United States Patent

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[33] Japan
[31] 44/16686

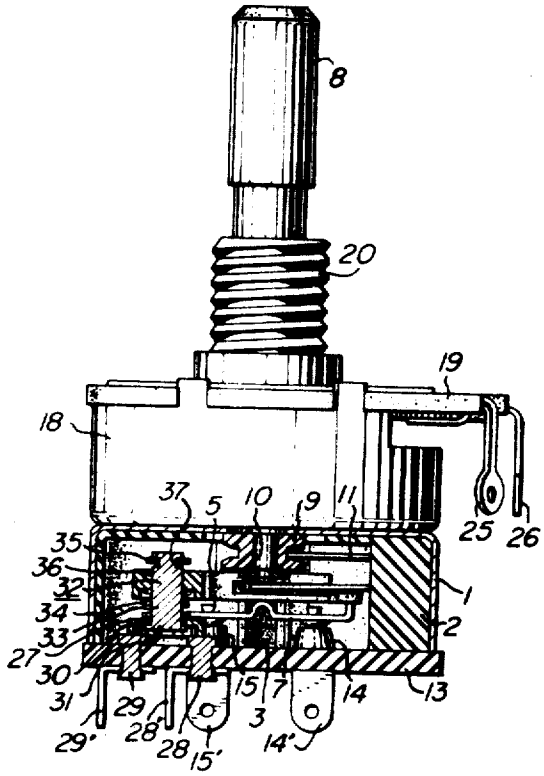
[54] **THREE POLE PULL-PUSH SWITCH**
1 Claim, 7 Drawing Figs.

[52] U.S. Cl. 200/76,
200/166 BE, 200/67 A, 338/172, 338/192
[51] Int. Cl. H01h 15/18
[50] Field of Search 200/76, 77,
67 A, 166 BE, 166 BF; 338/172, 198

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Primary Examiner—David Smith, Jr.
Attorney—Stevens, Davis, Miller and Mosher

ABSTRACT: A pull-push switch primarily adapted to be used in interlocking relationship with a variable resistor, wherein there are provided in total three sets of open-close contacts including one additional movable contact provided on the arcuate center portion of a U-shaped movable member of an insulating material which has been used in the conventional double-pole type switches, thereby making it possible to simultaneously open or close three circuits.



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SHEET 1 OF 2

FIG. 1
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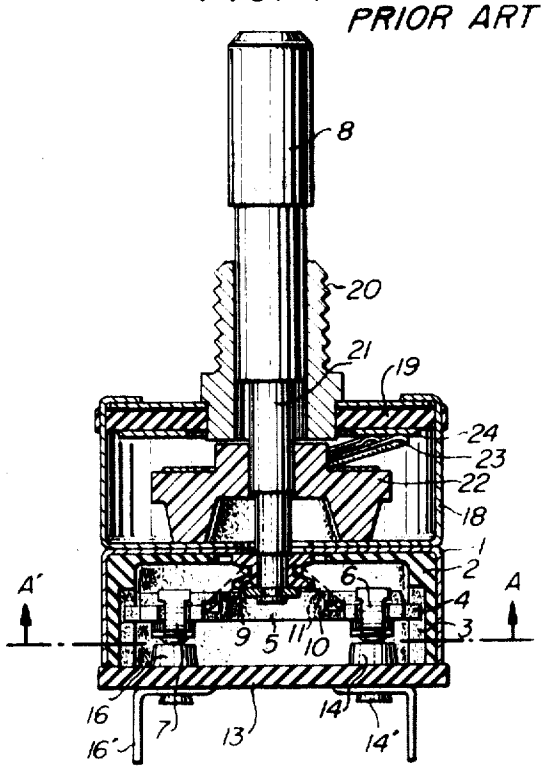


FIG. 2
PRIOR ART

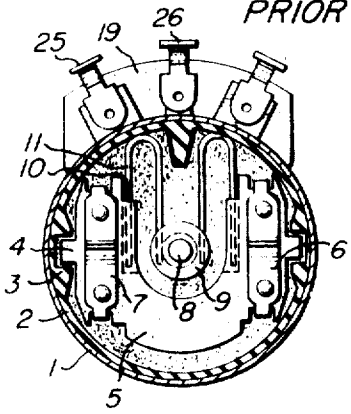
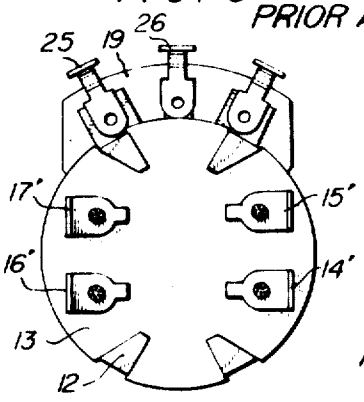


FIG. 3
PRIOR ART



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FIG. 4

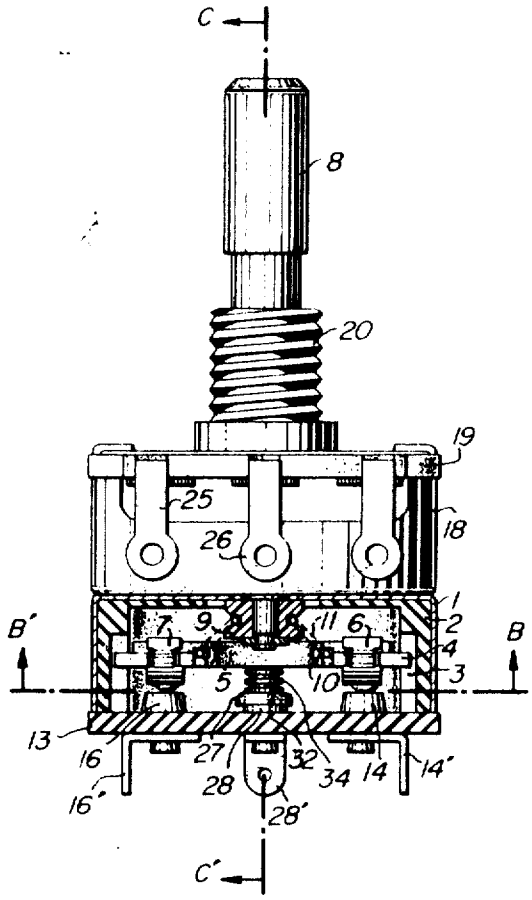


FIG. 5

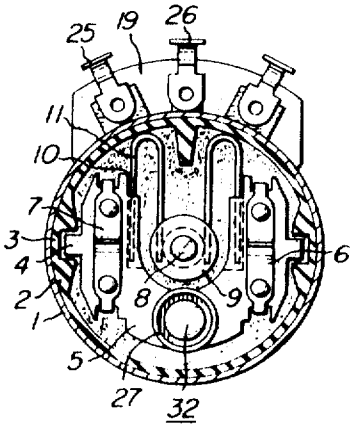


FIG. 6

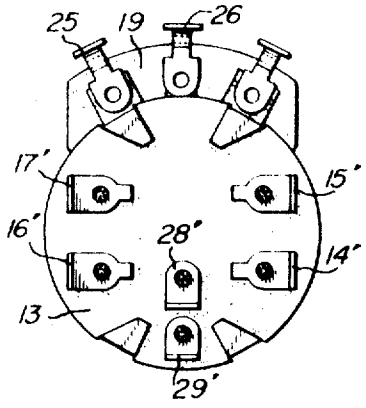
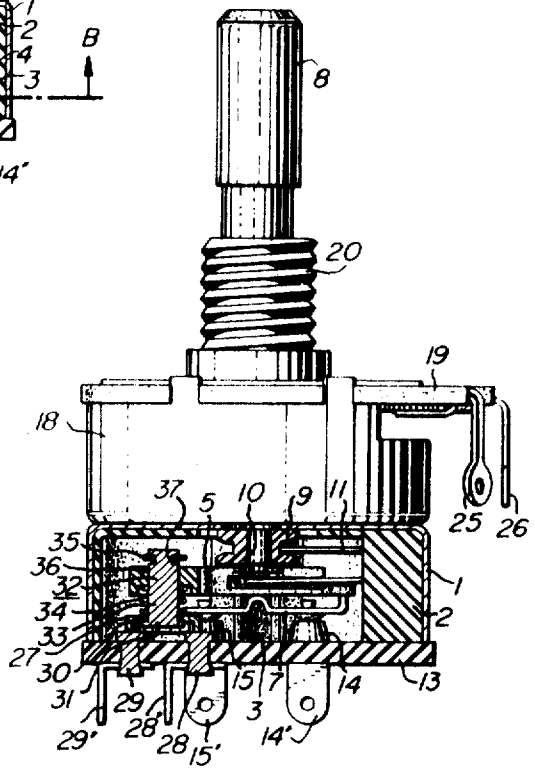


FIG. 7



THREE POLE PULL-PUSH SWITCH

This invention relates to a pull-push type of switch which is primarily used in interlocking relationship with a variable resistor.

The conventional pull-push type switches are of the single-pole or double-pole type. Recently, however, switches having an increased number of poles such as three-pole type ones have been required by complex circuits such as black-and-white television receivers, color television receivers and the like.

The present invention has been made to meet such requirements, and it is intended to convert a double-pole type switch into a three-pole type one through slight modifications to the former, thereby making it possible to simultaneously open or close three circuits.

Referring to FIGS. 1, 2 and 3, there is shown a conventional pull-push switch, wherein a cylindrical plastic case 1 constituted by a metal case or the like opening downwardly, guide grooves 3 are formed in the inner surface of the plastic case 2, and a U-shaped movable member 5 of an insulating material provided with projections 4 adapted for engagement with the guide grooves 3 are provided within the case 2. In the side portions of the lower surface of the movable member 5, there are provided two movable contacts 6 and 7. Further, an operating shaft 8 is axially movably provided at the center of the switch case 1, and a spring retainer 9 is provided on one end of the shaft 8. Two U-shaped springs 11 are interposed between a recessed groove of the spring retainer 9 and spring-holding portions 10 which are provided on the inner surface of the movable member 5 in opposing relationship to each other.

By pushing the operating shaft to displace it downwardly, the movable member 5 is upwardly retracted due to the resiliency of the springs 11, so that the switch is turned off. On the other hand, if the operating shaft 8 is pulled so as to be displaced upwardly as shown in FIG. 1, the movable member 5 is projected out to enable the movable contacts 6 and 7 to short circuit two pairs of fixed contacts 14, 15 (contact 15 not shown) and 16, 17 (contact 17 not shown) provided on a closure 13 which is attached to the opening bottom portion of the switch case 1 by bending the pliable-pieces 12, so that the switch is turned on. Thus, it is possible to open or close two circuits connected between external terminals 14', 15' and 16', 17' led out from the contacts 14, 15, 16 and 17, respectively.

A variable resistor case 18 constituted by a metal case opening only at the top is attached to the back of the switch case 1. A bearing 20 is mounted on the upper surface of the variable resistor case 18 through a base plate 19, and the aforementioned operating shaft 8 is disposed in rotatable and axially movable engagement with the bearing 20. By rotating the operating shaft 8, a slide piece mounting plate 22 of the variable resistor is rotated which is attached to a slotted portion 21 of the shaft within the variable resistor case 18 in such a manner that only rotational motion is transmitted thereto. Thereupon, a slide piece 23 attached to the mounting plate 22 is rotated in contact with a resistor 24 provided on the aforementioned base plate 19, with the center portion thereof being always disposed in contact with a contact plate (not shown). Thus, there is constituted a variable resistor wherein the resistance values between the side terminals 25 and the intermediate terminals 26 which are electrically connected with the resistor 24 and contact plate are varied.

It is an object of the present invention to provide a three-pole type pull-push switch in which one additional pole is provided by slightly modifying the aforementioned double-pole type pull-push switch.

In accordance with the present invention, there is provided a switch which reliably operated to simultaneously upon or close three circuits, by slightly modifying the conventional

double-pole pull-push switch. Furthermore, the switch according to the present invention has the same size as that of the conventional one, and therefore it can be advantageously utilized.

Other objects, features and advantages of the present invention will become apparent from the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a sectional side view showing a variable resistor having a conventional pull-push type switch attached thereto;

FIG. 2 is a sectional view taken along line A–A' of FIG. 1;

FIG. 3 is a front view of a bottom closure portion shown in FIG. 1;

FIG. 4 is a side view, partly in section, showing a variable resistor having a pull-push switch according to an embodiment of the present invention attached thereto;

FIG. 5 is a sectional view taken along line B–B' of FIG. 4;

FIG. 6 is a front view of a bottom closure portion shown in FIG. 4; and

FIG. 7 is a partial sectional view taken along line C–C' of FIG. 4.

As shown in the drawings, a dishlike movable contact 27 is mounted on the arcuate center portion of U-shaped movable member 5 formed of an insulating material to which two movable contacts 6 and 7 are attached, and a pair of fixed contacts 28 and 29 adapted to be engaged by the contact 27 are provided on the closure 13. In accordance with the present invention, the three contact means are simultaneously opened or closed.

Referring to FIG. 7, there is shown the construction of that portion where the additional movable contact 27 is mounted on the movable member 5, wherein the movable contact 27 is supported by a rivet 32 provided with a flange 31, the rivet being inserted through an aperture 30 formed in the movable contact 27. The movable contact 27 is pressed against the fixed contacts 28 and 29 provided on the closure 13, due to the pressure of a coil spring 34 loaded over the outer periphery of a smaller-diameter portion 33 of the rivet 32 so as to short circuit them, thus closing the circuit connected between the external terminals 28' and 29'. In the drawings, numeral 35 represents a stop washer fitted in a groove portion 37 of the rivet 32 to prevent the rivet 32 from being removed from a mounting aperture 36 formed in the movable member 5. The pressure of the coil spring 34 is considerably lower than that of the two U-shaped springs 11, since the springs 11 are somewhat stronger than in the case of the aforementioned double-pole type switch, lest the contact pressure imparted to the fixed contacts 14, 15 and 16, 17 by the other movable contacts 6 and 7 respectively should be decreased due to the pressure of the coil spring 34. The aperture 30 of the movable contact 27 is made slightly greater than the smaller-diameter portion 33 of the rivet 32 so that when the movable member 5 is somewhat inclined with respect to the closure 13, the movable contact 27 is inclined with respect to the rivet 32 so as to be positively pressed against the fixed contacts 28 and 29.

We claim:

1. A three-pole pull-push switch, comprising two movable contacts which are respectively provided on both arms of a U-shaped movable member movably provided in a switch case having an opening, a closure means attached to said opening, an element which is resiliently provided on the center portion of said U-shaped movable member, a third movable contact which is tiltably provided on said element, and an operating shaft movably provided on said switch case, said movable member being moved in accordance with the movement of said operating shaft through two U-shaped springs which are engaged with said operating shaft and said movable member, whereby said two movable contacts and said third contact are forced by said springs to respectively be in contact with three pairs of stationary contacts provided on said closure.