June 17, 1941. E. G. LODGE 2,246,373

ELECTRIC SWITCH

Filed Jan. 30, 1939

Fig. 1.

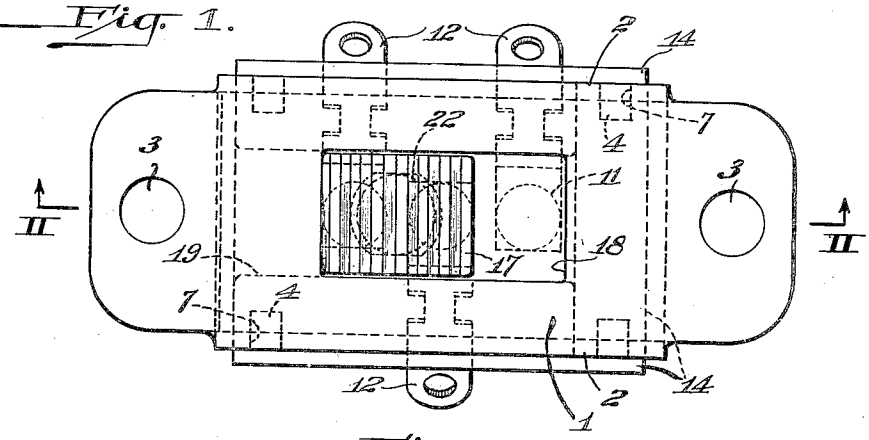


Fig. 2.

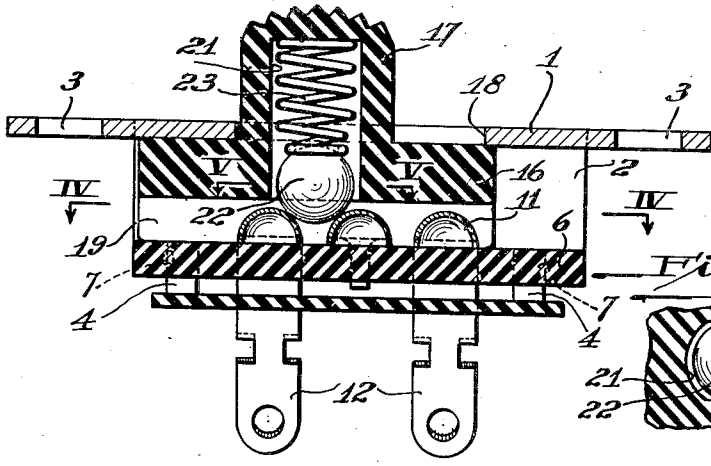


Fig. 5.

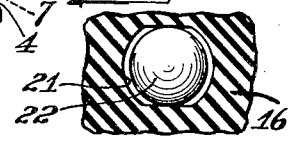


Fig. 3.

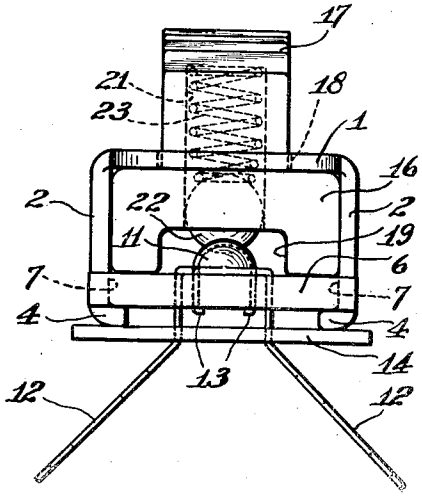
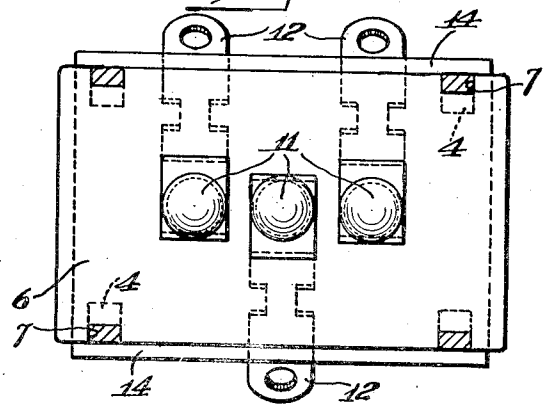


Fig. 4.



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ELECTRIC SWITCH

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2 Claims. (Cl. 200—16)

This invention relates to electric switches, and more particularly to those in which an electric bridging member is reciprocable across a plurality of laterally spaced electric contacts or terminals.

One of the greatest difficulties with switches of this character is that they are undependable in operation because the bridging members sometimes bind in their actuators. This causes the switch either to fail to operate or to make unsatisfactory electric contact which burns the contacts. In either event, the switches operate stiffly or jerkily.

It is among the objects of this invention to provide a slide switch which operates smoothly at all times, which is dependable in operation, which is simple and inexpensive in construction, and in which the bridging member does not bind but always makes good contact with the terminals regardless of inaccurate positioning of the terminals.

In accordance with this invention a plurality of terminals are mounted in laterally spaced relation in a substantially straight line. An actuating member is disposed adjacent the terminals where it is slidable lengthwise of the common line in which the terminals lie. Means is provided, such as a housing, for limiting the longitudinal movement of the actuator. The actuator is provided with a recess for receiving a bridging member which it carries back and forth across the terminals. The bridging member consists of a metal ball which is biased into contact with two adjacent terminals at a time by means of a coil spring compressed between the ball and the inner end of the actuator recess. The recess is enlarged to permit the ball to move across it longitudinally of the actuator in order to compensate for inaccurate positioning of the terminals. To prevent the ball from likewise moving transversely of the actuator and thereby moving away from both terminals, the sides of the recess adjacent the sides of the actuator are in close proximity to the ball. To keep the spring from working itself down around the ball and thereby wedging the ball in the recess, the ball-engaging convolution of the spring is made smaller than the rest of the convolutions so that it engages the ball in a relatively small circle.

The preferred embodiment of the invention is illustrated in the accompanying drawing in which Fig. 1 is a plan view of my switch; Fig. 2 is a longitudinal section taken on the line II—II of Fig. 1; Fig. 3 is an end view of the switch; and Figs. 4 and 5 are horizontal sections taken on the lines IV—IV and V—V, respectively, of Fig. 2.

Referring to the drawing, a housing is provided which is shown in the general form of a channel; that is, it has a web or top wall 1 and parallel flanges or side walls 2. The top wall has extensions at its ends provided with openings 3 by means of which the switch is fastened in place to the desired support. Although this housing may be made of any suitable material, it is preferred to make it of metal and to provide the free edges of its side walls with lugs 4 which are bent over the edges of a base member 6 to position the latter in spaced parallel relation to the top of the housing. The edges of this base member are provided with notches 7 (Fig. 4) for receiving the lugs in order to hold the base member in predetermined position longitudinally of the housing. The base member is made of insulating material, such as a small strip of Bakelite. Mounted in this base are a plurality of one-piece terminals each of which has a partially spherical contact portion or detent 11 disposed against the inner face of the base, and parallel portions projecting from the opposite sides of the detent through slots in the base, one of these latter portions having an extension 12 adapted to be connected to a wire of an electric circuit, and the other terminating in a lug 13 bent over the base to lock the terminal in place (Fig. 3). Lugs 4 and 13 are prevented from coming in contact with wires attached to the terminals by means of a slotted insulating strip 14 through which terminal extensions 12 project.

Disposed in the housing between its top and the base member is an actuating member which is slidable longitudinally of the base and housing. This actuator, which is preferably made of a molded insulating material, has a generally rectangular body 16 and an integral button 17 projecting outwardly through a slot 18 in the top wall of the housing. The opposite ends of this slot limit the longitudinal movements of the actuator by acting as stops against which the button abuts. The side of the actuator adjacent the base is provided with a longitudinally extending channel 19 into which terminal detents 11 project. The central portion of the actuator is provided with a recess 21 extending into button 17 and having its open end adjacent the terminals.

It is a feature of this invention that two adjacent terminals are bridged, in order to close an electric circuit, by a bridging metal ball 22 loosely disposed in recess 21 of the actuator by

which it is carried back and forth over the terminals. As shown in Fig. 2, the ball is biased against the terminals by means of a coil spring 23 which is compressed between it and the inner end of the recess. The spacing of the terminals and the size of the ball are such that when the ball is in the depression between two of the spherical detents 11 it can simultaneously engage both of them in order to close an electric circuit.

A ball bridging member has the very great advantage of loose mounting without a stem projecting up into the recess to cant and bind and thereby prevents uniform contact with both terminals. It also makes the switch operate more easily because it tends to roll over the terminals. The spherical detents 11 are inexpensive to make and prevent the ball from touching the insulating base member 6 in which it might wear grooves and thereby cause rough operation of the switch.

Due to inaccuracies that invariably creep into the manufacture of these switches, the terminals are not always spaced the same distance apart or the same distance to the side of the axis of recess 21 when the actuator is at either end of its path of movement. In prior switches this tended to prevent the bridging member from making proper contact with the terminals. This objection is overcome by this invention by enlarging the recess longitudinally of the actuator so that there is considerable clearance between the ball and two opposite walls of the recess when the ball is centered therein. If, when actuator button 17 engages one end of slot 18, the projected axis of recess 21 is not exactly half-way between two of the contact detents 11, ball 22 will move forward or backward in the recess, as necessary, to accommodate itself to the positioning of the terminals and thereby compensate for irregularities of switch manufacture. However, as shown in Fig. 5, the recess is not enlarged transversely of the actuator, but is provided with substantially parallel straight walls in close proximity to the ball so that the ball can not move transversely of the actuator. Otherwise, if such transverse movement were permitted, the ball might move laterally out of contact with one or both of the spherical contacts.

Another feature of this invention is that spring 23 is so formed that, in spite of the clearance in the recess, it does not work or slip down around the side of the ball and thereby become wedged between the ball and the side of the recess in an inoperative position. Accordingly, the convolution of the spring which engages the ball is smaller than most, if not all, of the remaining convolutions so that the spring engages the ball in a circle which is so small that the ball can not project up into the lower convolution far enough to be able to expand it.

According to the provisions of the patent statutes, I have explained the principle and construction of my invention and have illustrated and described what I now consider to represent its best embodiments. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. An electric switch comprising a housing having a slot in its top, an insulating base for the housing, a plurality of terminals projecting from the inner face of the base, said terminals having spherical contact portions laterally spaced in a substantially straight line extending longitudinally of the housing and slot, a slidable actuator disposed in the housing for movement longitudinally thereof and provided with a button projecting through said slot, the body of the actuator being provided with a recess having its open end facing the terminals, a ball loosely disposed in the recess, a coil spring compressed between the ball and the inner end of the recess for biasing the ball into bridging contact with two adjacent terminals, the ends of said slot being adapted to be engaged by said button to limit the longitudinal movement of the actuator, and said recess confining the movement of the ball longitudinally of the base to substantially a straight line but being enlarged at the sides of the ball adjacent the ends of the slide to permit the ball to properly engage said terminals.

2. An electric switch comprising a metal housing having a slot in its top and having substantially parallel side walls, an insulating base disposed between the free ends of the side walls, said walls being provided with lugs overlapping the bottom of the said base, a plurality of electric terminals having spherical contact portions projecting from the inner face of the base in a substantially straight line extending longitudinally of the housing and slot, said terminals extending through said base and projecting from its bottom, a slidable actuator disposed in the housing for movement longitudinally thereof and provided with a button projecting through said slot, the body of the actuator being provided with a recess having its open end facing the terminals, a ball loosely disposed in the recess, said recess confining the movement of the ball longitudinally of the base to substantially a straight line but being enlarged at the sides of the walls adjoining the ends of the slot to permit the ball to seat against two adjacent terminals, a coil spring compressed between the ball and the inner end of the recess for biasing the ball into bridging contact with two adjacent terminals, the ends of said slot being adapted to be engaged by said button to limit the longitudinal movement of the actuator, and an insulating member provided with openings through which the outer portions of said terminals project, said member overlying said lugs.

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