Sept. 18, 1934. J. L. LAPPIN 1,974,310

ELECTRIC SWITCH

Filed June 21, 1933

Fig. 1.

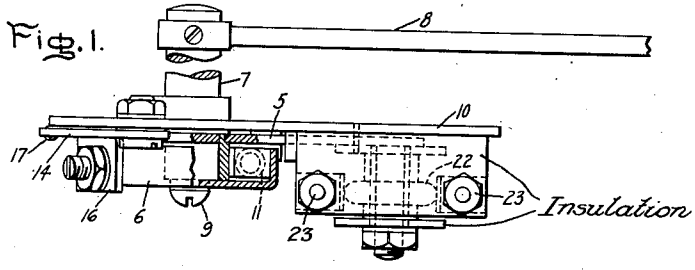


Fig. 2.

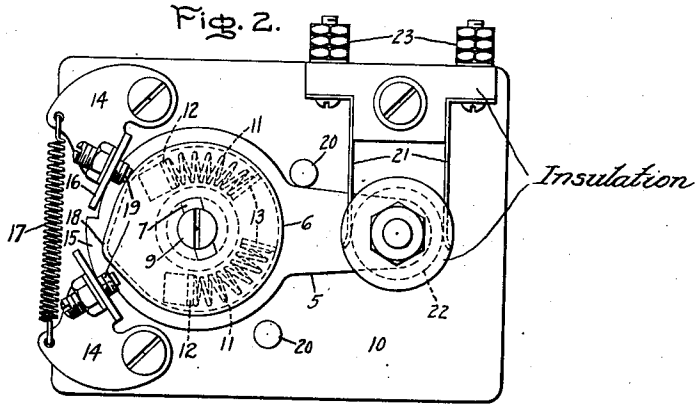


Fig. 3.

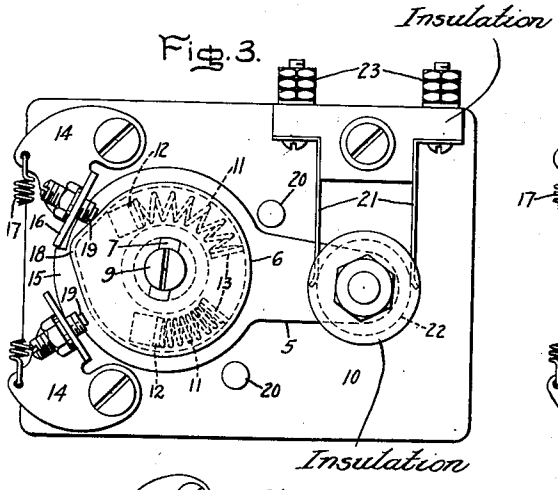


Fig. 4.

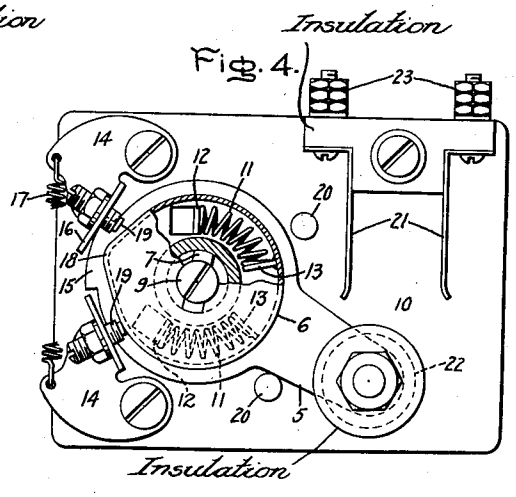
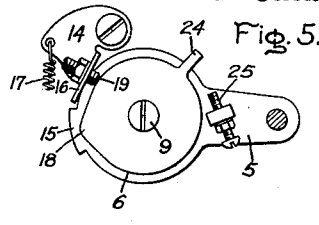


Fig. 5.



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ELECTRIC SWITCH

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Application June 21, 1933, Serial No. 676,867

3 Claims. (Cl. 200—70)

My invention relates to improvements in electric switches and more particularly to improvements in auxiliary electric switches which are used in conjunction with the operating mechanisms of electric power switches for controlling various auxiliary circuits, such as for example the energizing circuit of the operating mechanisms, in accordance with the particular circuit controlling positions of the power switches themselves.

When power switches are electrically operated, it is usually necessary that the energization of the operating mechanism be positively effected and concluded at critical points of the operating cycle in order to insure positive switch closure and free opening without damage to the parts. Moreover, the operating mechanism may draw a relatively heavy current which tends to maintain an arc unless the interruption is quickly and effectively made. In accordance with these requirements, an object of my invention is to provide an improved electric switch whereby a circuit controlling operation is quickly performed in response to a definite travel of the part to be controlled. Another object is to provide an improved switch whereby the control will be automatically changed to provide for the reverse movement of the controlled part.

My invention will be better understood from the following description when considered in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

In the accompanying drawing, Fig. 1 is a plan view partially in section of an electric switch embodying my invention; Figs. 2, 3 and 4 are side elevations of the switch shown in Fig. 1; Fig. 2 showing the switch closed, Fig. 3 just about to open and Fig. 4 open; and Fig. 5 illustrates a modification of a part of the switch shown in Fig. 1.

The illustrated embodiment of my invention is an auxiliary electric switch for use in conjunction with circuit breakers and the like. As shown, the switch includes a circuit controlling member 5 which is movable to a plurality of positions and means including an operating member 6 for moving the circuit controlling member 5 first in one direction to one of said positions, shown for example in Fig. 2, and next in the opposite direction to another of said positions, shown for example in Fig. 4. For actuating the operating member 6 in accordance with the position of a part or parts of the power switch to be controlled, this member may be rigidly secured in any suitable manner to a shaft 7 which is, in turn, coupled to the power switch mechanism through a crank 8 also rigidly secured in any suitable manner to the shaft 7. In the particular arrangement shown the operating member 6 is slotted to receive the flattened end of the shaft 7 and is secured thereto by a screw 9. The shaft 7 is suitably journaled in a supporting plate 10 which also serves to carry the rest of the switch parts and which may be suitably secured to the power switch structure, or otherwise as desired. Also, as shown, the circuit controlling member 5 is mounted on the shaft 7 so as to rotate or turn freely thereon. The operating and circuit controlling members are, therefore, concentrically mounted.

In order to effect a quick movement of the circuit controlling member 5 whereby to obtain a quick break, I provide means which is interposed between the operating and circuit controlling members 5 and 6 and in which energy is adapted to be stored when the operating member is moved in either direction. As shown, this means is of a resilient type and includes springs 11 which are positioned between projections or abutments 12, 13 on the circuit controlling and operating members, respectively, so that on movement of the operating member in one direction, clockwise with reference to Fig. 2, the lower spring is compressed as shown in Fig. 3, but on movement in the opposite direction counterclockwise with reference to Fig. 4, the upper spring is compressed.

In order to prevent movement of the circuit controlling member 5 until the desired point in the cycle of operation has been reached and so as to obtain a quick break action, I provide means for preventing movement of the circuit controlling member 5 until one or the other of the springs 11 has been suitably compressed and the proper point in the operating cycle reached. As shown, this means includes latches 14, which are so mounted that one or the other of them engages one of the shoulders of a projection 15 on the circuit controlling member 5 through a flange 16. The latches 14 may be pivotally mounted on the plate 10 for rotation into and out of latching position and they are biased to latching position by any suitable resilient means such as a spring 17.

In order to release the engaged latch at the correct point in the movement of the operating member 6, this member may be provided with a cam portion 18 which is arranged to engage suitable stubs 19 which may be adjustably mounted on the latches 14.

In order to limit the rotation of the circuit controlling member 5 in either direction, suitably positioned stops 20 may be provided.

The particular type of contact construction which may be employed in electric switches embodying my invention is more or less immaterial but I prefer to use an arrangement which provides something in the nature of a high pressure point or line contact and a quick, satisfactory break and at the same time avoids the necessity for flexible leads, pig tails and the like. In the illustrated embodiment of my invention the switch is provided with suitably insulated fixed contacts 21 which are arranged to be bridged by a suitably insulated roller type contact 22 pivotally mounted on the free end of the circuit controlling member 5. The contact face of this roller may be convex, as shown in Fig. 1, in order to provide a high pressure point or line contact. Suitable terminals 23 are associated with the stationary contacts 21.

Referring now to Fig. 2 which shows the circuit controlling member 5 in the circuit closing position and assuming that movement of the crank 8 occurs by reason of the operation of the mechanism with which the auxiliary switch is associated so as to turn the operating member 6 clockwise, the lower spring 11 will be compressed to the position shown in Fig. 3 and this will produce a slight movement of the circuit controlling member 5 to effect a preliminary starting of the circuit controlling member and thereby to break up any tendency for contact sticking. Further movement of the member 5 will be prevented by reason of the upper latch 14 engaging the upper shoulder of the projection 15 on the circuit controlling member 5 until such time as the cam portion 18 of the operating member 6 engages the stub 19 on the upper latch 14 and moves it away from the shoulder. The lower spring 11 which is under compression is then free to release its stored energy and will quickly snap the circuit controlling member 5 to the open circuit position shown in Fig. 4.

In the event of contact sticking which the spring pressure cannot break, a positive starting of the circuit controlling member 5 can be obtained by providing the operating member 6, as shown in Fig. 5, with a lug 24 which is arranged to engage the circuit controlling member 5 through means adjustably positioned thereon such as the screw 25 at a predetermined point in the movement of the operating member. The means 25 will be so adjusted as to be engaged by the lug 24 at the instant the upper latch 14 is released in the circuit opening movement.

The circuit closing operation is effected by a counterclockwise movement of the operating member 6 in response to a corresponding movement of the shaft 7. In this case the upper spring 11 is compressed and at a certain point in the movement the cam portion 18 of the operating member 6 releases the lower latch 14 from the lower shoulder of the projection 15 on the circuit controlling member 5 whereupon the energy in the upper spring 11 is released to snap the circuit controlling member 5 quickly into the position shown in Fig. 2 where the roller contact 22 bridges the stationary contacts 21.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. An electric switch including a movable circuit controlling member, a contact engageable thereby, means for moving said member out of engagement with said contact including an operating member, resilient means interposed between the operating member and the circuit controlling member for storing energy when the operating member is actuated, means for latching said circuit controlling member against movement including a latch engageable with said circuit controlling member after a predetermined movement thereof whereby to provide an initial starting movement of the circuit controlling member relatively to its cooperating contact, means for biasing said latch to latching position, means for releasing said latch after a predetermined movement of the operating member whereby to release the energy stored in said resilient means to effect movement of the circuit controlling member away from said contact.

2. An electric switch including a movable circuit controlling member, a contact engageable thereby, means for moving said member out of engagement with said contact including an operating member, resilient means interposed between the operating member and the circuit controlling member for storing energy when the operating member is actuated, a latch engageable with said circuit controlling member, means for biasing said latch to latching position, means for releasing said latch after a predetermined movement of the operating member whereby to release the energy stored in said resilient means to effect movement of the circuit controlling member away from said contact, and means associated with said operating member for positively starting said circuit controlling member immediately following the release of said latch.

3. An electric switch including a circuit controlling member movable to a plurality of positions, a contact engageable thereby in one of said positions, means for moving said member first in one direction and next in the opposite direction including an operating member movable in each of said directions, resilient means interposed between the operating member and the circuit controlling member for storing energy when the operating member is moved in either direction, a latch engageable with said circuit controlling member in one of the circuit controlling positions thereof, another latch engageable with said circuit controlling member after a predetermined movement thereof in one direction whereby to provide an initial starting movement of the circuit controlling member relatively to its cooperating contact, resilient means interconnecting said latches for biasing them to latching position, means for releasing the engaged latch after a predetermined movement of the operating member whereby to release the energy stored in the resilient means between the operating member and the circuit controlling member to effect movement of the circuit controlling member from one position to another.

JOHN L. LAPPIN.