H. K. ELY.

SNAP SWITCH.

APPLICATION FILED APR. 16, 1915.

1,162,735. Patented Nov. 30, 1915.

Fig. 1.

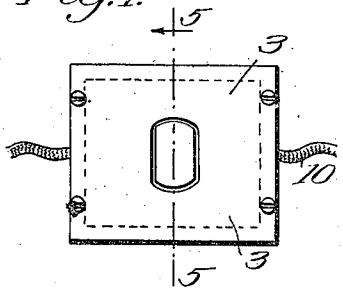


Fig. 2.

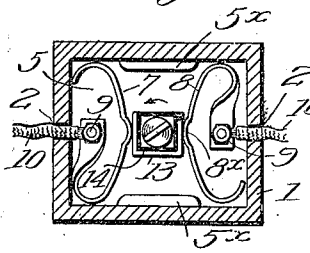


Fig. 3.

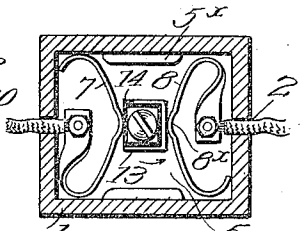
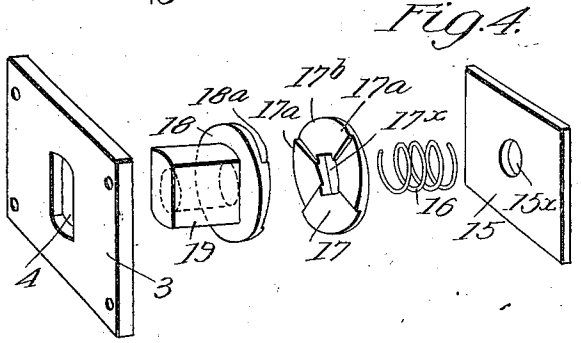


Fig. 4.



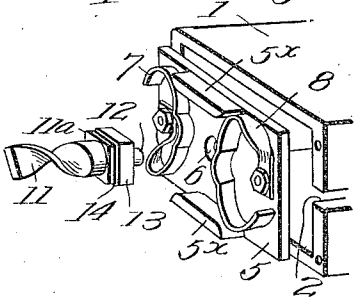


Fig. 5.

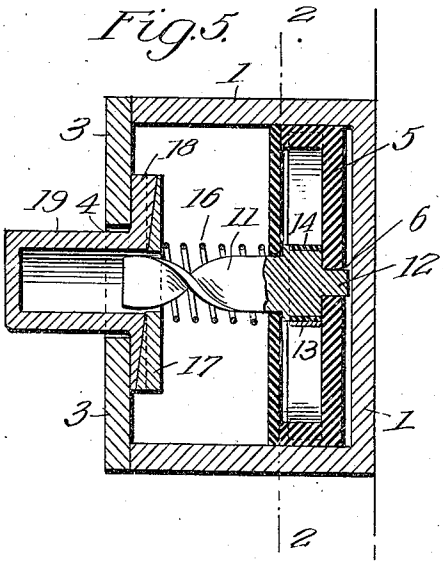
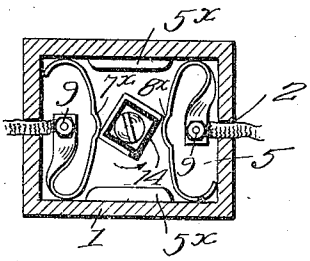


Fig. 6.



WITNESSES:

S. E. Wade.

H. E. Beck.

INVENTOR

HARRY K. ELY,

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

HARRY KIRK ELY, OF BALTIMORE, MARYLAND.

SNAP-SWITCH.

1,162,735. Specification of Letters Patent. Patented Nov. 30, 1915.

Application filed April 16, 1915. Serial No. 21,826.

To all whom it may concern:

Be it known that I, HARRY K. ELY, a citizen of the United States, and a resident of the city of Baltimore, in the State of Maryland, have invented a certain new and useful Improvement in Snap-Switches, of which the following is a specification.

My invention relates to improvements in electric switches, more particularly to those switches of the so-called snap switch type, in which the pressure of a button causes a quick movement of the switch to connect or disconnect an electric circuit.

An object of my invention is to provide a switch of the type mentioned, which is composed of relatively few parts and which, therefore, is not easily liable to get out of order.

A further object of my invention is to provide a switch whose pushbutton requires a minimum of force or pressure to operate it, due to the fact that in the construction of the switch the parts are so arranged as to afford a comparatively large leverage in transforming the reciprocatory motion of the push button into rotary motion for operating the switch members.

A further object of my invention is to provide a device of the type described which may be readily assembled or taken apart because of the simplicity of its construction.

A further object of my invention is to provide a device which will stand long and continued use.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming part of this application, in which—

Figure 1 is a plan view of the device. Fig. 2 is a section along the line 2—2 of Fig. 5, the screw being shown in elevation. Fig. 3 is a view similar to Fig. 2, showing the switch in a different position. Fig. 4 is a perspective view showing the various parts of the switch in position to be assembled. Fig. 5 is a section along the line 5—5 of Fig. 1, and Fig. 6 is a view similar to Figs. 2 and 3 showing the manner of preventing a dead center for the rotatable switch member.

In carrying out my invention I provide a suitable casing 1 which is preferably slotted on opposite sides as shown at 2, and which is provided with a cover 3 having a longitudinal slot 4, see Fig. 4.

Disposed within the casing 1 is a plate 5 preferably of insulating material having a central opening 6. Carried by the plate are two springs 7 and 8 respectively formed in the manner shown in the drawings. These springs, it will be observed, have a flat end which is held by a screw 9 which serves as a binding post for the terminals 10, which enter through the slots 2 of the casing 1. The spring is then bent inwardly in the form of an arc, and the end of the spring is curved so as to engage that side of the casing adjacent to its retaining screw 9. Each of the springs is provided with a central inwardly curved portion such as those shown at 7^x and 8^x. The plate 5 is preferably provided with integral spacing lugs 5^x.

At 11 I have shown a screw, one end of which is provided with a cylindrical extension 12 arranged to enter the opening 6 in the plate 5. The screw 11 has a squared portion 11^a bearing a conducting member 13 which extends substantially around three sides of the squared portion 11^a, suitable insulation 14 being disposed between the conducting member 13 and the squared portion 11^a of the screw 11.

As will be seen from Figs. 4 and 5, a plate 15 having an opening 15^x bears on the spacing member 5^x, the screw 11 projecting through the opening 15^x. A spiral spring 16 surrounds the screw and bears at one end on the plate 15 and at the other end on a clutch member like that shown at 17 in Fig. 4. This clutch member, it will be observed, has a longitudinal slot 17^x, through which the screw 11 projects. The clutch member 17 is in fact, a disk having one flat side and the other side provided with a series of teeth 17^a formed by cutting the face of the disk with beveled portions 17^b in the manner clearly shown in the drawings. There are four of these teeth. Arranged to engage the clutch member 17 is a similar clutch member 18 having teeth 18^a. The clutch member 18 is at the end of the push button 19. The latter is hollow as shown in Fig. 5, in order to receive the screw 11. It is also of rectangular cross section or substantially so, and is adapted to pass through the rectangular opening 4 in the cover plate 3.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. Con-

sider the position of the device as shown in Fig. 5. It is obvious that when the push button 19 is pushed inwardly, it will rotate the screw 11. That is to say, the clutch members 18 and 17 will be engaged, and since the clutch member 17 cannot rotate during such engagement due to the fact that the push button 19 is held in position by the plate 3, the screw 11 must rotate. Let us assume that the device is in the position shown in Fig. 2. Current will then pass from one of the conductors 10 through the spring 7, conductor 13, spring 8, and out by the other conductor 10. Now on pushing the pushbutton 19, the screw 11 will be rotated so as to bring the conducting portion 13 into the position shown in Fig. 3. Here the spring 7 now bears on the insulating portion 14, and hence the current is broken. On the release of the button 19, the spring 16 tends to force the members 17 and 18 outwardly into the position shown in Fig. 5. The screw is now held stationary by the springs 7 and 8, but the member 17 in its outward movement is rotated by passing along the convolutions of the screw, the teeth 17^a riding over the teeth 18^a, until the member 17 reaches the member 18. The screw is fastened so that when the button is pushed in as far as it will go, it will turn the screw so as to bring the squared portion past the dead center, that is to say, past the diagonal from one corner of the rectangular portion to the other. After this point is passed, the springs aid in giving the screw a quick turn so as to snap it into position. This action is best illustrated in Fig. 6, which shows that it is almost impossible to set the device on dead center, since motion in either direction will cause the screw to be turned either to switch on the current or to switch it off. In order to permit the quick action of the device, the opening 17^x in the member 17 is made wide enough for the play of the screw to some extent in either direction of rotation, while at the same time engaging the screw to turn it positively when the button is pushed inwardly.

The springs 7 and 8 act not only as conducting members, but also as contacts and as spring members to give a snap or quick throw to the switch. The plate 15 which bears the thrust of the spring 16 relieves any end thrust of the screw which of course would add to the friction, and make the operation of the device more difficult.

One of the main features of this device is the ease of manipulation. This is accomplished because of the fact that the disk 17 and the clutch member 18 are of relatively large diameter as compared with the portion of the screw between the springs 7 and 8. In other words, one gets a large leverage for operating the screw. I am aware that there are devices of a similar nature in which the power is applied to the screw to operate spring contacts at a considerable distance from the axis of the screw, but as stated above, one of the main features of my invention is to provide a device of this type which may be easily operated, since as a rule, these devices are not easily operated because of the friction in translating the reciprocatory motion into rotary motion. Another point I wish to mention is that there is no rotation of the button; the operator simply pushes it in and lets it come out. The screw is only rotated when the button is being pushed in, while as stated above, it is the disk 17 that rotates when the spring pushes the disk 17 and the button, together with the disk 18, outwardly.

It will be noted that the conducting member 13 stops short of the edge of the insulating portion 14 on one side, but is continued to it on the other side. The reason for this is obvious. When the conducting portion 13 is turning in the direction shown by the arrows in Figs. 2, 3, and 6, it is desirable to maintain the contact until the screw is under the tension of the spring which throws it suddenly around. This contact is retained by prolonging the member 13 on one side. When the current is cut off as shown in Fig. 3, it is desirable to cut it off until the screw is in rapid motion due to the action of the spring, and hence the contact is not made until the corner has been passed, thus letting the squared portion fly around under the action of the spring and make the contact suddenly.

The device is simple in construction, easily assembled, and is not liable to get out of order, and as stated, is easily manipulated.

I claim:—

1. In an electric switch, a pair of opposed conducting springs, a screw having a squared portion disposed between said springs, a plate having an oblong opening adapted to receive the screw, means for forcing said plate along the screw, in a direction parallel with the axis of the latter and for preventing the rotation of the plate during such movement, means for subsequently causing the rotation of said plate and for simultaneously returning it to its original position, said last-named means comprising a spiral spring engaging one face of the plate and adapted to be compressed in the initial movement of the plate, and means for relieving the screw from the end thrust of the spiral spring.

2. In an electric switch, a casing, a pair of opposed conducting springs disposed therein, a screw having a squared portion disposed between said springs, a plate having an oblong opening adapted to receive the screw, a push member arranged to engage the plate and to move it along the screw in a direction parallel with the axis of

the latter, means carried by said push member for preventing the rotation of the plate during its movement in a forward direction, a spiral spring for returning the plate and the push member to their original positions, said plate having a rotary movement on its return relative to said screw and to said push member and means for transmitting the end thrust of the spring directly to the casing.

3. In an electric switch, a base, a pair of opposed conducting springs, carried by said base, a screw having a squared portion disposed between said springs and being provided with a cylindrical extension having a bearing in said base, spacing plates carried by said base and projecting beyond said springs, an abutment plate having an opening to receive said screw and arranged to bear on said spacing plates, a spiral spring surrounding said screw and bearing at one end on said abutment plate, a clutch member having an oblong opening arranged to receive the screw and being provided with teeth on one side, said clutch member being normally pressed upon by said spring, and means for forcing said clutch member toward said abutment plate, and means for preventing the rotation of said clutch member during its movement toward said abutment plate.

4. In an electric switch, a base, a pair of opposed conducting springs carried by said base, a screw having a squared portion disposed between said springs and being provided with a cylindrical extension having a bearing in said base, spacing plates carried by said base and projecting beyond said springs, an abutment plate having an opening to receive said screw and arranged to bear on said spacing plates, a spiral spring surrounding said screw and bearing at one end on said abutment plate, a clutch member having an oblong opening arranged to receive the screw and being provided with teeth on one side, said clutch member being normally pressed upon by said spring, and means for forcing said clutch member toward said abutment plate and for preventing the rotation of the clutch member during such movement.

5. In an electric switch, a base, a pair of opposed conducting springs carried by said base, a screw having a squared portion disposed between said springs and being provided with a cylindrical extension having a bearing in said base, spacing plates carried by said base and projecting beyond said springs, an abutment plate having an opening to receive said screw and arranged to bear on said spacing plates, a spiral spring surrounding said screw and bearing at one end on said abutment plate, a clutch member having an oblong opening arranged to receive the screw and being provided with teeth on one side, said clutch member being normally pressed upon by said spring, and means for forcing said clutch member toward said abutment plate, said means comprising a push button, a clutch member carried by said push button and arranged to engage said first mentioned clutch member, and means for preventing the rotation of the push button.

6. In an electric switch, a base, a pair of opposed conducting springs carried by said base, a screw having a squared portion disposed between said springs and being provided with a cylindrical extension having a bearing in said base, spacing plates carried by said base and projecting beyond said springs, an abutment plate having an opening to receive said screw and arranged to bear on said spacing plates, a spiral spring surrounding said screw and bearing at one end on said abutment plate, a clutch member having an oblong opening arranged to receive the screw and being provided with teeth on one side, said clutch member being normally pressed upon by said spring, means for forcing said clutch member toward said abutment plate and for preventing rotation of the clutch member during such movement, said means comprising a stationary plate having an opening arranged to receive the push button, said opening conforming to the contour of the push button, and the wall of the opening preventing the rotation of the push button by the engagement of the walls of the latter.

HARRY KIRK ELY.

Witnesses:
MARY E. MATTINGLY,
ELSIE B. ELY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."