Jan. 21, 1930. J. SANDIN 1,744,245

ROTARY SWITCH

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Fig. 1

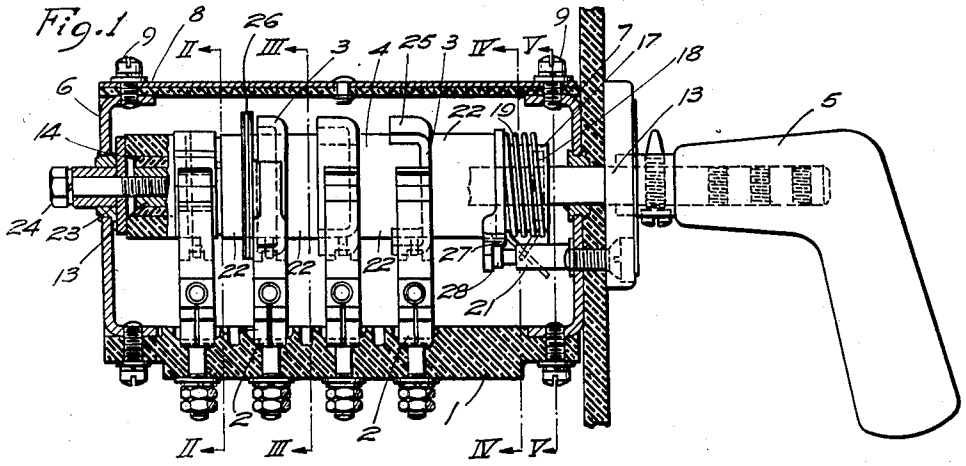


Fig. 2.

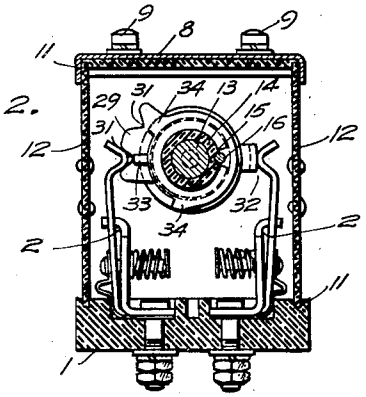


Fig. 3.

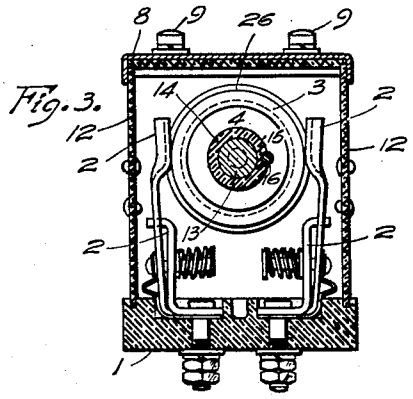


Fig. 4.

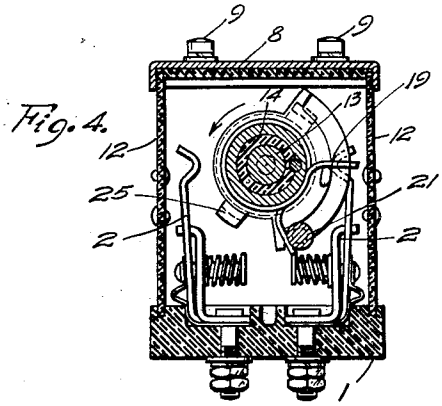
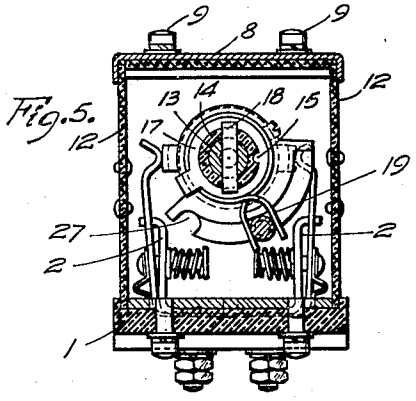


Fig. 5.



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Fig. 6.

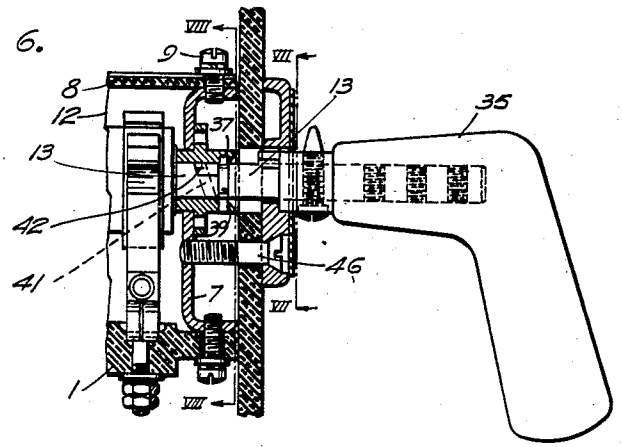


Fig. 7.

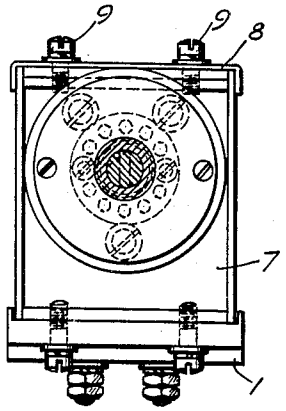
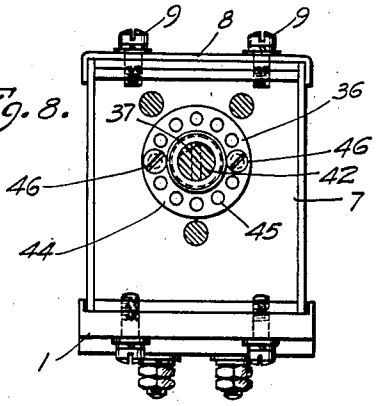


Fig. 8.



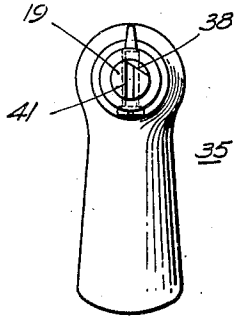


Fig. 9.

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UNITED STATES PATENT OFFICE

JEROME SANDIN, OF EAST PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

ROTARY SWITCH

Application filed October 6, 1928. Serial No. 310,687.

My invention relates to switches for electrical systems and more particularly to switches of the drum type.

One object of my invention is to provide a switch of the above-designated type that shall be rigid in construction and have a novel assembly that lends itself to wide variations in the shapes and the positioning of the contacts thereof.

Another object of my invention is to provide a pair of contacts for a switch of the above-designated type that shall be associated with a contact segment in all of its rotative positions and that shall be disconnected therefrom when the drum is moved longitudinally through the insertion of an insulating member therebetween.

A further object of my invention is to provide a plurality of switches with a guide for an operating key that shall be associated with the switches in a plurality of different positions in such manner that a different operating key will be required for each switch.

In practicing my invention, I provide finger contacts, a drum assembly and a housing therefor to form a drum-type switch that may be employed as a control switch for opening and closing a circuit interrupter and also as a metering switch to connect a meter to a plurality of circuits. Heretofore, drum switches of different types were employed for the services mentioned above but my drum assembly lends itself to satisfactory operation when employed in either service.

My invention will best be understood by referring to the drawings, in which;

Figure 1 is a view, in longitudinal section, of one embodiment of my invention,

Fig. 2 is a transverse sectional view in a plane represented by the line II—II of Fig. 1,

Fig. 3 is another transverse sectional view of the embodiment shown in Fig. 1, in a plane represented by the line III—III,

Fig. 4 is a transverse sectional view of the structure shown in Fig. 1, in a plane represented by the line IV—IV,

Fig. 5 is a transverse sectional view of the embodiment of my invention shown in Fig. 1, in a plane represented by the line V—V,

Fig. 6 is a longitudinal sectional view of the operating key and guide member embodied in my invention,

Fig. 7 is an end sectional view in elevation thereof in a plane represented by the line VII—VII,

Fig. 8 is an end sectional view of Fig. 6 in a plane represented by the line VIII—VIII, and

Fig. 9 is an end view, in elevation, of the operating key shown in Fig. 6.

My invention comprises, in general, an insulating base 1, whereon pairs of contact fingers 2 are mounted and oppositely disposed in spaced relation to each other and between which contact members 3 of a rotor 4 complete a circuit.

The embodiment of my invention shown in Figs. 1 to 5 is that of a control switch in which the rotor 4, along with a handle 5, is returned to "off" position when the handle 5 has been released after being moved either to circuit-closing or to circuit-opening position.

The rotor is supported in end plates 6 and 7 attached to the base 1 and having a top plate 8 attached thereto by bolts 9. Grooves 11 are formed in the top plate 8 and in the base 1, wherein insulating side plates 12 are slidable to completely enclose the rotor 4 and the contact fingers 2.

The rotor 4 comprises a metal shaft 13 that has thereon an insulating tube 14 in which a longitudinal groove 15 is cut to receive an insulating rod 16 which serves as a key for the members to be assembled.

A spring support 17 is first placed upon the tube 14 against a pin 18, as shown in Fig. 5. A double-acting spring 19 is carried by the spring-support 17 and is held in neutral position by a stationary pin 21, as will be more fully referred to hereinafter.

An insulating spacer 22 is next placed upon the tube 14 and, thereafter, contacts 3 and insulating spacers 22 are assembled alternately until the drum structure is completed. The spacing of the contact fingers 2 and the width of insulating members 22 are such that the contacts 3 are always directly opposite a pair of fingers 2.

After the various members are assembled on the tube 14, an end bearing plate 23 is attached to the end of the shaft 13 by a bolt 24, which assembly forces the insulating and contact members tightly together, in a manner shown in the broken section of the rotor 4, in Fig. 1.

The contact members 3 have contact portions 25 of different widths varying from 20° to 360° to meet the service requirements of any system. As it is desired to locate the contacts at various circumferential positions with relation to the handle, a plurality of notches or key ways are placed in the inner peripheries of the contact members 3.

As pointed out above, the spring 19 is employed to always return the handle to neutral position after tripping or closing the breaker, a signal lamp (not shown) being provided to inform the operator whether or not the circuit interrupter is in closed position. When the system is shut down for a considerable time, it is desirable to cut off the signal lamp and trip coil circuit and this I accomplish by a longitudinal movement of the drum 4.

Referring to Figs. 3, 4 and 5, the contact members 3 of Fig. 3 is in circuit with both of the fingers 2 in all the rotatable positions of the drum 4. An insulating ring 26 of greater diameter than the adjacent contact member 3 serves to lift the fingers 2 from engagement with that member when the rotor 4 is pulled forward, thereby cutting off the control circuit from the trip coil and the signal lamp.

The spring support 17 is provided with an extension having a notch 27 on the periphery thereof that passes over a head 28 of the pin 21 when the rotor has been moved to its trip position and pulled longitudinally. The notch 27 passes over the head 28 and is locked against longitudinal movement, retaining the handle in trip position, with the signal lamp switched off, informing the operator that the main circuit has been disconnected.

A lost-motion contact is shown in Fig. 2 comprising a contact segment 29 having notches 31 on one contact portion and a plain contact tip 32 diametrically opposite thereto. Projections 33 are located adjacent to the notches 31 and are engaged by pairs of rotatable lugs 34 to operate the segment 29.

When the handle returns to neutral position, the segment 29 is retained in its rotated position by a notch 31 engaging a finger 2. When the handle is moved to its other position another pair of lugs 34 actuate the segment 29 to its other position, being held in this position by the other notch 31 when the handle returns to neutral position.

Fig. 6 discloses a second embodiment of my invention, in which the contact members are assembled to form a switch employed for metering service. This type of switch may have a fixed or a detachable handle, as the spring-return feature found on the control switch, as pointed out above, is not ordinarily employed on switches of this type.

The assembly shown in Fig. 6 includes a detachable operating key 35 that may be removed after the switch has been returned to neutral position and is designed to fit no other switch in a particular group, so that the danger of operating the wrong switch will be avoided. This variation in the type of key employed on a plurality of different switches, I accomplish in a novel and cheap manner by supplying a guide member 36 having a lug 37 projecting from its inner periphery that prevents a cylindrical rod from being inserted therein. It is necessary, therefore, to have the side of the key machined flat, as designated by numeral 38 in Fig. 9, and, in order that the key may rotate after being inserted in the guide, an annular groove 39 is provided.

A projection 41 that may be slightly off the center axis of the rod 13, extends from the end thereof and is machined at an angle, as shown in Fig. 6, so that a cooperating groove 42 in the end of the rod 13 on which the contacts are assembled may be engaged by the projection 41 only in one position in a revolution of 360°.

The guide member 36 has a flange portion 44 that has a plurality of mounting holes 45 therein. The guide member 36 is fastened to the end bracket 7 by means of bolts 46 that may be inserted in any of the mounting holes 45 to thereby position the lug 37 in different angular relations to the slot 42 in such manner that each different position thereof requires an operating key 35 that has the machine portion 38 associated with the projection 41 in identical relation to that of the lug 37 with the slot 42. Such an arrangement changes the operating key for my metering switches by merely removing the two bolts 46 and clamping the guide member 36 to the plate 7 by means of another pair of mounting holes 45.

It will thus be seen that I have provided a drum-type switch with a rotor that has such a flexible manner of assembling the contact fingers thereof that a switch may be built up either for circuit controlling or for metering.

My switch is further novel in providing a positive means for cutting out the control circuit when the apparatus is not to be used for sometime, which means inserts an insulating member between the contact fingers and locks the switch in this position.

I have also provided a very simple arrangement for obtaining protection in the operation of my metering switches by supplying a series of keys for the various switches, the switches differing only in the position of a single guide member that is mounted in different angular positions with reference thereto.

I do not wish to be limited to the particular structure herein shown, as many changes, additions, subtractions and substitutions may be made therein without departing from the spirit and scope of my invention. I, therefore, do not wish my structure to be limited beyond that imposed by the prior art.

I claim as my invention:

1. The combination, in a rotor for a control switch, of a shaft having an insulating covering in which a longitudinal groove is cut, a rod associated with the grove and employed as a key, conducting and insulating members assembled on the shaft, the said members having notches that conform to the key, and a bearing plate associated with the end thereof for locking the assembly longitudinally to form a unitary structure.

2. The combination, in a rotor for a control switch, of a shaft having an insulating covering in which a longitudinal groove is cut, a rod associated with the groove and employed as a key, contact members slidable over the said insulating covering for the shaft having a plurality of notches on its inner periphery that are spaced to permit the contacts to be position in any desired circumferential relation through the association of the proper notch with the key.

3. The combination with a shaft having a handle attached thereto, of a series of contact members assembled thereon and insulated from each other and the shaft, a plurality of pairs of contact fingers selectively associated with the contact members at predetermined positions of the handle, a pair of contact fingers associated with a contact member at all rotatable positions of the handle, and insulating means inserted between the contact fingers of the last named pair when the handle and rod are moved longitudinally.

4. The combination with a shaft having a handle attached thereto, of a series of contact members assembled thereon and insulated from each other and the shaft, a plurality of pairs of contact fingers selectively associated with the contact members at predetermined positions of the handle, a pair of contact fingers associated with a contact member at all rotatable positions of the handle, insulating means inserted between the contact fingers of the last named pair by the movement of the handle and shaft longitudinally, and locking means for the handle including a notched member and a pin over which the notch passes to retain the switch in longitudinally moved position.

5. The combination with a shaft having a plurality of contact members assembled thereon, of an operating key therefor adapted to rotate the shaft, means on one end of the shaft for receiving the said operating key, guide means for the key having a lug thereon adapted to prevent the passage of the key therethrough in all except one predetermined position, means for shifting the guide means to vary the relation of the lug with the receiving means of the shaft to thereby require different operating keys for a plurality of switches.

6. The combination with a switch structure including a frame and a shaft rotatable thereon that is provided with a key-engaging means on one of its ends, of a series of contact members supported on the shaft, a key for rotating the shaft having means on the end thereof engageable with the means on the end of the shaft in a single position, a key guide having a lug thereon conforming to the shape of the key to permit passage thereof in a single relative position and means for changing the position of the lug with respect to the key-engaging means, including a plurality of mounting holes in the flange thereof.

7. The combination with a switch of the drum type having rotatable contact members cooperating with engaging fingers at predetermined positions of the drum, of a contact member having an insulating member associated therewith of greater diameter than that of the said contact member, cooperating engaging fingers therefor adapted to engage the contact member at all positions of the drum, means for moving the drum longitudinally to thereby insert the said insulating member between the cooperating engaging fingers and locking means, including a notch and a grooved pin adapted to retain the drum in longitudinally moved position until the notch has been released from the engaged groove.

In testimony whereof, I have hereunto subscribed my name this 22nd day of September, 1928.

JEROME SANDIN.