Feb. 28, 1939. W. SCHMID 2,148,881

KEY CONTROLLED SWITCH

Filed Nov. 26, 1937

Fig. 1.

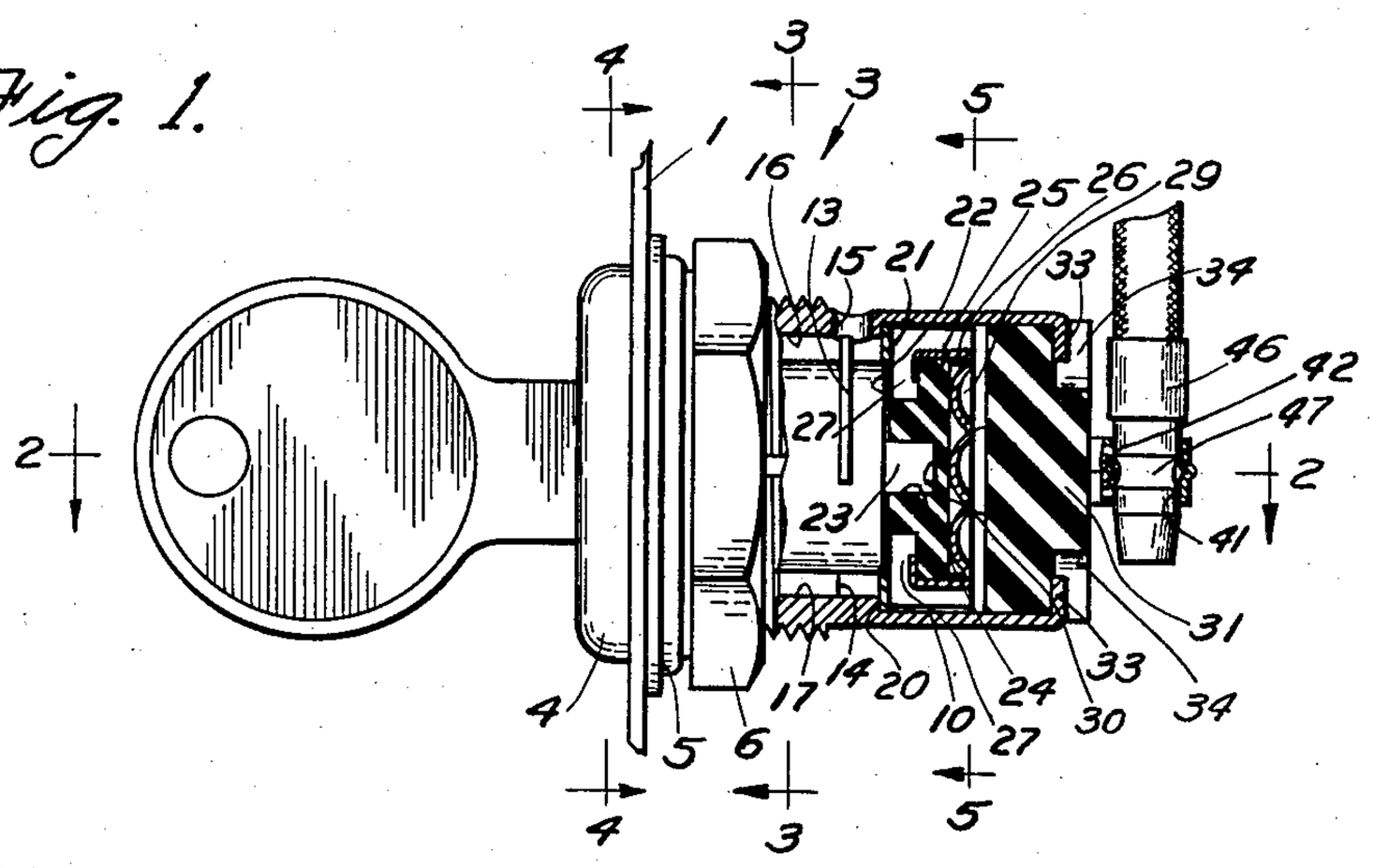


Fig. 2.

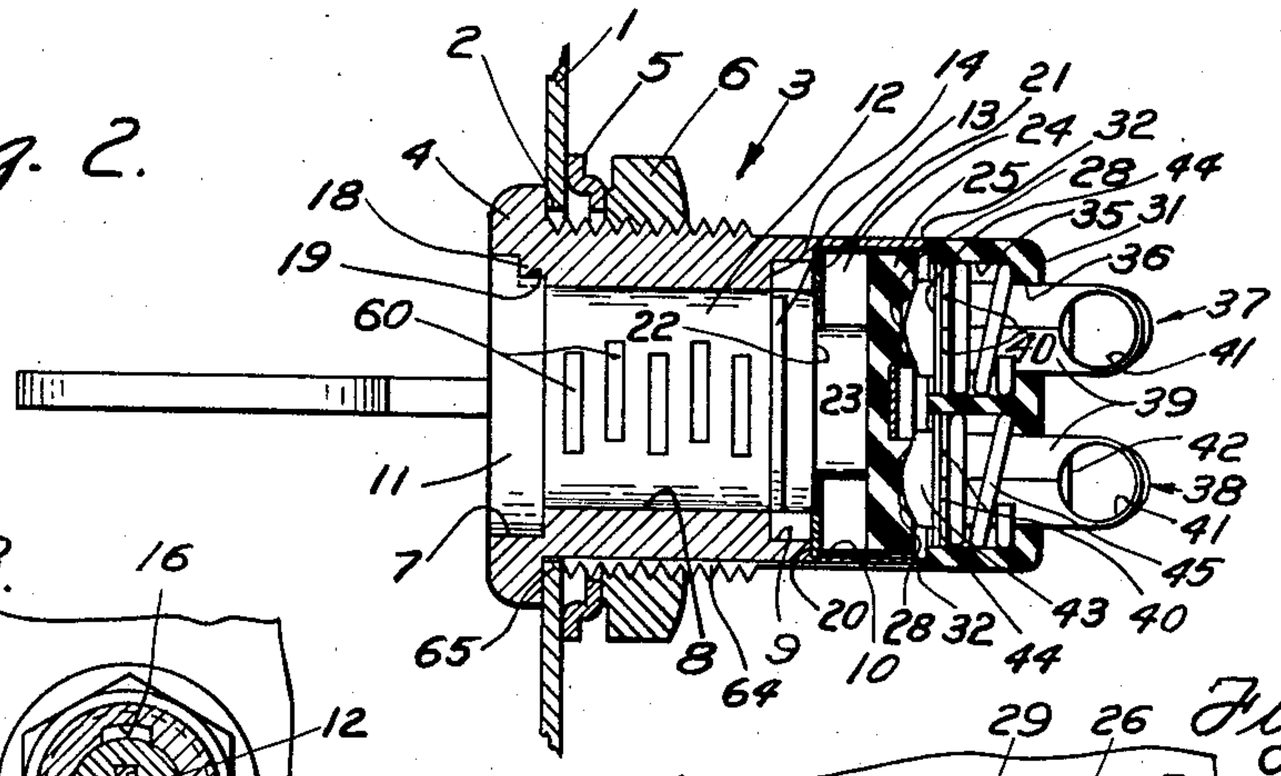


Fig. 3.

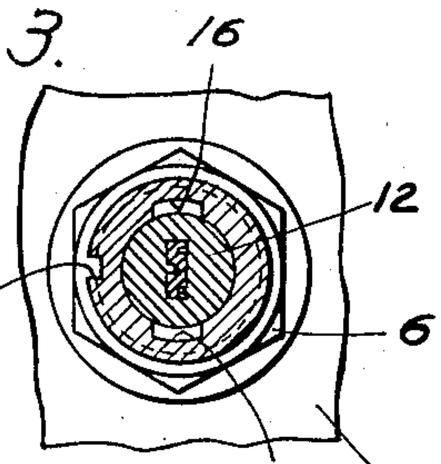


Fig. 4.

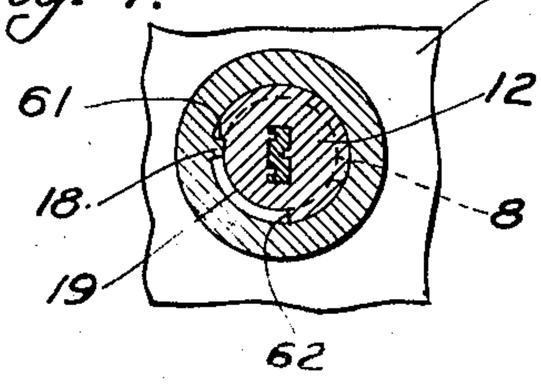
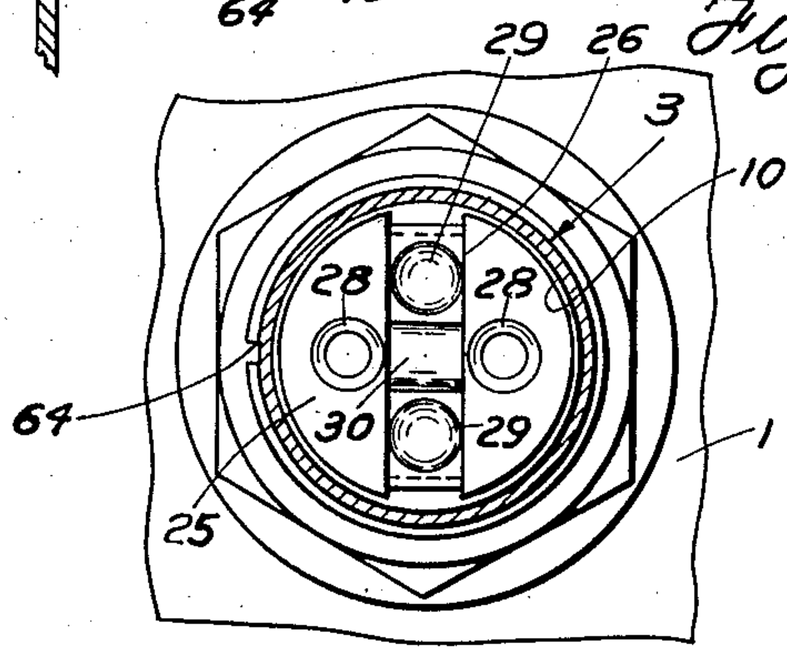


Fig. 5.



William Schmid INVENTOR.

BY

Charles S. Tenfold ATTORNEY.

Patented Feb. 28, 1939 2,148,881

UNITED STATES PATENT OFFICE

2,148,881

KEY CONTROLLED SWITCH

William Schmid, Bronson, Mich., assignor to H. A. Douglas Mfg. Co., Bronson, Mich., a corporation of Michigan

Application November 26, 1937, Serial No. 176,586

6 Claims. (Cl. 200—44)

This invention is directed generally to electric switches and particularly to ignition lock switches adapted to be mounted on an instrument panel of a vehicle.

One particular object of the invention is to design and construct a durable switch that is positive in action electrically and mechanically, and consists of very few parts that can be economically manufactured and assembled on a commercial scale.

Another object is to provide a switch including in combination, a lock cylinder, a bridge member and bridge carrier, a switch back provided with contacts having springs associated therewith, and a joint connection between the cylinder and the bridge carrier, whereby the bridge member may be moved into electrical engagement with the contacts to close an electric circuit.

A further object is to provide the bridge member and bridge carrier, each with a pair of pockets adapted to cooperate with the contacts in a manner to predetermine the on and off positions of the switch.

Other objects and advantages of the invention will readily appear after reading the description in connection with the drawing annexed hereto.

Referring to the drawing:

Figure 1 is an enlarged side view in elevation of the switch, parts of which are shown in section;

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

Figure 3 is a reduced sectional view taken substantially on line 3—3 of Figure 1;

Figure 4 is a reduced section taken substantially on line 4—4 of Figure 1, which together with Figure 3, clearly shows the means whereby the rotational movement of the lock cylinder is predetermined; and

Figure 5 is a section taken substantially on line 5—5 of Figure 1, and shows in greater detail the bridge member and carrier therefor.

Referring to the drawing wherein the principles of design and construction are clearly shown, numeral 1 represents the instrument panel of a vehicle. The panel is provided with a circular aperture 2 through which projects the switch, generally designated 3. The switch may be held in relation to the panel by any suitable means, but as here shown, the switch is preferably provided with an annular outwardly extending integral flange 4 which engages the front face of the instrument panel, and a flanged washer 5 is forced against the rear face of the panel by means of a hexagonal clamping nut 6, which cooperates with the threads provided on the exterior of the switch casing.

The switch casing is preferably cast into one piece, and the wall of the forwardly projecting extremity is rather thick as compared to its rearwardly extending extremity. The casing is provided with a plurality of holes of various diameters and depths, and as clearly shown, the flange 4 of the forwardly extending extremity is provided with a hole 7 of a rather large diameter. The forwardly extending extremity is provided with a hole 8, which is of a less diameter but of a greater depth than hole 7. The rearwardly extending extremity of the switch casing is provided with a hole 9, which is of a greater diameter but of a less depth than the hole 8, and is also provided with a hole 10 which is preferably of a larger diameter than any of the other holes. All of these holes are communicatively connected together, and the holes 7 and 8 receive the flange 11 and the cylinder 12 of the key controlled lock, respectively. The key controlled lock is substantially of standard construction now in use and may be provided with any suitable means for holding the same in relation to the switch casing, but as here shown, the inner extremity of the cylinder is provided with a spring pressed detent 13 that is located within the hole 9 of the casing, and bears against the shoulder 14 formed by the holes 8 and 9. In switches of this character, a hole such as 15 is provided in a wall of the casing in order that a tool may be inserted through the hole to depress the detent 13 whereupon the lock cylinder may be removed from the switch casing when the key is within the lock cylinder and the cylinder is within the casing in predetermined positions. The lock cylinder is provided with a plurality of tumblers 60 which normally project within an internal longitudinal slot 16 provided in the casing in order to lock the cylinder in place and maintain a circuit open when the key is withdrawn from the lock. In other words, if the key shown in Figure 1 is removed, the tumblers 60 will project into the slot 16, but when the key is inserted, as shown, the tumblers are returned within the confines of the cylinder, and in this position the key may be turned clockwise one-quarter turn whereby to close an electrical circuit, and in such position the key cannot be withdrawn from the lock. The switch casing is also provided with a longitudinal slot 17 which is diametrically opposite the slot 16, and provides

clearance for the tumblers when the key is inserted into the lock cylinder.

Rotation of the lock cylinder with respect to the switch casing is predetermined, and this is accomplished by the arrangement clearly shown in Figures 3 and 4. The switch casing adjacent its forward extremity is provided with a lug or stop 18, which projects outwardly from the bottom of the hole 7, and the flange 4 is provided with a circumferential notch 19 which receives the stop 18. When the key is inserted into the lock as shown in Figure 4, the end 61 of the notch 19 is in engagement with the stop 18, but when the key is turned substantially a quarter of a revolution in a clockwise direction, the end 62 of the notch 19 will abut the stop 18. By this arrangement, rotation of the lock with respect to the housing is predetermined. Rotation of the switch with respect to the instrument panel may be prevented by providing an external longitudinal slot 64 in the switch casing which receives an integral projection 65 extending inwardly of the aperture 2.

A shoulder 20 is formed by providing the holes 9 and 10 in the switch casing, and a washer 21 is located in the hole 10 in abutment with shoulder 20, and as clearly shown, the right face of the washer extends slightly to the right of the end 22 of the lock cylinder, the purpose of which will be described later.

The inner extremity of the lock cylinder is preferably provided with a transversely arranged continuation 23, substantially rectangular in cross-section, which is received by a diametrically arranged substantially rectangular slot 24 provided adjacent one side of the switch carrier 25. This provides a direct connection between the switch carrier and the lock cylinder, and thus eliminates any possible lost motion between said parts. In order to provide a better bearing surface and eliminate any possible unnecessary friction between the moving parts of the switch, the left face of the bridge carrier 25 is adapted to engage the washer 21, and not the end 22 of the cylinder. In some instances, the switch is manufactured and sold to parties who install a lock cylinder of their own construction, and in such cases, the washer 21 primarily serves to prevent the possibility of the switch carrier 25 from being projected into a tilted position. It is to be understood, that if found desirable, the washer may be entirely omitted, in which event the parts would be so constructed and arranged that the left face of the carrier would directly engage the end 22 of the lock cylinder.

A bridge member 26 is supported on the bridge carrier 25, and as clearly shown, this bridge member is preferably constructed of sheet metal in the form of a rectangular strip, of which a length thereof is located in a recess provided therefor in the right face of the carrier in order that the bridge member will be flush with said face. The bridge member may be held in relation to the carrier 25 in any suitable manner, but as here shown, the ends of the bridge member are preferably bent around the sides of the carrier in peripheral notches and into notches 27 provided therefor.

The right face of the carrier is provided with a pair of spaced apart pockets 28, one on each side of the bridge member, and as clearly shown in Figure 5, the bridge member is provided with a pair of spaced apart contact seats 29. All of these pockets and seats are circumferentially arranged, and equally spaced from each other. In order to prevent deformation of the bridge member, a depression 30 is provided intermediate its ends between the seats and engages the bottom of the diametrical slot provided for the bridge member.

Referring now to the switch back 31, the same is adapted to engage the end portions 32 of the inner extremity of the switch casing, and is held in relation to the switch casing by a pair of fingers that are bent inwardly as indicated at 33 into the notches 34 provided in the switch back. The switch back is provided with a pair of circular wells 35, as clearly shown in Figure 2, and a pair of rectangular apertures 36 which communicate with wells 35. Contact means generally designated 37 and 38 are mounted in the wells 35 and apertures 36. Each of the contact means is preferably constructed of a strip of sheet metal which is folded into a tubular body 39 substantially rectangular in cross-section. More specifically, each body 39 is comprised of two channel portions, and the inner extremity of each portion is provided with an outwardly extending substantially semi-circular flange 40, and the outer extremity of the body is provided with a circular terminal receiving aperture 41. An insert is located in each of the tubular bodies 39, and its outer extremity is provided with a detent portion 42, and its inner extremity with an enlarged conical contact portion 43, which is provided with a substantially circular flange 44. The flanges 40 and 44 are adapted to abut each other, and a helical compression spring 45 is arranged in each of the circular wells 35 about each of the tubular bodies in a manner whereby one end engages the flanges 40, and the other end engages the bottom of the well. By this arrangement, the contact means generally designated 37 and 38, including the inserts contained therein, are normally urged inwardly in a manner whereby the conical contact portions 43 of the inserts will either engage the pockets 28 provided in the carrier 25, or the contact seats 29 provided in the bridge member 26, depending upon whether the switch is in an on or off position. Each of the contact means 37 and 38 is preferably adapted to receive a plug conductor terminal of the snap type, such as 46 as clearly shown in Figure 1. When a terminal, such as 46, is inserted into a terminal receiving aperture 41 of a contact means, the tubular body 39 will move outwardly, separating the flanges 40 and 44 to some extent, and will remain substantially in this position when the groove 47 in the terminal is in engagement with the detent portion 42 of the insert. In other words, the inserts remain substantially stationary when the switch is in a circuit opening or closing position, regardless of whether a terminal is or is not associated with a contact means. Moreover, it will be evident that the springs 45 serve two functions, one of which is to resiliently retain the plug conductor terminal in relation to the contact means, and the other, to urge the inserts in a direction whereby the contact portions 43 will cooperate with the pockets 28, or the seats 29 in the bridge member. The depression 30 between the contact seats 29 also serves to prevent the conical contact portions 43 of the contact means from electrically engaging the bridge member, when the bridge is in the position shown in Figure 2.

The contact means above described, are disclosed and claimed in an application of Harry A. Douglas, entitled Electrical connection means, Serial Number 115,076, filed December 10, 1936.

Having thus described my invention, it is obvious that various immaterial 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.

What I claim and desire to secure by Letters Patent is:

1. A switch including in combination, a casing open at its ends, a key-controlled lock arranged at one end and a switch back provided with spring pressed contacts including terminal receptacles associated with said contacts arranged at the other end, and bridge means carried by said lock for engaging said spring pressed contacts, said contacts being provided with integral extensions cooperating with said receptacles whereby to directly engage and resiliently retain terminals placed in said receptacles.

2. A switch including in combination, a cylindrical casing open at its ends, a key-controlled lock arranged at one end and a switch back arranged at the other end provided with a pair of spring pressed contact means, receptacle means adapted to receive plug conductors of the snap type associated with and movable with respect to said contact means, a carrier having a slot in one face and a pair of pockets in the other face, a bridge member mounted on said carrier between said pockets and provided with a pair of contact seats, a projection provided on said lock fitting in said slot whereby movement of the lock in a predetermined direction will cause said spring pressed contact means to ride out of said pockets into said contact seats.

3. A claim as set forth in claim 2, including bearing means in the form of a washer abutting said casing whereby to retain said carrier in place when said lock is removed.

4. A switch including in combination, a casing provided with a partially rotatable lock cylinder, a carrier jointly connected to said cylinder and provided with a bridge member, a switch back carried by said casing and provided with contact means, said contact means including in combination, a tubular body provided with a terminal receiving aperture, a spring surrounding said tubular body, an insert arranged within said tubular body and provided with a contact at one extremity adapted to be pressed into engagement with said bridge member by said spring and a detent at the other extremity adapted to resiliently retain a terminal arranged in said aperture through the agency of said spring.

5. A claim as set forth in claim 4, including means providing a bearing for said bridge member and limiting movement thereof in one direction, and means provided in the casing forming a seat for said bearing means.

6. A claim as set forth in claim 4, in which the bridge member is provided with a depression in order to prevent the contacts on said inserts from electrically engaging said bridge member near its center, when the switch is in an off position.

WILLIAM SCHMID.