

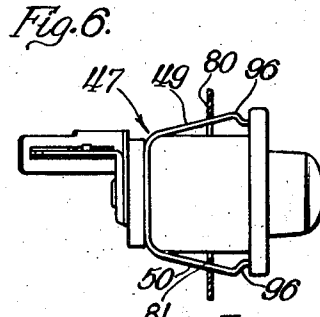
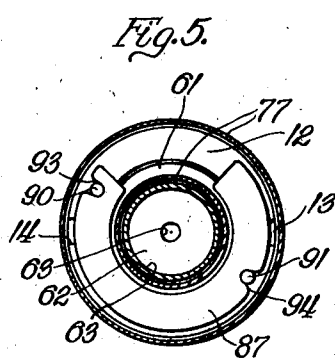
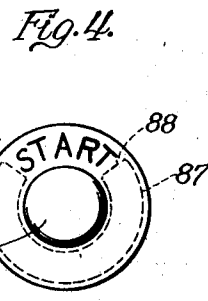
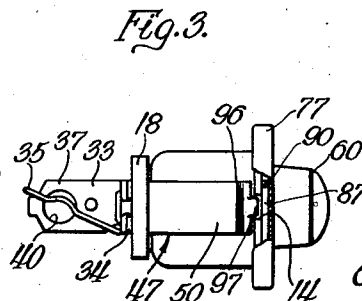
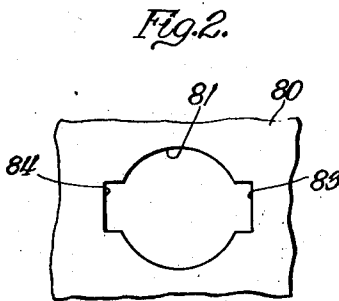
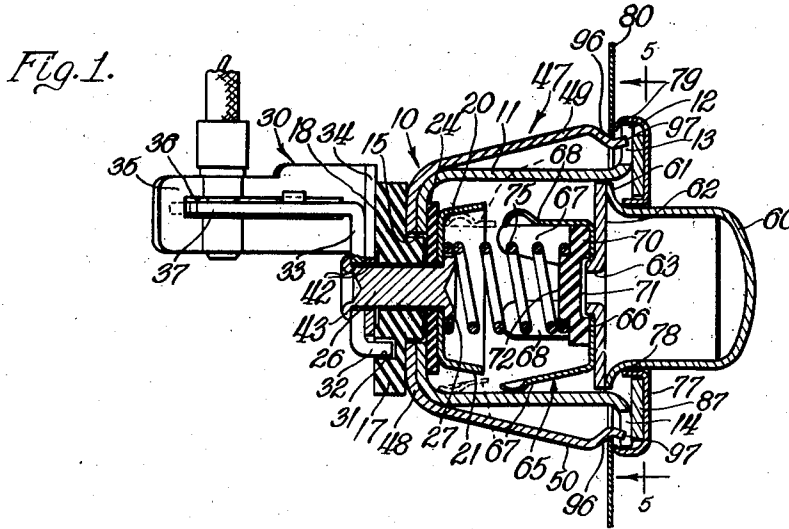
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H. CATRON ET AL

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PUSH BUTTON SWITCH

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PUSH BUTTON SWITCH

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The present invention relates generally to push button switches and the like, and is particularly concerned with the provision of a new and improved solenoid control switch of the type that is mounted on the instrument panel of an automobile for controlling the starting mechanism.

The principal object of the present invention is the provision of a push button switch of the type above referred to which is so constructed and arranged that it may be mounted in position by merely pressing the switch unit into place in its opening in the instrument panel. More specifically, it is an object of the present invention to provide a snap mounting arrangement for a push button switch or other electrical unit in which one or more spring arms are constructed and formed so as to be capable of exerting a continuous wedging action against one or more edges of the panel opening receiving the unit so as to hold the unit in position firmly and rigidly without any danger of becoming loosened under the influence of jars and vibrations to which it is subjected in the use of the automobile. According to the present invention, by virtue of the use of spring members that exert a continuous bias wedging the unit in position, the effect of jars and vibrations is to hold the unit even more securely in position.

Another object of the present invention is the provision of a notched opening in the instrument panel and a switch unit having a pair of spring arms especially adapted to fit in said notches, thereby guiding the unit into its proper position, and moreover, yieldingly holding the unit in position with a continuously exerted wedging action.

Still further, another object of the present invention is the provision of a new and improved switch structure, embodying a pronged contact member carried by the push button and adapted to connect an insulated contact member with the case of the switch so as to ground the contact through the switch case to the panel, and a further object of the present invention in this connection is the provision of new and improved means for holding the insulated contact in position, which may also be used for anchoring the one or more latch arms, the ends of which are particularly formed so as to secure the above-mentioned wedging action.

These and other objects and advantages of the present invention will be apparent to those skilled in the art after a consideration of the following detailed description, taken in conjunction with the accompanying drawing illustrating the same.

In the drawing:

Figure 1 is an enlarged section taken horizontally through a switch unit embodying the principles of the present invention;

Figure 2 is a view of the opening in the instrument panel that is especially adapted to receive the switch unit shown in Figure 1;

Figure 3 is a side view of the switch unit shown in Figure 1;

Figure 4 is an outside end view of the unit shown in Figure 3;

Figure 5 is a section, taken at a reduced scale, along the line 5—5 of Figure 1; and

Figure 6 is a horizontal or plan view illustrating the action of the spring arms when the unit is being placed in position on the instrument panel.

Referring now to the drawing, more particularly to Figure 1, the switch unit, indicated in its entirety by the reference numeral 10, includes a hollow switch case or body member 11 which is provided at one end with a radially outwardly extending flange 12 having a pair of opposed notches 13 and 14. At the end of the switch case 11 opposite the flange 12 the end is closed except for a central opening 15 in which the reduced portion 17 of a terminal block 18 is disposed. The terminal block 18 is formed of insulating material and is generally circular in formation. On the interior of the switch case 11 is a contact cup 20, also of circular formation and having a generally axially extending flange 21 disposed concentrically of the case 11. An insulating washer 24 is disposed between the bottom of the contact cup 20 and the end of the switch case 11 opposite the outer flange 12 thereof. The contact cup 20, the insulating washer 24, and the terminal block 18 are provided with axially aligned openings that are adapted to receive a rivet 26, the head 27 of which is disposed against the inside of the cup 20. A terminal assembly, indicated in its entirety by the reference numeral 30, is mounted against the rear face of the terminal block 18 and the latter has a recess 31 therein to receive a lug 32 that is formed on a terminal frame 33. A terminal spring 34 is arranged with a resilient contact arm 35 which is slotted, as at 36, to receive the conductor-receiving portion 37 of the terminal frame 33. The portion 37 of the terminal frame 33 is provided with an opening 40 (Figure 3) in which a conductor is adapted to be placed and to be held in position by the resilient portion 35 of the contact section 34. The members 33 and 34 are provided with apertures 42 which are in line with the apertures in the terminal block 18

and associated parts, and which receive the rivet 26. When the end of the latter is riveted over, as at 43, the terminal block assembly and the inside insulated contact cup 20 are held in proper position on the switch case 11.

The attachment of the contact cup 20 and terminal assembly 30 also serves to secure in place a spring member 47 which includes an intermediate apertured section 48 disposed about the reduced end 17 of the terminal block 18 and a pair of spring arms 49 and 50. As best shown in Figure 1, the inner end of the terminal block 17 clears the inside insulating washer 24 by a small amount, so that when the rivet 26 is tightened the inside cup 20, the terminal assembly 30, and the spring member 47 are all firmly and rigidly secured in position. The spring arms 49 and 50 are utilized for holding the switch unit 10 in position as will be described later.

A push button 60 is arranged at the end of the switch case 11 opposite the terminal assembly 30 and includes a drawn part having a radially outwardly disposed flange 61. A locating washer 62 is arranged against the flanged end 61 of the push button 60 and is provided with a central raised section 63 about which a contact member 65 is disposed. The member 65 is formed with a central web 66 having a plurality of prongs 67 and 68, the ends of each being cupped as best shown in Figure 1. The prongs 67 are flared outwardly from the central web section 66 so as to be resiliently held in electrical contact with the inner surface of the switch case 11, while the other prongs 68 are more centrally disposed and are arranged in a position to engage the flanged section 21 of the contact cup 20, as best illustrated in dotted lines in Figure 1. A spring insulating washer 70 is provided with a recess 71 on one side and a raised section 72 on the other side, the recess 71 being adapted to overlie the projection 63 on the locating washer 62, while a spring 75 has one end disposed over the head 27 of the rivet 26 and the other end engaged over the raised section 72 of the washer 62. The spring 75 is thus arranged to bias the movable contact member 65 away from the stationary contact cup 20, also biasing the push button 60 for outward movement relative to the switch case 11.

The outward movement of the push button 60 is limited by the engagement of the flanged section 61 thereof with a bezel 77 which has an inner collar section 78 receiving the push button 60 and an outer rim section 79 the edge portion of which is spun over the flange 12 on the switch case 11 in the assembly of the unit. It is to be noted that when the rivet 26 is placed and when the bezel 77 is fastened over the flange 12, all of the switch parts are held in assembled relation.

The switch unit 10 is adapted to be mounted in a panel, indicated in Figures 1 and 2 by the reference numeral 80, which is especially adapted to receive the same. Usually, the panel 80 is a metallic plate or sheet and, according to the present invention, we form a generally circular opening 81 (Figure 2) in the panel 80 and provide a pair of horizontally extending opposed notches 83 and 84 of generally rectangular formation, the vertical dimension of which is substantially equal to the width of the spring arms 49 and 50. In cases where the push button is used as a starting contact, the word "Start" is stamped into the bezel 77, as indicated in Figure 4. To accommodate this arrangement, and to insure that the bezel will be fastened tightly in place when the rim section 79 is spun over the flange 12 on the

switch case, we provide a U-shaped spacing washer 87 having a gap 88 therein dimensioned so as to clear the material in which the word "Start" is impressed. This spacing washer 87 is adapted to lie against the flange 12 on the switch case 11, and for the purpose of locating the same in order that the legend on the bezel 77 will be in the proper position, two diametrically opposite projections 90 and 91 are formed on the flange 12 and the spacing washer 87 is provided with a pair of notches 93 and 94 to receive the projections 90 and 91, as best indicated in Figure 5.

According to the principles of the present invention, the switch unit 10 is mounted on the instrument panel 80 by the simple act of pushing the same into position in the opening 81 thereof. The spring arms 49 and 50 serve as latch members in this operation and they are especially formed so as to exert a continuous force at all times tending to wedge the unit tightly in the opening 81 of the panel 80.

Referring now more particularly to Figures 1, 3 and 6, each end of the spring arms 49 and 50 is formed with an angled section 96 which is bent inwardly toward the body of the switch case 11. Each angularly bent section 96 is of the same width as the arm itself, but outwardly of the bent section 96 each arm has a reduced portion or lug 97 which is adapted to be disposed within the associated notch, 13 or 14, formed in the flange 12 of the switch case 11. The ends 97, as best shown in Figure 1, are embraced by the rim section 79 of the bezel 77, so that the latter serves to limit the outward springing of the arms 49 and 50 under the action of their own resiliency.

When the unit 10 is to be mounted in place, the unit is placed in the opening 81 with the spring arms 49 and 50 disposed in the rectangular openings 83 and 84 in the panel 80. Thus, the openings 83 and 84 and the spring arms 49 and 50 serve to locate the unit 10 in the proper position and prevent the same from being turned out of the proper position about its own axis. During the operation of pressing the unit 10 into the opening 81, the outer ends of the spring arms 49 and 50 engage the vertical edges of the openings 83 and 84 before the high points on the spring arms pass the edges of the openings 83 and 84, as indicated in Figure 6. However, when the high points clear the edges of the openings, the wedge or angled portions 96 engage the inner edges of the openings 83 and 84 in the relation shown in Figure 1. The dimensions of the parts are such that the angled sections 96 engage the edges of the opening in the panel 80 when the bezel rim is in engagement with the outer face of the panel. The resiliency of the arms 49 and 50 tends to cause the arms to swing outwardly about the point of anchorage at the terminal block 18, and the angle of the bent sections 96 is such that the springs exert a continuous bias against the edges of the panel opening and establish a continuous force actively holding the unit 10 in place against the forward face of the instrument panel 80. Since the spring arms 49 and 50 act continuously against the rear edges of the panel openings, any jars and vibrations to which the switch unit is subjected will tend only to cause the arms to grip the panel tighter and hold the unit even more firmly in position. However, if it is desired to remove the unit, all that it is necessary to do is to force a flat tool, such as a screw-driver, underneath the flange and pry the unit outwardly through the opening in the panel. This action

forces the arms 49 and 50 inwardly toward the switch case 11.

While we have shown and described above the preferred structure in which the principles of the present invention have been embodied, it is to be understood that our invention is not to be limited to the specific details shown and described above, but that, in fact, widely different means may be employed in the practice of the broader aspects of our invention.

What we claim, therefore, and desire to secure by Letters Patent is:

1. A unit adapted to be mounted on a panel having an opening therein to receive the unit, comprising a body member having one or more movable arms biased for outward movement, said body member having means adapted to engage the panel to determine the position of the body member in the opening therein and each of said arms having its outer end formed at an angle so as to exert a wedging action against the edge of the opening to hold the body member in said position, and means carried by said body member and engageable with the outer end of each arm for limiting the outward movement thereof when the unit is removed from said panel opening.

2. An electrical unit adapted to be mounted on a panel having an opening therein adapted to receive said unit, comprising a body member having a flange adapted to be disposed substantially up against one side of the panel when said unit is mounted in place in the opening thereof, said flange having a pair of oppositely disposed notches therein, spring means secured to said body member and having oppositely disposed arms extending alongside the body member and terminating in ends disposed in said notches, the portions of said oppositely disposed arms just inside the ends thereof which are disposed in said notches lying in convergent lines at an angle to the axis of the body member, whereby said portions are adapted to engage the edge of the panel opening at the other side of the panel with a wedging action to exert a force tending to move the unit inwardly of said opening.

3. An electrical unit as defined in claim 2, further characterized by a bevel mounted on said flange over said notches and receiving the end portions of said spring arms to limit the outward movement of the latter.

4. An electrical unit adapted to be mounted on a panel having an opening therein adapted to receive said unit, comprising a body member having a flange, a spring member secured to said body member and having oppositely disposed arms extending alongside the body member and terminating in ends which are bent inwardly adjacent the plane of said flange and adapted to engage the edge of the panel opening with a wedging action and to exert a force against the panel for tending to move the unit inwardly of the panel opening receiving the unit, and a bezel surrounding said flange and the end portions of said spring arms, said bezel and flange serving to limit the inward movement of the unit under the wedging action of said spring arms.

5. In a switch, the combination of a hollow switch case having an exterior flange at one end, a generally U-shaped spring member embracing the other end of said switch case and rigidly fastened thereto, said spring member having a pair of arms extending along the switch case and having inwardly bent ends adjacent said flange, and a bezel mounted on said flange and having in-

wardly directed flange portions engaging the ends of said arms to limit the outward movement thereof relative to said case.

6. A switch unit for use with a panel having an opening therein and provided with a pair of oppositely disposed generally rectangular notches, comprising a body member, a pair of oppositely disposed spring arms carried by the body member and adapted to be received in said notches when the switch unit is mounted in said opening and acting against the panel for the purpose of holding the switch unit in said opening, and means carried by said body member and engaging the ends of said spring arms for limiting their outward movement when the unit is separated from said panel.

7. The combination with a panel having an opening therein, of a switch unit embodying a switch case having a flange at one end, a pair of spring arms anchored at the other end, said arms extending along the switch case to points adjacent said flange, said flange being larger than the opening in the panel and said arms flaring outwardly relative to the switch case and having ends bent inwardly at an angle so that when the switch unit is inserted in the opening in said panel said angled ends engage the inner edge of said opening with a wedging action as said arms flex outwardly, so as to yieldingly hold the switch unit in said opening with a continuously exerted wedging action, each of said arms extending through said panel opening, and means at the flange end of said switch case and engageable with the ends of said spring arms for limiting the outward movement thereof when the switch case is separated from said panel.

8. A switch unit comprising a hollow switch case, a push button carried thereby and extending therefrom at one end, a contact cup carried at the other end of said switch case, and a contact member carried by said push button and having a plurality of prongs, certain of said prongs being in engagement with said switch case and certain of the other prongs being adapted to engage said contact cup in one position of the push button.

9. A switch adapted to be mounted in an opening in a panel, comprising a hollow switch case having a flange at one end, an insulating terminal block at the other end, a terminal mounted thereon, a contact cup disposed on the inside of said switch case, rivet means fastening said contact cup, said terminal block and said terminal in position on said switch case, a push button extending outwardly from said switch case and having a flange, a bezel carried on the flange of said switch case and cooperating with the flange on said push button for limiting the outward movement of the push button, a locating washer disposed inside said switch case and engaging the flanged end of said push button, a contact member disposed against said locating washer and having a plurality of prongs, certain of the latter being arranged to have sliding contact with said switch case and others being arranged in a position to engage said contact cup when the push button is depressed, an insulating washer disposed against the said contact, and a spring engaging the head of said rivet at one end and bearing against said insulating washer at the other end, said spring serving to keep said contact out of engagement with said contact cup unless the push button is depressed.

10. A switch adapted to be mounted in an opening in a panel, comprising a hollow switch

case having a flange at one end, an insulating terminal block at the other end, a terminal mounted thereon, a contact cup disposed on the inside of said switch case, a latch arm having one end arranged to engage the panel, the other end engaging said switch case, rivet means fastening said contact cup, said terminal block, said latch arm and said terminal in position on said switch case, a push button extending outwardly from said switch case and having a flange, a bezel carried on the flange of said switch case and cooperating with the flange on said push button for limiting the outward movement of the push button, said latch arm reacting against the panel for holding the switch case in a position with the bezel up against the panel, a locating washer disposed inside said switch case and engaging the flanged end of said push button, a contact member disposed against said locating washer and having a plurality of prongs, certain of the latter being arranged to have sliding contact with said switch case and others being arranged in a position to engage said contact cup when the push button is depressed, an insulating washer disposed against the said contact, and a spring engaging the head of said rivet at one end and bearing against said insulating washer at the other end, said spring serving to keep said contact out of engagement with said contact cup unless the push button is depressed.

11. An electrical unit adapted to be mounted on a panel having an opening therein adapted to receive said unit, comprising a casing having a flange with a plurality of notches formed in the flange, spring means secured to said casing and having panel engaging arms adapted to extend through the panel opening and into said notches, said ends being formed to engage the edges of said panel opening, and means on said casing and cooperating with the outer ends of said arms for limiting the outward movement of the latter.

12. A push button switch comprising a body member having an outwardly disposed flange, a spacing washer disposed against the outer surface of the flange and having a central opening, a spring biased push button carried by the body member and extending outwardly through the central opening of said spacing washer at the flanged end of said body member, and a separate bezel of thin stock disposed at the outer surface of said spacing washer and spun over the edge thereof and the edge of said flange for holding the spacing washer in position and embracing the push button to and limit its movement outwardly of the body member.

13. A push button switch as defined in claim 12 in which said bezel is provided with indented characters and said spacing member is provided with a recessed part to receive the indented portions of the bezel.

14. A push button switch as defined in claim 12 in which said bezel is provided with indented characters and said spacing member is interrupted to provide a portion receiving the bezel indentations, and locating means on said flange and spacing member for determining the position of the latter.

15. A push button switch comprising a body member having an open end and provided with a radially outwardly extending flange at that end, there being one or more openings formed in said flange, one or more spring arms fastened to said body member and having ends extending into said openings, a push button carried on the body member and having a reduced portion adapted

to be disposed exteriorly of the body member and a radially outwardly flanged portion adapted to be disposed within said body member, and a bezel having a central opening receiving the reduced portion of said push button and adapted to be engaged by the flange of the latter for limiting the outward movement of the push button relative to the body member, the rim section of said bezel being spun over the edge of the flange on the body member so as to hold both the bezel and the push button in position, said rim section of the bezel adjacent said openings serving as means limiting the outward movement of said spring arms relative to the body member.

16. A switch adapted to be mounted in an opening in a panel, comprising a hollow switch case, an insulating terminal block at one end, a terminal mounted thereon, a contact disposed on the inside of said switch case, rivet means fastening said contact, said terminal block and said terminal in position on said switch case, a push button extending outwardly from said switch case at the other end, a contact member movable with said push button and having a plurality of prongs, certain of the latter being arranged to have sliding contact with said switch case and others being arranged in a position to engage said contact when the push button is depressed, an insulating washer disposed against said contact member, and a spring engaging the head of said rivet at one end and bearing against said insulating washer at the other end and held in place thereby, said spring serving to keep said contact member out of engagement with said contact unless the push button is depressed.

17. A switch comprising a switch case, a contact carried at one end thereof in insulated relation and comprising a cup-like part having an outwardly flaring flange, and a movable contact cooperating therewith and comprising a member having a first spring arm bearing outwardly against the side of the switch case and second spring arm adapted to engage the flaring flange of said part with a wiping action and increasing contact pressure as said movable contact is moved inwardly of the switch case.

18. A switch as defined in claim 17 further characterized by said spring arms being in diametrically opposed relation, and spring means disposed between said cup-like part and said movable contact for holding the second arm thereof out of engagement with said part.

19. A switch as defined in claim 17 further characterized by said part having a plurality of spring arms engaging the switch case, a spring disposed between said cup-like part and said movable contact for holding the latter out of engagement with said cup-like part, and a push button loosely receiving said contact member for moving the same into engagement with said insulated contact with said plurality of arms engaging the switch case and guiding the movement of said movable contact member.

20. A switch as defined in claim 17 further characterized by a push button movably mounted in the switch case, means carried by the latter for limiting the outward movement of the push button, and a spring disposed between said cup-like part and said movable contact for holding the latter against said push button and the push button against said limiting means with the movable contact out of engagement with said part.