

July 29, 1924.

1,502,785

T. J. KERWIN

PUSHBUTTON SWITCH

Filed Dec. 2, 1921

2 Sheets-Sheet 1

Fig. 1.

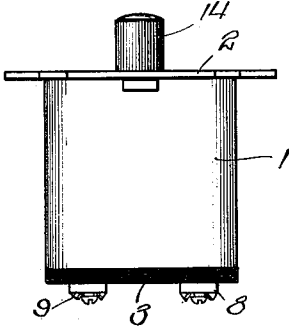


Fig. 3.

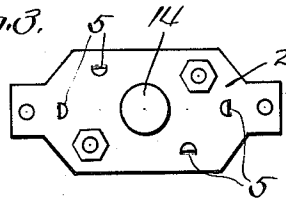


Fig. 2.

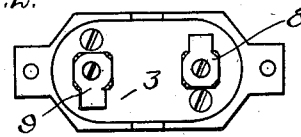


Fig. 4.

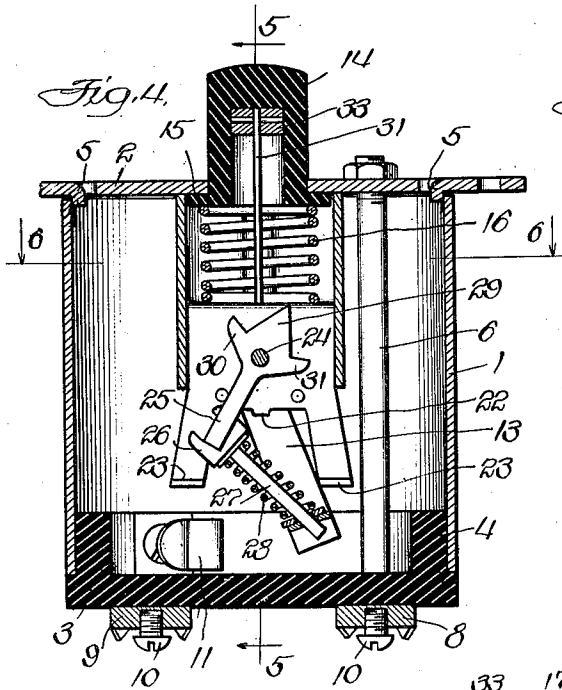


Fig. 5.

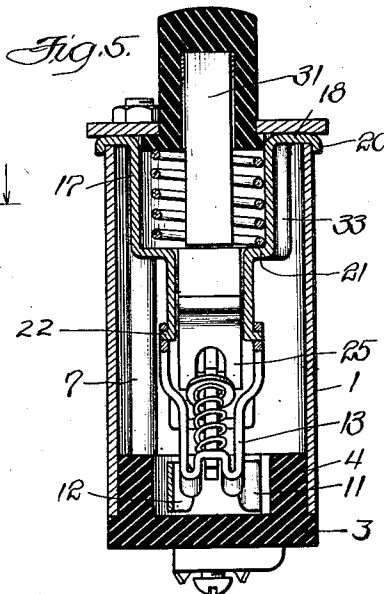
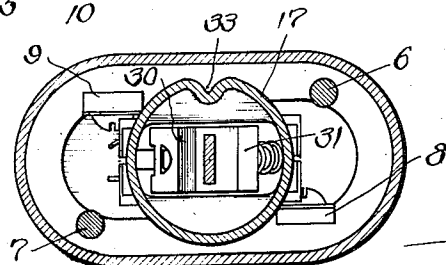


Fig. 6.



Witness:
W. K. Olson

Inventor:
Thomas J. Kerwin
By Albert Schick, atty.

July 29, 1924.

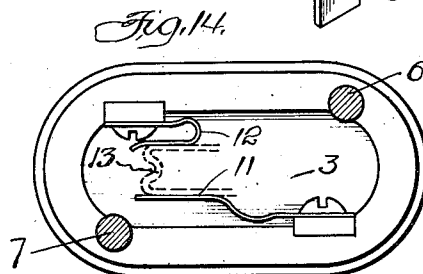
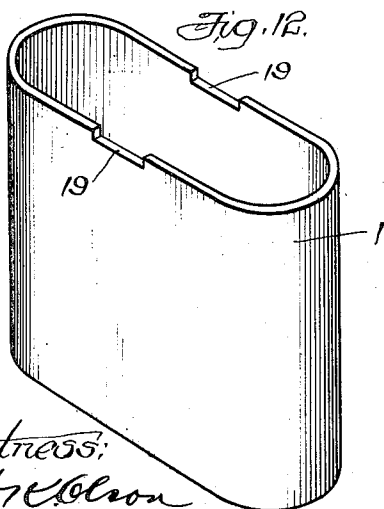
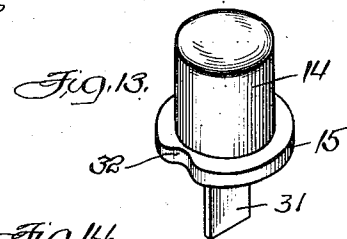
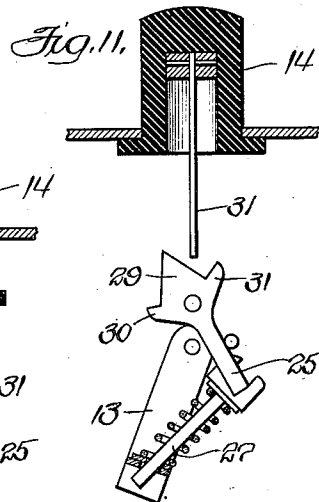
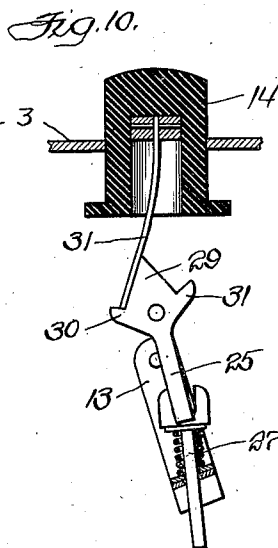
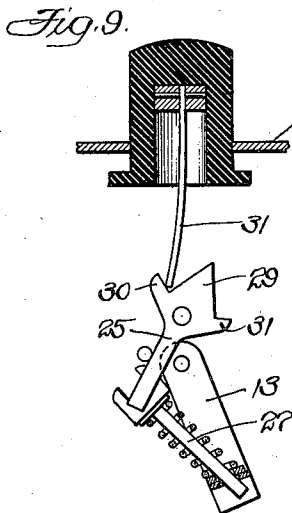
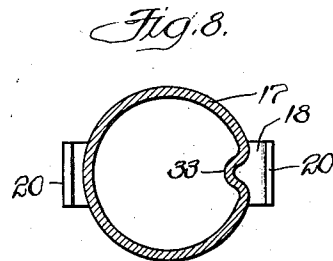
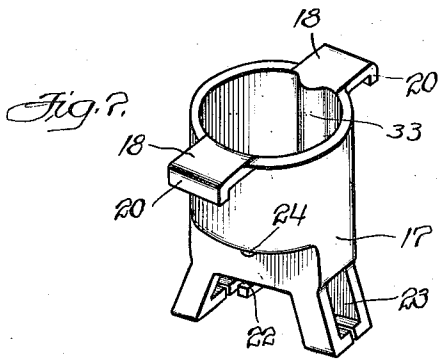
1,502,785

T. J. KERWIN

PUSHBUTTON SWITCH

Filed Dec. 2, 1921

2 Sheets-Sheet 2



Witness:
W. E. Olson

Inventor:
Thomas J. Kerwin
By Albert Scheidt, atty.

UNITED STATES PATENT OFFICE.

THOMAS J. KERWIN, OF CHICAGO, ILLINOIS, ASSIGNOR TO EDMUNDS & JONES CORPORATION, A CORPORATION OF NEW YORK.

PUSHBUTTON SWITCH.

Application filed December 2, 1921. Serial No. 519,543.

To all whom it may concern:

Be it known that I, THOMAS J. KERWIN, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Pushbutton Switch; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an electric switch of the general class which employs a single spring-returned pushbutton for alternately moving the switch to its on and its off positions upon consecutive movements of the pushbutton against the pressure of a spring which holds this button yieldingly in its normal position. Switches of this general class have heretofore been constructed with a switching lever operatively connected to an actuating lever through a link which affords a toggle joint connection, and with spring means for automatically effecting the desired movement of the switching lever whenever the operating lever has been rocked sufficiently to throw the connection between it and the link past given center lines.

My present invention employs a switching mechanism of this general type and aims to provide unusually simple, effective, cheaply constructed and easily assembled means for supporting the switching mechanism and for imparting movement to the same from the pushbutton. More particularly, it aims to provide a simple mounting for the parts thus operatively associated with each other, and aims to provide simple means for securing an operative element to the pushbutton and for maintaining this element normally in a predetermined plane. It also aims to provide simple means for supporting such an operative assembly within a switch casing and for resisting the thrust of the spring which returns the pushbutton to its normal position. Furthermore, it aims to provide simple means for preventing the casing of the switch from rotating, as well as simple means for pivoting the switching lever and for limiting the movement thereof in both directions.

More particularly, my invention aims to provide a simple and cheaply constructed supporting member or mechanism carrier

which will readily afford the pivotal support for both the switching lever and the actuating lever, which will provide the needed stops for limiting the moving of the switching member in both directions, which will provide suitable formations for resisting the thrust of the spring employed for returning the pushbutton to its normal position. It also aims to provide such a mechanism carrier with suitable formations whereby it can readily be supported from the switch casing and whereby it will automatically be held in effective position by the mere assembling of the parts of the switch casing, without requiring any auxiliary fastening elements for this purpose. Still further and also more detailed objects will appear from the following specification and from the accompanying drawings, in which

Fig. 1 is a front elevation of a pushbutton switch embodying my invention.

Fig. 2 is a rear view of the same.

Fig. 3 is an enlarged front view of the switch.

Fig. 4 is an enlarged central and longitudinal section through the switch taken along its longer axis and Fig. 5 is a similarly enlarged central and longitudinal section taken transversely of Fig. 4.

Fig. 6 is an enlarged and rearward transverse section taken from the correspondingly numbered line in Fig. 4.

Fig. 7 is a perspective view of the mechanism carrier which carries the switching mechanism and the button returning spring.

Fig. 8 is a transverse section through this mechanism carrier taken from below the projecting gears 18 and looking upwards.

Fig. 9 is a fragmentary view showing the position of the pushbutton and the switch actuating lever when the button has been depressed to the point at which it will begin to move the lever from the position shown in Fig. 4.

Fig. 10 is a similar view showing these parts when the pushbutton has reached the limit of its downward movement and has thrown the forward end of the actuating lever past the axis of the pushbutton.

Fig. 11 is a view of the same parts after the pressure on the pushbutton has been released and the button has been returned to its normal position by the retracting spring, while the actuating lever has been swung to

its extreme position opposite that of Fig. 4.

Fig. 12 is a perspective view of the metal shell of the switch casing, showing the notches which afford seats for the ears of the mechanism carrier of Fig. 7.

Fig. 13 is a perspective view of the pushbutton and of the resilient actuating element fastened to this button.

Fig. 14 is a front elevation of the rear casing head with the circuit terminals attached thereto.

In the embodiment of the drawings, the switch of my invention includes a casing having a tubular shell 1 interposed between a front plate 2 (which is desirably of metal) and a rear head 3 of insulating material. The shell 1 is desirably of elongated transverse section and the rear head 3 desirably has a forwardly directed annular flange 4 fitting into the rear end of the shell so as to prevent both rotational and lateral movement of this head with respect to the shell, while the forward head 2 desirably has a number of ears 5 formed from it and directed rearwardly so as to engage the bore of the shell at various points spaced circumferentially of the shell for preventing lateral movement of the head 2 with respect to the shell. The two heads are connected to each other by a pair of bolts 6 and 7 which cooperate with the flange 4 and the ears 5 in holding both the front plate and the rear head interlocked with the shell of the casing.

On the insulating head 3 I mount a pair of circuit terminals 8 and 9, each of which desirably has a portion extending through the head proper into the interior of the annular flange 4 and each of which also has an outer portion threaded for receiving a binding screw 10 adapted to clamp one wire of the circuit to the adjacent circuit terminal. Each of the circuit terminal portions projecting into the bore of the annular channel 4 has a resilient contact strip fastened to it, thus providing contacts 11 and 12 each connected to one terminal of the circuit and adapted to have the circuit closed through them when a switching lever 13 is interposed between them as shown in dotted lines in Fig. 14.

The front plate or head 2 is provided with a central aperture through which a button 14 slidably projects, this button having a flange 15 disposed within the casing of the switch and adapted to limit the outward sliding movement of the button and being continuously urged outwardly by a compression spring 16 disposed within the casing.

To support this spring as well as the switching lever 13 and the operating connections between this lever and the push button, I employ a mechanism carrier which desirably may be formed from a single piece of tubing or sheet material. This mechanism carrier desirably consists of a tube 17

equipped at its forward end with a pair of oppositely and outwardly directed ears 18, each of which ears is adapted to seat upon the upper face of a notch 19 in one side of the shell 1 of the casing, and each of which ears terminates in a rearwardly directed finger 20 which normally overhangs the outer face of the said shell. These ears 18 fit sidewise into the notches 19, so that the side walls of these notches prevent movement of the ears with respect to the shell in the direction of the longer axis of the end of the shell, while the ears are spaced from each other by the width of the shell in the opposite direction and hence cooperate in preventing a movement of the mechanism carrier in that direction. Moreover, the ears 18 are desirably slightly thicker than the depth of each of the notches 19, so that they are clamped between the shell 1 and the front plate 2 by the action of the bolts 6 and 7, thereby holding the mechanism carrier rigidly in its proper position.

Intermediate of its ends, this mechanism carrier is contracted to afford a shoulder 21 forming a seat for the spring 16 which continuously urges the pushbutton outwardly, and the mechanism carrier also has integral with it a pair of oppositely directed pivot fingers 22 which afford pivots for the free ends of the substantially U-shaped switching lever 13. The mechanism carrier also has at its rear end a pair of portions adapted to act as stops for this switching lever, these stop portions being desirably in the form of a pair of stirrups 23 formed integral with the supporting member and spaced from each other transversely of the axis of the latter. Forwardly of the pivot fingers 22, the supporting member is provided with a pair of opposite perforations affording bearings for a shaft 24 which forms the pivot for the actuating lever of the switch. This lever comprises an arm 25 which desirably is slightly narrower in width than the distance between the opposite sides of the laterally contracted portion of the supporting member which extends rearwardly of the shoulder 21 and desirably has its rear end formed into a loop straddled by a fork 26 on a link 27 which extends slidably through a bore in the bight of the switching member 13 and which cooperates with the rocking lever in affording a toggle connection between the switching member and the shaft 24. The link 27 extends through a compression spring 28 which continuously tends to slide the forked head 26 of the link away from the bight of the switching member and therefore tends to maintain the rocking lever either in the position of Fig. 4 or in the oppositely directed position of Fig. 11.

At its forward end the rocking lever is equipped with a wedge-shaped tip 29 which extends in axial alinement with the arm 25

of the lever, and is also equipped with a pair of stop arms 30 and 31 projecting in opposite directions from the base of the wedge 29.

To move the rocking lever, I provide a pushbutton and a thrust member 31 fastened at its upper end to this button, and desirably employ for this latter purpose a strip of resilient metal pinned into a plug 33 which in turn is cemented into the upper end of the hollow pushbutton as shown in Fig. 4 and in Figs. 9 to 11 inclusive. This thrust strip 31 normally extends in straight alignment with the common axis of the pushbutton and switch casing and in radial alignment with the axis of the rock shaft 24, while the tip of the wedge 29 is normally disposed considerably to one side of this axis, and one or the other of the stop arms 30 and 31 is disposed considerably to the other side of the same axis. However, the plane of the thrust strip 31 is substantially radial of the rock shaft 24, so that the rear end of this thrust strip will strike the edge of the wedge 29 substantially flatwise when the pushbutton 14 is moved against the pressure of the retracting spring 16. When the button is thus moved, the inclination of the edge of the wedge directed towards the free end of the thrust strip bends the resilient thrust strip after the manner of Fig. 9 so as to guide the tip of that strip into engagement with the adjacent arm 30 close to the juncture of that arm with the wedge portion of the rocking lever. Then a continuing of the rearward (or inward) movement of the pushbutton causes the thrust strip to exert its thrust on the adjacent arm of the rocking lever by rocking the lever to a position such as that of Fig. 10, in doing which it carries the connection between the rocking lever and the link 27 past the center line joining the bight of the switching lever 13 and the axis of the shaft 24. As soon as this occurs, the spring 28 which has been compressed during the said movement of the rocking lever exerts its pressure by throwing the switching lever over to a position opposite that of Fig. 4 while at the same time continuing the movement of the rocking lever to its extreme position in the new direction. Then when the pressure on the pushbutton is relaxed, the spring 16 retracts the same and raises it to the position of Fig. 11, in doing which the free end of the thrust strip snaps past the tip of the wedge 29 and is thereafter disposed for engaging the opposite face of the wedge and for exerting a thrust on the arm 31 when the pushbutton is again moved inwardly.

The successive movements of the pushbutton therefore alternately swing the switching lever from one to the other of its two oppositely inclined positions, in one of which it engages the contact strips 11 and

12, while entirely out of contact with both thereof in its other position which is the "off" position of Fig. 4. In each position, the movement of the switching lever is stopped by one of the stirrups or stop formations 23 which desirably are integral parts of the mechanism carrier.

To maintain the thrust strip 31 in the desired plane, I equip the pushbutton and the supporting member with cooperating formations for preventing the pushbutton from rotating, for which purpose I desirably provide the flange 15 of the pushbutton on one side with a recess 32 and indent the supporting member on the same side to afford an inwardly directed rib 33 extending longitudinally of the supporting member and continuously entering the notch 32.

With the parts arranged as described, it will be evident from the drawings and from the above description that the operating mechanism of the switch (with the exception of the pushbutton, the thrust member fastened to the latter, and the retracting spring 16) are all permanently carried by the mechanism carrier. Consequently, all of these parts of the mechanism can readily be assembled on this member without attaching any of the separate parts to the casing. Likewise, the circuit terminals, including the contact clips or strips 11 and 12 can readily be assembled initially on the insulating head of the casing. Then by simply slipping the spring and the flange of the pushbutton into the forward or mouth end of the mechanism carrier, interposing the arms on this carrier between the shell 1 and the front plate, and affixing the head 3 with the bolts 6 and 7, the entire switch is easily and quickly assembled with all of the parts in proper operative position and with the employment of a minimum of fastening elements.

However, while I have illustrated and described the switch of my invention in an embodiment including various highly desirable features, I do not wish to be limited to the details of the construction and arrangement thus described. Obviously, these might be varied in many ways without departing from the spirit of my invention or from the appended claims. So also, I do not wish to be limited to the employment of all of the features thus disclosed in connection with each other.

I claim as my invention:—

1. A mechanism carrier for a switch in which a pivoted lever is actuated by a slidably mounted push-button, comprising a tubular push-button guide having an integral extension formed for limiting the movement of the said lever in both directions.

2. A mechanism carrier for a switch in which a pivoted lever is actuated by a slidably mounted push-button, comprising a tu-

bular push-button guide having an integral extension formed for limiting the movement of the said lever in both directions and having ears formed thereon to afford pivots for parts of the switching mechanism.

3. A mechanism carrier for a switch in which a pivoted lever is actuated by a slidably mounted push-button, comprising a tubular push-button guide having an integral extension formed for limiting the movement of the said lever in both directions, the push-button guide being laterally contracted to afford an interior abutment for the button retracting spring.

4. A mechanism carrier for a switch in which a pivoted lever is actuated by a slidably mounted push-button, comprising a tubular push-button guide having an integral extension formed for limiting the movement of the said lever in both directions, the push-button guide being laterally contracted to afford an interior abutment for the button retracting spring, the pushbutton guide being laterally contracted to afford an interior abutment for the button retracting spring and having its other end equipped with arms for securing the carrier to the switch casing.

5. An electric switch comprising a carrier having a cylindrical portion contracted at one end and then extended to afford flat and spaced parallel extensions, a pushbutton slidable in the cylindrical portion, a resilient thrust strip carried by the pushbutton, and a throw-over switching mechanism actuated by the thrust strip and including a lever pivoted between the said parallel extensions.

6. An electric switch comprising a front plate, a pair of relatively insulated circuit terminals mounted at a distance behind the front plate, the front plate having a perforation therein, a pushbutton extending slidably through the said perforation, a carrier member fast with respect to the cover plate and having a tubular forward end alining with the said perforation and co-

operating with the latter in guiding the pushbutton, the carrier member also having a shoulder spaced further from the cover plate than the inward range of movement of the pushbutton, a spring abutting against the shoulder and continuously urging the pushbutton outwardly, and switching means mounted on the carrier member and arranged for operation by rearward movements of the pushbutton and for controlling the circuit connection between the circuit terminals.

7. An electric switch comprising a forwardly open shell having recesses at its forward end, circuit terminals carried by the shell and presenting exposed contact portions within the shell, a front secured to the shell and having a perforation, switching mechanism housed by the shell and including a switching member for electrically connecting the said contact portions and an operating member projecting through the said frontal perforation, and a carrier supporting the switching mechanism; the carrier having portions respectively extending into the said recesses and clamped between the shell and the front plate.

8. An electric switch comprising a forwardly open shell having recesses at its forward end, circuit terminals carried by the shell and presenting exposed contact portions within the shell, a front secured to the shell and having a perforation, switching mechanism housed by the shell and including a switching member for electrically connecting the said contact portions and an operating member projecting through the said frontal perforation, and a carrier supporting the switching mechanism; the carrier having portions respectively extending through the said recesses and each laterally engaging a wall of the shell.

Signed at Chicago, Illinois, November 26th, 1921.

THOMAS J. KERWIN.