and a forward wall forming a rearwardly open recess within said push button, a shaft integral with said push button and extending rearwardly from said forward wall through said rearwardly open recess and into longitudinally sliding guiding relationship

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with said hole, said push button also having a pair of forwardly flared barbs extending outwardly from opposite side walls of said push button and one each into said pair of opposite apertures in said housing with said push button barbs sized and shaped to permit limited reciprocal longitudinal movement of said push button within said recess at the forward end of said housing,

- a contacting plate positioned within said rearwardly open recess and lying in facing relation with the rearward side of said forward wall of said push button, a helical spring coaxially mounted on said shaft with one end engaging said housing and the other end engaging said conductive member, said spring normally tensioning said push button outwardly of said recess at the forward end of said housing,
- a pair of contact terminals each formed of a unitary flat metal member having a base with lips extending longitudinally thereof, and a rearwardly extending barb, said contact terminals one each positioned within said elongated recess with the forward end of said contact terminal extending through said

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recess in said forward end of said housing and into said rearwardly open recess of said push button and adapted to engage said contacting plate on rearward movement of said push button against the tension of said spring, and with the rear end of said contacting terminal extending rearwardly through said other end of said elongated opening.

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