

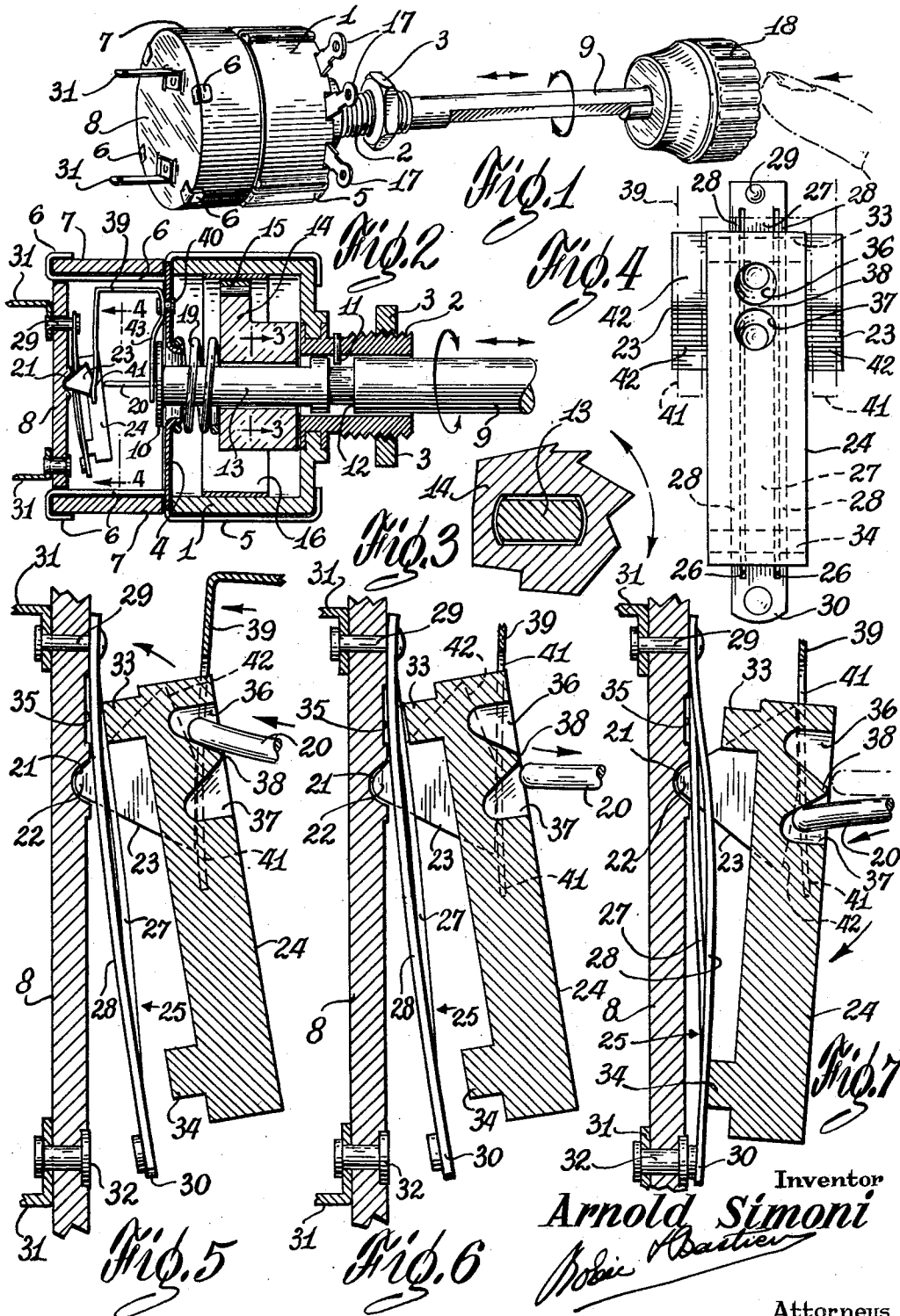
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CONTROL SWITCH OF THE PUSH-PUSH TYPE

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CONTROL SWITCH OF THE PUSH-PUSH
TYPE

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1 Claim. (Cl. 200—153)

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The present invention relates to a control switch and more particularly to a control switch of the push-push type.

The term "push-push" as applied to a type of control switch means that the "on" and "off" positions of the switch are successively assumed by the simple pressure on the end of an actuating shaft.

Switches of the "push" type are already known which are either normally closed or open and will be respectively opened or closed by applying pressure on an actuating button but will stay so only so long as said pressure is applied, or "push-push" types having, however, means requiring a heavy and long pressure stroke.

Accordingly the main object of the present invention is the provision of a control switch which will successively assume an "on" and "off" position upon a light and short pressure stroke on the end of an actuating shaft or control member, said switch maintaining its desired position even after the pressure has ceased to exist.

Another important object, according to the present invention, is the provision of an electric switch of the character above mentioned in which the control member is a single actuating shaft or button.

Still another important object, according to the present invention, is the provision of a control switch of the character above mentioned which is of a simple construction and will stand service for a considerable period of time.

Still another important object, according to the present invention, is the combination of an electric switch of the push-push type as described hereabove with an electronic control such as a rheostat, potentiometer and the like used in electronic apparatus and actuated by means of a rotary movement.

Still another important object, according to the present invention, is a combination of a control switch of the character above mentioned, with an electronic control actuated by the rotary movement of a control shaft, the reciprocal movement of said same shaft being used to actuate said control switch.

Still another important object, according to the present invention, is the provision of a combined variable resistance and switch for use with radio receivers and like electronic apparatus, said variable resistance being actuated by means of the rotary movement of a control shaft, and said switch being actuated by the longitudinal axial movement of said same shaft.

Yet another important object, according to

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the present invention, is the provision of a combined switch and volume control for a radio receiver and like electronic apparatus, in which it will not be necessary to adjust the volume control every time the switch is turned on, therefore providing for longer service of said volume control.

The foregoing and other important objects according to the present invention will become more apparent during the following disclosure and by referring to the drawing in which:

Figure 1 is a perspective view of one application of the control switch, according to the present invention, in the form of a combined variable resistance and switch for use with an electronic apparatus;

Figure 2 is a longitudinal section of the device shown in Figure 1;

Figure 3 is a fractional cross-section along line 3—3 of Figure 2;

Figure 4 is an elevation view of the main elements of the electric switch of the present invention along line 4—4 of Figure 2;

Figures 5, 6, and 7 are longitudinal sections of the electric switch of the present invention taken at different stages of its operation.

Referring now more particularly to the drawing in which like reference characters indicate like elements throughout, the numeral 1 indicates a cylindrical housing made of insulating material and centrally supporting a metallic sleeve 2 which is threaded on the outside to receive a nut 3 for securing the device according to standard practice.

The housing 1 is closed at the end opposite the sleeve 2 by means of a metallic annular disc 4 secured to the housing 1 by means of radial integral strips 5 bent over said housing. Said annular disc 4 is further provided with metallic strips 6 outwardly projecting for supporting the switch housing 7 made of insulating material and closed at its outer end to form a base plate 8 for the switch.

The two housings 1 and 7 have substantially the same diameter and are therefor seen to form a continuous cylinder-like housing which is made of two sections.

The control shaft 9 is rotatively and slidably inserted through and supported by the sleeve 2, extends centrally of the housing 1 and through the annular disc 4 to be terminated by a flange 10 positioned inside the housing 7.

The shaft 9 is rotatively and slidably locked by means of stud 11 inwardly projecting and secured to the sleeve 2 and engaging a suitable

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annular groove 12 made in the shaft 9. The portion 13 of the shaft extending inside the housing 1 is preferably flat milled as shown in Figure 3 to rotatively actuate the rotary member or arm 14, the outer end 15 of which is in slidable electrical contact with a resistance strip 16 peripherally extending on the inner face of the cylindrical housing 1. The rotary arm 14 and resistance strip 16 are suitably connected to the terminals 17 extending outside of the housing 1.

Thus it is seen that the rotary movement of the shaft 9 which is actuated by means of the control knob 18 will operate the variable resistance or potentiometer device in the combination shown in Figures 1 and 2.

Because the shaft 9 is adapted to effect an axial movement for operating the switch contained in the housing 7, it is seen that the rotary arm 14 is slidably enclosing the shaft 9 and is constantly urged towards the sleeve 2 by means of the spring 19 which contacts said arm 14 and the partition or annular disc 4.

Thus there will be no transverse displacement of the contacting end 15 of the rotary arm 14 relative to the resistance strip 16 thereby minimizing the wear of the latter.

The switch comprises a somewhat flexible pin 20 rigidly secured to the flange 10 and preferably extending along the axis of the shaft 9. The outer end or base plate 8 of the switch housing 7 is provided with an elongated transverse groove 21 so positioned as to cross the extended axis of the pin 20, for receiving in rocking engagement the rounded pivot end 22 of the triangular fulcrum legs 23 integrally dependent on both sides of the elongated lever member rocker 24.

The lever member 24, preferably made of insulating material, is capable of a rocking movement in a plane extending at right angles with the axis of the groove 21 for actuating the elongated contact member 25 which is disposed longitudinally of said lever member 24 between the two fulcrum legs 23.

The contact member 25 consists of a strip of electrically conducting material provided with two parallel slits 26 longitudinally extending over a substantial portion of the same and defining two side portions 28 which have been drawn as by peening so as to have a natural length substantially greater than the length of the medial elongated portion 27 of said contact member 25.

Thus, the contact member 25 which is secured at one end to the base 8 by means of the rivet 29 will tend to assume either a fully open position as shown in Figure 5 or a fully closed position as shown in Figure 7, being in an unstable state between said two extreme positions. The fully open position is assumed when the side portions 28 lie below the middle portion 27 as shown in Figure 5 being curved in such a manner as to cause the outer end 30 of the contact member 25 to assume an open position.

The closed position is assumed when the middle portion 27 lies below the side portions 28, causing the latter to be inwardly curved with respect to the base plate 8 thereby producing the closing of the outer end 30.

The contact member 25 is adapted to close the circuit between the two outer terminals 31, one of which is secured to the rivet 29 and the other to the contact rivet 32 secured to the base plate 8 opposite the free end 30 of said contact member 25.

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The contact member 25 is actuated by the lever member 24 the inner projections 33 and 34 of which come alternatively in pressing contact with said contact member near its end secured to the base plate 8 and near its free end respectively. The projection 33 is adjacent the pivot point 22 so that the extent of its arcuate movement is much less than the extent of the arcuate movement of the projection 34.

The base plate 8 is further provided with a shallow groove 35 extending intermediate the groove 21 and the rivet 29, said groove 35 being opposite the projection 33 of the lever member 24. Thus when the projection 33 comes into contact with the contact member 25 the latter is made to slightly engage said recess 35 thereby facilitating its outward bending movement.

The lever member 24 is provided with two juxtaposed substantially conical recesses 36 and 37 which are converging in the direction of their opening, the edge 38 of the portion of the lever member 24 separating said two recesses being thin enough so that the free end of the pin 20 when at rest will be opposite either one of said recesses depending on the position of the lever member 24 as shown in Figure 6 and in dotted line in Figure 7.

In order to maintain the lever member 24 and its fulcrum legs 23 in rocking engagement with the groove 21, a leaf spring 39 bent in the form of a U is secured to the partition 4 as by means of a rivet 40 as shown in Figure 2, said spring 39 being in the form of a yoke at one of its free ends forming two legs 41 respectively engaging the top of the two fulcrum legs 23 to exert thereon a pressure towards the base plate 8.

The legs 41 are adapted to lay flat against either one of the two mutually inclined top faces 42 of the fulcrum legs 23 in order to maintain the lever member 24 either in open or closed position.

It is seen that the leg 43 of the U-shaped leaf spring 39 retained by the rivet 40 is adapted to exert a pressure on the flange 10 of the shaft 9 away from the base plate 8. Thus, after actuation of the switch by the axial movement of the pin 20 towards the latter, the pin 20 will be returned to its initial position upon release of the pressure exerted on the shaft 9.

From the foregoing description, the operation of the switch according to the present invention should be apparent. Suppose that the switch has just been closed, as shown in Figure 7, upon release of the control shaft 9 the pin 20 will disengage the conical recess 37 and will assume a position shown in dotted line in Figure 7 opposite the other recess 36. Thus upon inward movement of said pin 20, the latter will engage recess 36 as shown in Figure 5, and the lever member 24 will be caused to pivot about 22 and the projection 33 will press against the contact member 25 so as to effect opening of the same. Upon withdrawing of the pin 20, the latter will assume a position as shown in Figure 6 opposite the recess 37, while the lever member 24 will be maintained in its open position by means of the leaf spring 39. Thus upon further inward movement of pin 20, the pin will engage the original recess 37 in order to close the switch.

The switch, according to the present invention, is especially useful for use in combination with a volume control for radio and television receivers or electronic devices in general, because

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it is not necessary to readjust the volume control upon turning "on" said switch when said radio receiver is already set on a definite wave length. Thus wear of the volume control is considerably diminished and will, therefore, give a much longer life service.

It is obvious that the "push-push" switch, according to the present invention, may be used in a number of different applications wherein it is necessary to have a switch that will maintain its "on" or "off" position after it has been actuated by means of a simple and light pressure of short course on the end of a control member, said pressure being exerted always in the same direction.

While a preferred embodiment according to the present invention has been illustrated and described it is understood that various modifications may be resorted to without departing from the spirit and scope of the appended claim.

Having described my invention I claim:

In an electric switch of the "push-push" type, said switch having a contact member for closing and opening a circuit and consisting of a strip slitted longitudinally to a pair of outside portions and a center portion, said portions being relatively deformed by peening so that the length of the center is different from the outside portions, a rocker fulcrumed over the contact member and substantially parallel thereto, a projection at each end of the rocker adapted

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to engage the corresponding end of the contact member, one of said projections engaging the center and the other projection the outside portions of the contact member respectively, means for passively retaining the rocker in either of its engaging positions with the contact member, the said rocker having an angularly diverging recess in its outer face opposed to the contact member on each side of the fulcrum, and an axially movable and spring retractable plunger for engaging in turn each of the recesses as said plunger is extended into said recesses, whereby the rocker is alternately rocked from one side to the other to engage the portions of the contact member causing said member to snap into circuit closing and circuit opening position.

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