

Oct. 14, 1941.

W. M. FOSTER

2,259,304

PUSH BUTTON SWITCH

Original Filed Feb. 3, 1938

Fig. 1.

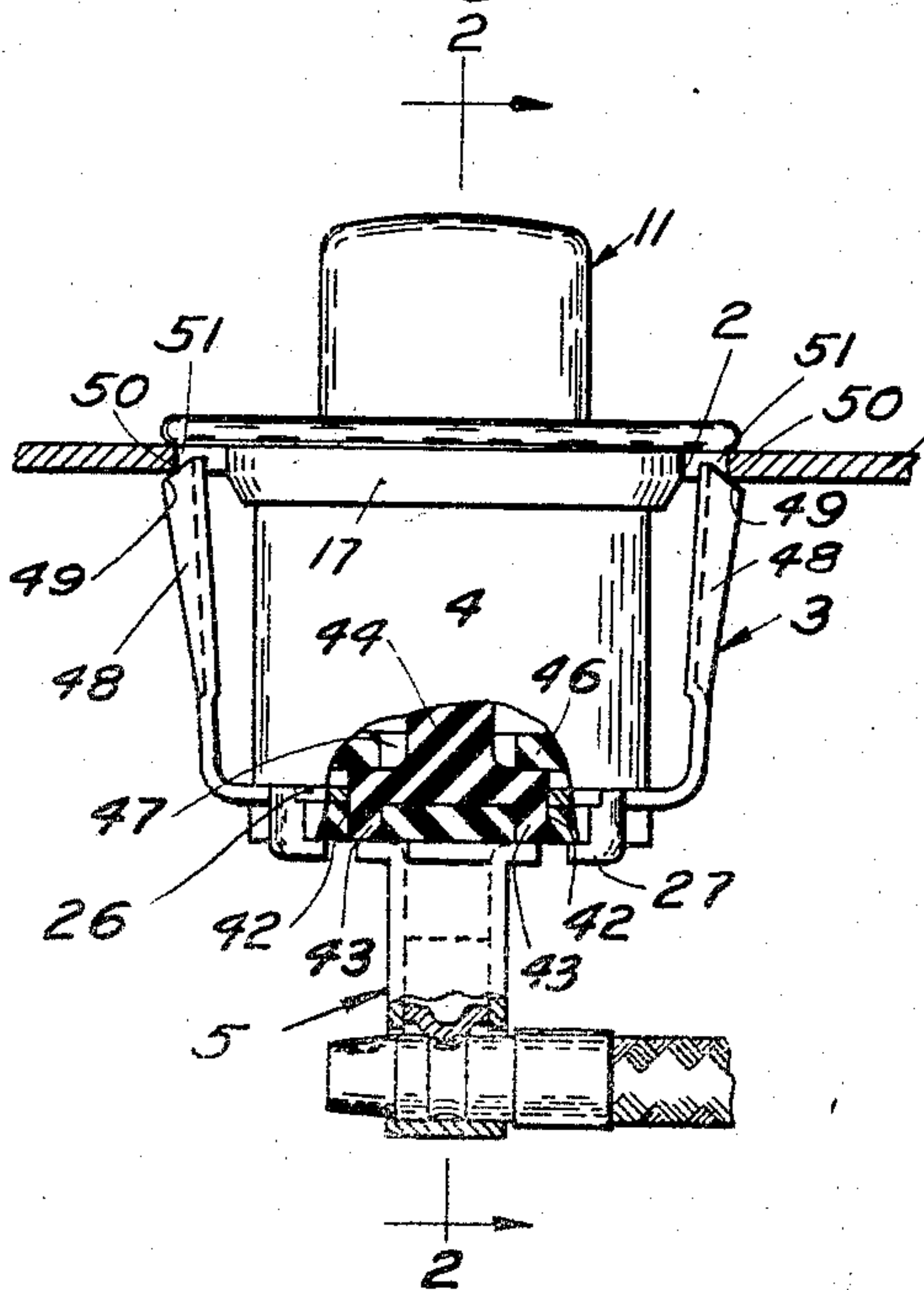


Fig. 2.

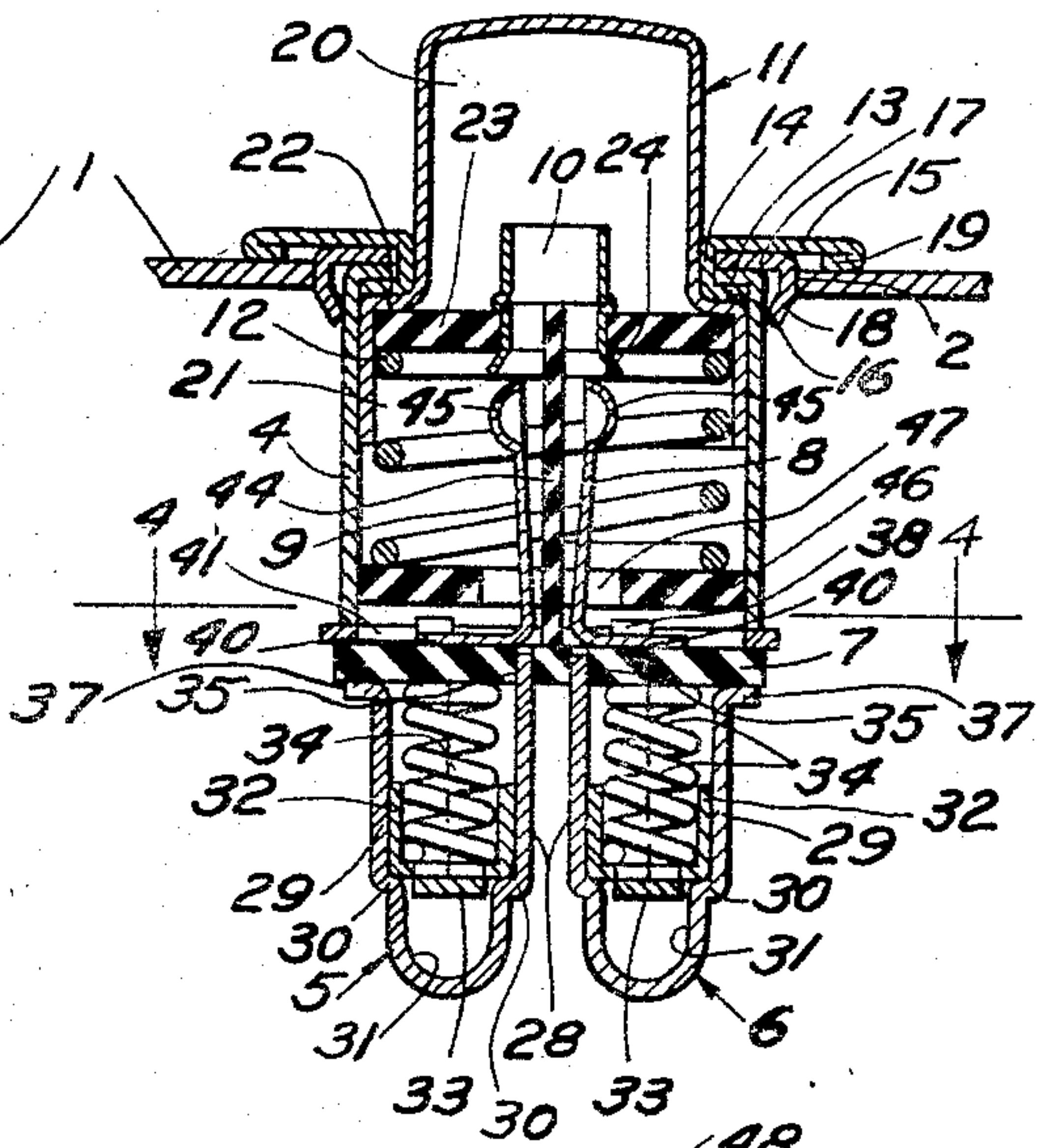


Fig. 3.

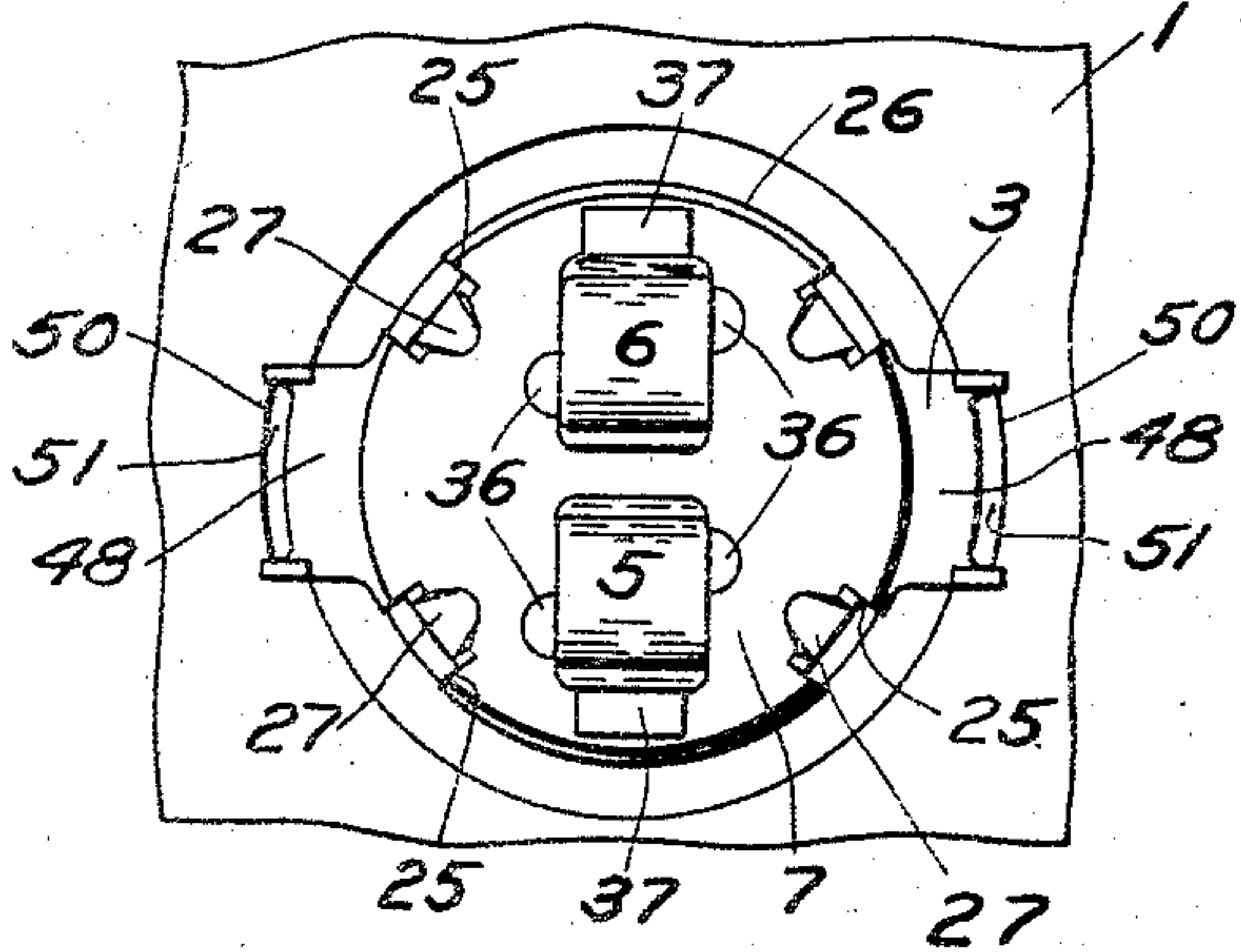
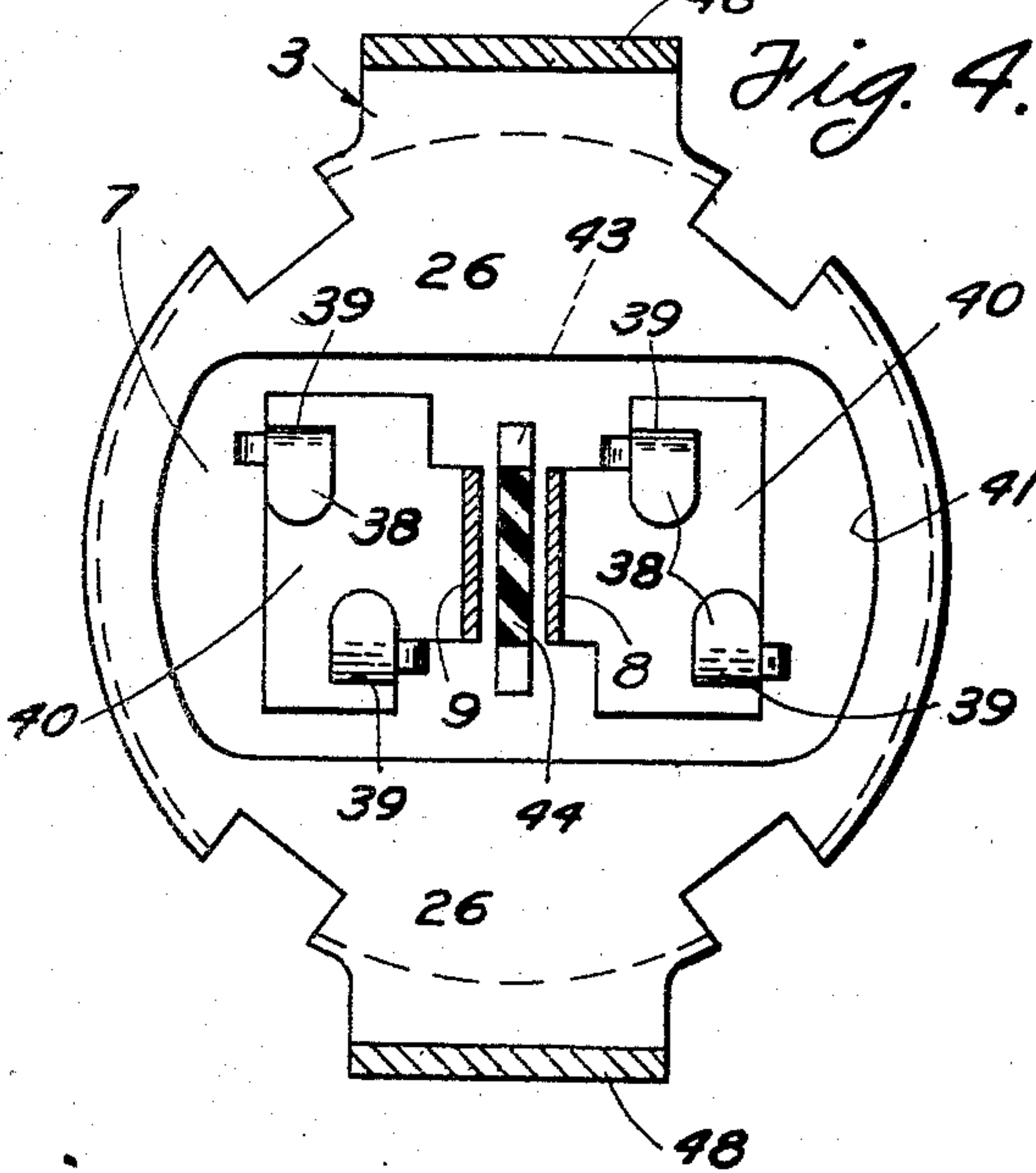


Fig. 4.



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UNITED STATES PATENT OFFICE

2,259,304

PUSH BUTTON SWITCH

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Continuation of application Serial No. 188,445,
February 3, 1938. This application March 10,
1941, Serial No. 382,612

13 Claims. (Cl. 200—159)

This invention relates generally to switches, and particularly to a switch that is operable by a reciprocating member, and preferably adapted for use in connection with automotive vehicles for closing a circuit to start the motor.

This application is a continuation of application Serial No. 158,445, filed February 3, 1938.

One principal object of the invention is to design and construct a switch that may be economically manufactured, and assembled on a commercial scale.

Another object is to provide a pair of elongated spring contacts secured to a switch back, an insulator secured to the back and extending between the contacts, and a bridge member receiving part of the insulator whereby to assist in guiding the bridge member into effective electrical engagement with said contacts.

Another object of the invention is to provide an arrangement set forth in the preceding paragraph, and including a washer of insulating material and a spring for urging the washer in a direction to hold the insulator in relation to the switch back and the bridge member normally out of engagement with said contacts. Said washer also serves to prevent any possible short circuit that might otherwise occur between the spring and the base portions of said contacts.

A further object is to provide improved bridge means which is adapted to electrically engage the contacts carried by the switch back.

Many other objects and advantages of the invention will be obvious to those skilled in the art after reading the description hereinafter set forth in conjunction with the drawing annexed hereto.

In the accompanying drawing:

Figure 1 is an enlarged view in elevation, partly in section, of the switch as applied to a mounting such as an instrument panel, and including a plug conductor terminal;

Figure 2 is a section taken substantially on line 2—2 of Figure 1, with the terminal shown in Figure 1 omitted;

Figure 3 is a bottom view of the switch with the terminal omitted; and

Figure 4 is an enlarged sectional view taken substantially on line 4—4 of Figure 2, clearly showing certain details, and particularly the manner in which the elongated spring contacts and the plug conductor receiving means are secured together and to the switch back.

Referring to the drawing, 1 represents a mounting such as the instrument panel of an automotive vehicle. The panel is provided with a circular aperture 2 through which the switch

is adapted to be inserted from the front side of the panel. The switch may be held in relation to the panel by the locking means generally designated 3, the details of which will be described later.

The switch, in general, includes a cylindrical tubular metal casing 4, a pair of plug conductor terminal receiving means generally designated 5 and 6 which are secured to a switch back 7. The switch among other things, includes a pair of elongated outstanding spring contact fingers 8 and 9, which are permanently secured to the contact means 5 and 6, as well as, to the switch back 7. A bridge member 10 is adapted to be moved into effective electrical engagement with the spring contacts 8 and 9 through the agency of a push button 11, and a helical spring 12 within the casing is adapted to normally maintain the bridge member 10 out of electrical engagement with said contacts. In other words, the spring 12 normally maintains the push button 11 in an extended position, and automatically returns said button to said position subsequent to each in-stroke thereof.

The forward end extremity 13 of the casing 4 is provided with an opening, and the tubular portion 14 of an outer flange 15 projects through said opening, and the integral radial portion 16 of the flange is adapted to project within the casing and engage the extremity 13. A bushing 17 is arranged between the flange 15 and extremity 13, as clearly shown in Figure 2. Obviously, the bushing 17 is provided with an opening of substantially the same diameter as the opening in the extremity 13 of the switch casing in order that the tubular portion 14 of the flange 15 may project therethrough. The bushing is of a diameter or size whereby the same fits snugly within the aperture 2 provided in the panel, and said bushing is preferably tapered as indicated at 18, in order to assist in piloting the switch into position. In order that the flange 15 will bear uniformly against the front face of the panel 1, the flange is provided with an inturned portion 19.

The push button 11 may be of any desirable design and constructed of any suitable material, but as here shown, it is preferably constructed of metal, pressed into the form shown, which includes an outwardly extending tubular cylindrical extremity 20, and an enlarged tubular cylindrical extremity 21 of a greater diameter than 20. These extremities are joined together by a shoulder 22. The extremities 20 and 21 of the button are thus properly guided by the tubular portion 14 of the flange 15, and the casing 4

respectively, and outward movement of the push button is predetermined, by the shoulder engaging the radial portion 16 of said flange.

A bridge carrier 23 in the form of a disc of insulating material is mounted within the extremity 21 of the push button and normally engages the shoulder 22 to force the button outwardly through the agency of spring 12, and also guide the bridge into relation with the contacts. The bridge member 10 is secured within a central opening provided therefor in the bridge carrier. Said bridge member is preferably tubular in form, and the extremities thereof extend beyond the plane of the carrier 23. Its lower extremity is flared as indicated at 24 in order to properly receive the spring contacts 8 and 9.

The switch back 7 is made of a suitable insulating material, and is provided with a plurality of peripheral notches 25 preferably four in number, and the flat base 26 of the locking means 3 is also preferably provided with four peripheral notches, which cooperate with notches 25. The casing 4 has a plurality of fingers 27 which project through these notches, and are clinched over against the lower face of the switch back, as clearly shown in Figures 1 and 3. The base 26 of the locking means 3 is thus held between the end of the switch casing and the switch back. It is to be noted that the diameter of the switch back and the base portion of the locking means is less than the diameter of the bushing 18.

Each of the plug conductor terminal receiving means, generally designated 5 and 6 is preferably constructed from a strip of sheet metal which is folded to provide substantially two channel portions 28 and 29, which, when brought together, form a tubular body substantially rectangular in cross-section. Each body has shoulders 30, and a reduced outer extremity 31 which is formed to receive a plug conductor terminal of the snap type shown in Figure 1. A detent means 32 is slidably arranged within each body in abutting relation to the shoulders 30. One end of each detent means is preferably provided with a struck out portion 33, which is adapted to project into the terminal receiving aperture formed by the reduced extremity 31, and cooperate with the groove formed in the terminal. A helical spring 34 is arranged in each body, with one end engaging the switch back and the other end received by the detent means 32 whereby to normally maintain each detent in the position shown.

Each of the terminal receiving means 5 and 6 may be secured in any suitable manner to the switch back 7, but as here shown, the channel portion 28 of each contact means is provided with a continuation 35 that is adapted to project into a hole provided therefor in the switch back as clearly shown in Figure 2. Each of the channel portions 28 and 29 has an outwardly extending foot 36 that is adapted to bear against the outer face of the switch back, and each of the channel portions 29 has an additional foot 37 that engages said surface, all of which is clearly shown in Figures 1, 2, and 3. Each of the channel portions 28 and 29 is further provided with an elongated integral projection 38, which extends through an aperture provided therefor in the switch back and through a notch 39, provided in the base 40 of each of the spring contacts 8 and 9, and is clinched over upon said base. It is to be noted that each body has three feet extending outwardly from three sides thereof at desirable points. By this arrangement, the receiving means 5 and 6 are firmly anchored in an erect

position with respect to the switch back, and are mechanically and electrically connected to the base 40 of each of the spring contacts 8 and 9. The base portion 26 of the locking means 3 is preferably provided with a relatively large substantially rectangular aperture 41 in order that the base will not engage said contacts to effectuate a short circuit.

As most clearly shown in Figure 1, the switch back is provided with a pair of spaced apart apertures 42, which receive the legs 43 of an elongated insulator 44. The lower extremity of the insulator is preferably of a size whereby a portion thereof projects above the plane of the base 26 of the locking means 3, and as clearly shown in Figures 2 and 4, extends upwardly between the spring contact members 8 and 9, with its upper extremity normally located within the tubular bridge member 10. The insulator is of a width to prevent the contacts 8 and 9 from engaging each other, and the upper extremity of the insulator functions to pilot the bridge member into position whereby to engage the offset contact portions 45 formed on the spring contacts, and since the bridge member 10 is flared as indicated at 24, there is no likelihood that the spring contacts 8 and 9 will be damaged in any way when the bridge member is pressed into electrical engagement with said contacts.

The insulator is loosely mounted in the switch back 7, and in order to maintain the insulator 44 in an erect position between the contacts, a disc of insulating material 46 is preferably located within the casing, and the enlarged helical spring 12 is adapted to force the disc 46 against that portion of the lower extremity of the actuator that projects above the base 26 of the locking means. The spring contacts 8 and 9, including the insulator project through an opening 47, provided in the disc.

Any suitable locking means may be employed whereby to hold the switch in relation to the instrument panel, but as here shown, the locking means 3 is preferably constructed as shown, and is comprised of the base 26, and a pair of integral resilient arms 48, which are provided with cam portions 49, that cooperate with the arrises 50 of the notches 51 formed in the panel to prevent rotation of the switch. By this arrangement, the arms 48, are pressed toward the switch casing when the switch is being inserted into the aperture 2 of the instrument panel, and when it is moved to a position whereby the flange 15 engages the outer face of the instrument panel, the spring arms snap outwardly to the position most clearly shown in Figure 1, and hold the switch in place.

Having thus described my invention, it is obvious that various modifications may be made in the same without departing from the spirit of the invention; and, therefore, I do not wish to be understood as limiting myself to the exact form, construction, arrangement, and combination of parts, herein shown and described. Moreover, it is to be understood that the term "switch back" is not only directed to a contact carrier which closes off the open end of a switch casing, but also applies to any form of contact carrier. In order to make this perfectly clear the open end of the switch casing may be closed by a metal closure member and the closure member may be provided with an aperture of a size to receive a piece of insulation to which is secured contacts adapted to be engaged by a bridge means associated with the switching mechanism.

I claim:

1. A switch back, contacts secured to and extending from said back, an upstanding insulator loosely mounted on said back between said contacts, a substantially flat insulator engaging said upstanding insulator and resilient means engaging said flat insulator for pressing and holding said upstanding insulator in relation to said back.

2. A switch including in combination, a casing, a carrier of insulating material secured to said casing, contact means adapted to have conductors secured thereto mounted on said carrier and provided with spaced apart resilient portions projecting into said casing, an insulator loosely mounted on said carrier and extending between and beyond the free ends of said resilient portions, a push button carried by the forward extremity of said casing, a bridge carrier mounted within said push button, a bridge member carried by said bridge carrier, a washer of insulating material arranged in the opposite extremity of said casing, a spring abutting said bridge carrier and said washer whereby to normally maintain said push button in an extended position with said bridge member normally out of engagement with said resilient portions and functioning to hold said insulator in relation to said contact carrier.

3. A switch back provided with a plurality of spaced apart contacts, apertures provided in said switch back, an upstanding insulator mounted on said back between said contacts and provided with portions cooperating with said apertures, a substantially flat insulator engaging said upstanding insulator, and means including a spring engaging said flat insulator whereby to press and hold said upstanding insulator in relation to said switch back.

4. A contact carrier for a switch provided with a plurality of spaced apart contacts, an upstanding insulator loosely mounted on said mounting carrier between said contacts, a substantially flat insulator engaging said upstanding insulator and means including a spring for pressing and holding said upstanding insulator in relation to said carrier.

5. A switch including in combination, a casing, a carrier of insulating material secured to said casing, contact means adapted to have conductors secured thereto mounted on said carrier and provided with spaced apart resilient portions projecting into said casing, an insulator loosely mounted on said carrier and extending between and beyond the free ends of said resilient portions, a push button carried by the forward extremity of said casing, a bridge carrier mounted on said push button, a bridge member carried by said bridge carrier and receiving a portion of said insulator, and a spring abutting said bridge carrier and arranged to normally maintain said push button in an extended position with said bridge member normally out of engagement with said resilient portions and also functioning to hold said insulator in relation to said contact carrier.

6. A switch including in combination, a casing, a carrier of insulating material secured to said casing, contact means adapted to have conductors secured thereto mounted on said carrier and provided with spaced apart resilient portions projecting into said casing, an insulator loosely mounted on said carrier and extending between and beyond the free ends of said resilient portions, a bridge carrier arranged in said casing, a bridge member mounted on said bridge carrier and receiving a portion of said insulator, and a

spring arranged within said casing functioning to normally maintain said bridge member out of engagement with said resilient portions and to hold said insulator in relation to said contact carrier.

7. A switch including in combination, a casing, a carrier of insulating material secured to said casing, contact means adapted to have conductors secured thereto mounted on said carrier and provided with spaced apart resilient portions projecting into said casing, an insulator loosely mounted on said carrier and extending between and beyond the free ends of said resilient portions, a push button carried by the forward extremity of said casing, a bridge carrier mounted on said push button, a bridge member carried by said bridge carrier, a compressed spring abutting said bridge carrier whereby to normally maintain said push button in an extended position with said bridge member normally out of engagement with said resilient portions and functioning to hold said insulator in relation to said contact carrier.

8. A switch including in combination, a casing, a carrier of insulating material secured to said casing, contact means adapted to have conductors secured thereto mounted on said carrier and provided with spaced apart resilient portions projecting into said casing, an insulator loosely mounted on said carrier and extending between and beyond the free ends of said resilient portions, a push button carried by the forward extremity of said casing, a bridge carrier mounted on said push button, a bridge member carried by said bridge carrier and receiving a portion of said insulator, and a spring abutting said bridge carrier and arranged to normally maintain said push button in an extended position with said bridge member in a predetermined position with respect to said contact portions and hold said insulator in relation to said contact carrier.

9. A switch including in combination, a casing, a carrier of insulating material secured to said casing, contact means adapted to have conductors secured thereto mounted on said carrier and provided with spaced apart resilient portions projecting into said casing, an insulator mounted on said carrier and extending between and beyond the free ends of said resilient portions, a push button carried by the forward extremity of said casing, a bridge carrier mounted on said push button, a tubular bridge member carried by said bridge carrier and receiving a portion of said insulator, and a spring abutting said bridge carrier and arranged to normally maintain said push button in an extended position with said bridge member normally out of engagement with said resilient portions.

10. A switch including in combination, a casing, a carrier of insulating material secured to said casing, contact means adapted to have conductors secured thereto mounted on said carrier and provided with spaced apart resilient portions projecting into said casing, an insulator loosely mounted on said carrier and extending between and beyond the free ends of said resilient portions, a bridge carrier arranged in said casing, a tubular bridge member mounted on said bridge carrier and receiving a portion of said insulator, and a spring arranged within said casing functioning to normally maintain said bridge member in a predetermined relation with respect to said resilient portions and hold said insulator in relation to said contact carrier.

11. An electric switch including, a tubular casing, a carrier carrying contacts secured to one

end of said casing, insulating means arranged in said casing over said contacts, operating means supporting a carrier carrying a tubular bridge member, said carrier being arranged transverse to the longitudinal axis of the casing to position the axis of the bridge member in alignment with said longitudinal axis, and resilient means engaging said insulating means to prevent electrical engagement between said resilient means and said contacts.

12. An electric switch including, a tubular casing, a carrier carrying contacts secured to one end of said casing, insulating means arranged in said casing over said contacts, operating means supporting a carrier carrying a tubular bridge member, said carrier being arranged transverse to the longitudinal axis of the casing to position the axis of the bridge member in alignment with said longitudinal axis, and resilient means engaging said insulating means to prevent electrical engagement between said resilient means and said contacts, said resilient means also acting to press said operating means outwardly to pre-

termine the position of the bridge with respect to said contacts.

13. A mounting plate, a tubular casing secured to said plate with a portion of the plate extending into the casing to provide an abutment, a carrier carrying contacts secured to one end of said casing, insulating means arranged in said casing over said contacts, operating means projecting through the other end of said casing, said operating means having an enlargement supporting a carrier carrying a tubular bridge member, said carrier being arranged transverse to the longitudinal axis of the casing to position the axis of the bridge member in alignment with said longitudinal axis, and resilient means engaging said insulating means to prevent electrical engagement between said resilient means and said contacts, said resilient means also functioning to press said operating means outwardly whereby the enlargement thereof engages the abutment from that part of the mounting plate disposed in the casing to predetermine the position of the bridge with respect to said contacts.

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