July 1, 1930. S. GERSMANN ET AL 1,768,756

SWITCH MECHANISM

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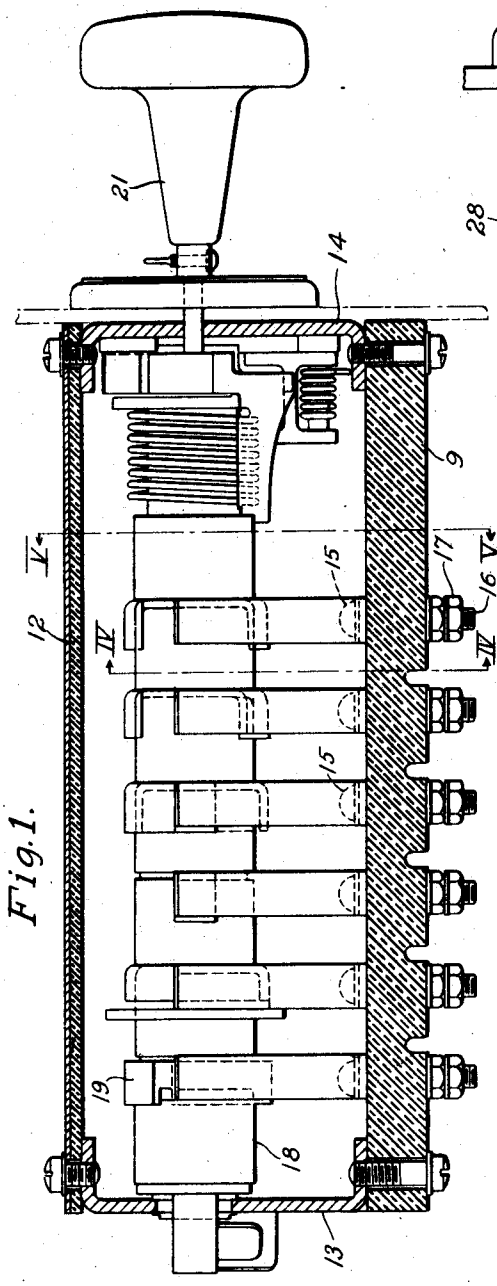


Fig. 1.

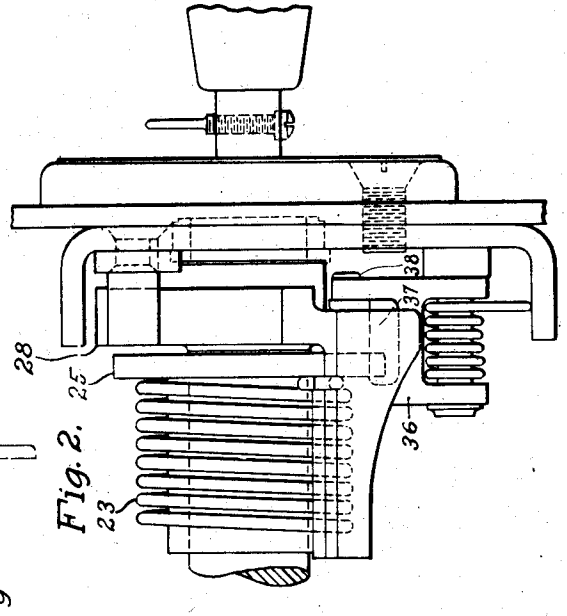


Fig. 2.

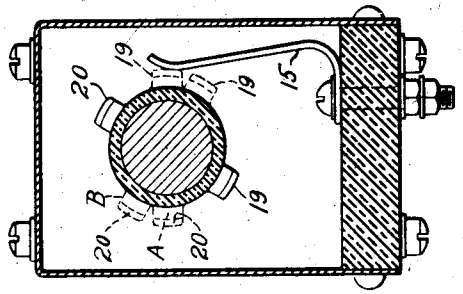


Fig. 4.

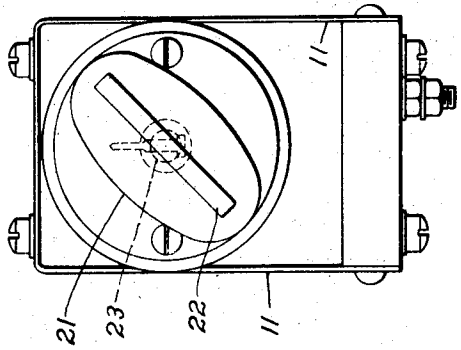


Fig. 3.

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Fig. 5.

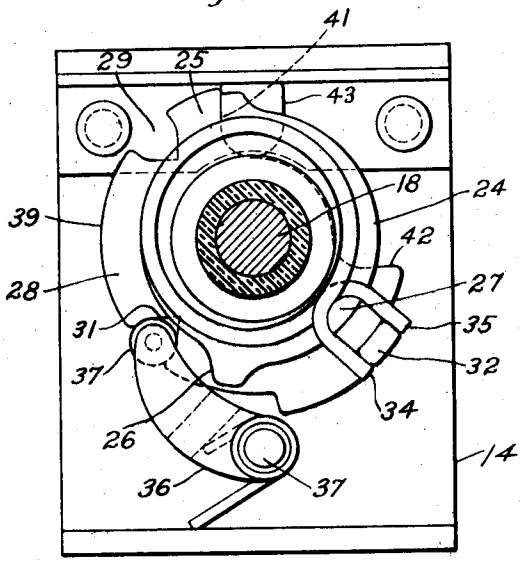


Fig. 6.

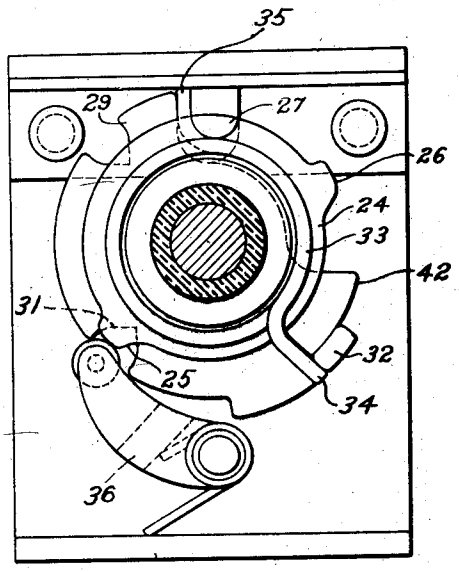


Fig. 7.

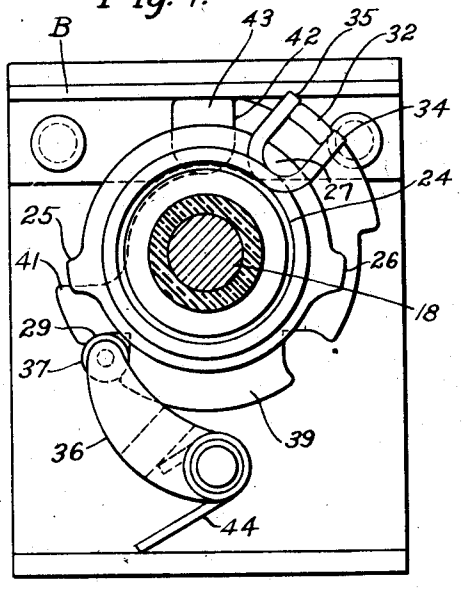
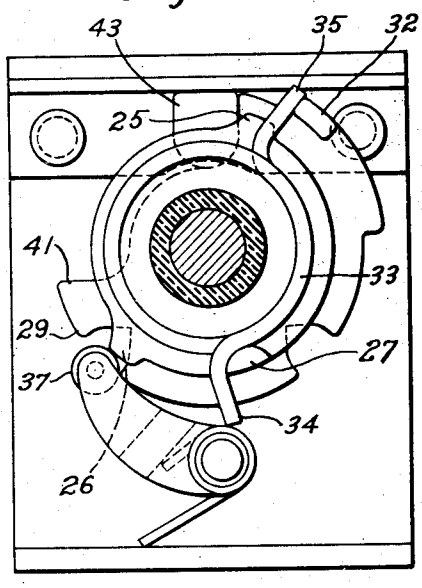


Fig. 8.



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UNITED STATES PATENT OFFICE

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SWITCH MECHANISM

Application filed June 23, 1928. Serial No. 287,804.

Our invention relates to switch mechanisms and particularly to switch mechanisms for controlling the operation of circuit breakers that are actuated by electromagnetic controlling devices.

An object of our invention is to provide a switch mechanism for controlling circuit breakers wherein the operating handle is moved, after each operation, from one operative position, to a position in which it indicates the last operation of the control switch.

Another object of our invention is to provide a control switch for circuit breakers wherein the switch is movable to two alternative positions for effecting operation of the circuit breaker and wherein the operating handle and the switch are automatically returned to predetermined positions when released by the operator, and wherein the switch is normally maintained in open position in either of two positions.

A further object of our invention is to provide a control switch for circuit breakers wherein the switch is moved out of engagement with the stationary contact members thereof with a snap action and wherein the mechanism for accomplishing the above noted results is of simple construction and economical to manufacture.

These and other objects that will be made apparent throughout the further description of our invention are attained by means of the control-switch mechanism hereinafter described and illustrated in the accompanying drawings, wherein

Figure 1 is a longitudinal section through a control switch embodying features of our invention.

Fig. 2 is an enlarged side elevational view of a portion of the control switch shown in Fig. 1.

Fig. 3 is an end elevation of the control switch shown in Fig. 1.

Fig. 4 is a transverse section through the control switch shown in Fig. 1, taken on the line IV—IV thereof, and

Figs. 5, 6, 7 and 8 are transverse sections through the control-switch mechanism shown in Fig. 1, taken on the line V—V thereof and showing the parts in different operating positions.

Referring to the drawings, the control switch comprises a casing having an insulating bottom wall 9, insulating side walls 11, an insulating top wall 12 and metal end walls 13 and 14. Stationary contacts 15 are mounted on the insulating base 9, the terminals thereof extending through the base and terminating in threaded terminals 16 for receiving clamping nuts 17 which serve to secure the conductors to the contact members.

A switch shaft 18 is rotatably journaled in the end walls 13 and 14. Switch contact members 19 are secured to the insulating switch shaft 18 and are adapted to engage the stationary contact members 15. The shaft is provided with an operating handle 21 that is mounted exteriorly of the casing and serves to indicate the position of the switch shaft and the switch contacts with respect to the stationary contacts. The knob portion of the operating handle is oval in cross section and is provided with an elongated rectangular washer 22 that is retained in place by a screw 23 which serves to secure the operating handle to the switch shaft 18.

The switch shaft may be rotated through substantially 110°, in which extreme positions of movement the switch contacts engage their respective stationary contact members 15.

To trip open a circuit breaker or to cause the closure of the circuit breaker, it is necessary only to momentarily close the circuit through the control switch contacts, and means are provided for automatically reversing the movement of the switch shaft when the operator has released the operating handle. It is desirable, however, that the operating handle shall indicate the last operation of the control switch and, therefore, means are provided for moving the switch to two separate neutral positions angularly disposed substantially 90° apart.

Referring to Fig. 4, it will be noted that the switch contacts 19 and 20 are in their open positions, such as they will occupy after

the switch contacts have been moved from the horizontal position as shown by dotted lines A, wherein the switch contact member 20 is in engagement with the stationary contact member 15. When the operating handle is released, the spring, to be hereinafter described, automatically reverses the movement of the switch which is subsequenty arrested in the position shown in full lines in Fig. 4.

In order to cause the switch contacts 19 to engage their respective contact member 15, the switch shaft 18 is rotated counter-clockwise (Fig. 4) through substantially 110° until the switch contacts are again in the dotted line position A. When the contact has been made and the operator has released the operating handle, the aforementioned spring will reverse the movement of the switch, which movement will be arrested when the switch contacts are in the dot and dash line position B. By reason of the separate neutral positions occupied by the switch and operating handle after each operation, the operating handle indicates the operation last performed by the switch. It is obvious that, if the operating handle were returned to the same neutral open position, there would be no indication of what operation had last been performed.

Referring to Figs. 2, 5, 6, 7 and 8, the switch-controlling-and-actuating mechanism comprises a cam plate 24 that is fixed to the switch shaft 18 and is provided with a pair of latch-releasing lugs 25 and 26, and an inwardly extending bar 27, the purpose of which will hereinafter appear. The positioning plate 28 is rotatably mounted upon the shaft 18 and is provided with positioning notches 29 and 31 and an inwardly extending bar 32. A helical spring 33 surrounds the operating shaft and the free ends 34 and 35 thereof engage opposite sides of the bars 27 and 32 and are biased toward each other in such manner that the spring ends tend to move the bar 27 and the switch shaft to a predetermined position which is determined by the position of the positioning plate 28.

The position of the positioning plate 28 is controlled by a pawl 36 that is pivotally mounted upon a shaft 37 which is secured to the end wall 14. The pawl 36 is bifurcated, and a roller 37 is rotatably mounted upon a shaft 28 between the forks of the pawl 36 in such position that the roller rides upon the peripheral edge 39 of the positioning plate and wherein it may be forced into the positioning notches 29 and 31 thereof when the notches register with the roller. When the roller 37 is pressed within the notches 29 and 31, movement of the positioning plate is arrested until the pawl and roller are withdrawn from the notches.

The positioning plate 28 is provided with two shoulders 41 and 42 that are adapted to engage a stop lug 43 secured to the end wall 14 to serve to limit angular movement of the positioning plate and to permit angular movement thereof through substantially 90°.

As indicated in Fig. 5, the switch shaft occupies the position shown in Fig. 4. The position of the operating handle, which corresponds to the position of the switch shaft, indicates that, at the last operation of the control switch, the switch contact 20 engaged its respective stationary contact member 15.

When it is desired to cause the switch contact member 19 to engage the stationary contact member 15 the shaft 18 is rotated counter-clockwise through substantially 110°, thus bringing the contact member 19 into engagement with a contact member 15. At this time, the cam plate 24 occupies the position shown in Fig. 6 wherein the lug 25 has caused the pawl 36 to release the roller from the notch 31.

It will be noted that the bar 27 on the cam plate has caused the end 35 of the spring 33 to be moved away from the end 34, thus placing the end 34 under tension which, upon the release of the positioning plate 28, by withdrawal of the pawl 36, causes counter-clockwise rotation of the positioning plate through substantially 90° or until the shoulder 42 has engaged the stop lug 43.

The stop plate will then occupy the position shown in Fig. 7, and the roller 37 is forced into the notch 29 as a result of the action of the coil spring 44 which normally biases the pawl 36 into contact with the peripheral edge 39 of the positioning plate. When the operator releases his grip upon the operating handle the spring end 35, which is under tension, causes the cam plate and the switch shaft and its operating handle to be moved in the reverse direction until the movement of the spring end 35 is arrested by engagement of the bar 32 on the positioning plate. The switch shaft 18 will, at such time, occupy the position B shown in Fig. 4. The switch contact 19 is thus moved to neutral position and the operating handle indicates the last operation of the switch.

In order to cause the switch contacts 20 to momentarily engage their respective contact members 15, the switch shaft 18 is rotated from the position B to the position A in Fig. 4, in a clockwise direction, through substantially 110°. At this time, the lug 26 of the cam plate forces the roller 37 out of engagement with the notch 29, as indicated in Fig. 8. The spring end 34 has been moved away from the spring end 35 by the bar 27 on the cam plate and, when the roller 37 clears the notch 29, the spring end 35, engaging the bar 32 on the positioning plate, causes the latter to be moved, through substantially 90°, to the position shown in

Fig. 5. Release of the operating handle permits the spring end 34 to reverse the movement of the switch shaft and move it in a counter-clockwise direction until the switch end 34 engages the bar 32 on the positioning plate. Thus, the switch and its operating handle are moved to the neutral position indicated in full lines in Fig. 4.

By reason of this construction, the switch is opened with a snap action when the operator releases the operating handle after closing operation of the switch. The switch and operating handle are thus automatically moved to a neutral position which indicates the last operation of the control switch.

While we have illustrated but one embodiment of our invention, it will be apparent to those skilled in the art that various changes, modifications, substitutions, additions and omissions may be made in the apparatus illustrated without departing from the spirit and scope of our invention, as set forth in the appended claims.

We claim as our invention:

1. Switch mechanism comprising a contact member, a movable switch member for engaging the contact member, an operating member connected to the switch member and movable a predetermined distance to effect engagement of the switch member with the contact member, means for reversing the movement of the operating member, when released for disengaging the switch member from the contact member, and means for arresting reverse movement of the operating member after it has moved a predetermined distance and before it reaches its orginal position.

2. Switch mechanism comprising a contact member, a movable switch member for engaging the contact member, an operating member connected to the switch member and movable a predetermined distance to effect engagement of the switch member with the contact member, means for reversing the movement of the operating member and switch member when released for disengaging the switch member from the contact member, and means for arresting reverse movement of the operating member and the switch member after they have moved a predetermined distance and before it reaches its orginal position.

3. Switch mechanism comprising a contact member, a movable switch member for engaging the contact member, an operating member connected to the switch member and movable a predetermined distance to effect engagement of the switch member with the contact member, means for reversing the movement of the switch member when the operating member is released for disengaging the switch member from the contact member, and means for arresting reverse movement of the switch member after it has moved a predetermined distance and before it reaches its original position.

4. Switch mechanism comprising a contact member, a movable switch member for engaging the contact member, an operating member connected to the switch member and movable a predetermined distance to effect engagement of the switch member with the contact member, means for reversing the movement of the switch member when the operating member is released for disengaging the switch member from the contact member, and a movable stop member for arresting reverse movement of the switch member after it has moved a predetermined distance and before it reaches its original position.

5. Switch mechanism comprising a contact member, a movable switch member for engaging the contact member, an operating member connected to the switch member and movable a predetermined distance to effect engagement of the switch member with the contact member, means for reversing the movement of the switch member when the operating member is released, a movable stop member for arresting reverse movement of the switch member after it has moved a predetermined distance, and means actuated by the operating member for controlling the movement of the stop member.

6. Switch mechanism comprising a contact member, a movable switch member for engaging the contact member, an operating member connected to the switch member and movable a predetermined distance to effect engagement of the switch member with the contact member, means for reversing the movement of the switch member when the operating member is released, a movable positioning member for the switch for arresting reverse movement of the switch member after it has moved a predetermined distance, and a latch actuated by the operating member for retaining the positioning member in any of a plurality of operating positions.

7. Switch mechanism comprising a pair of contact members, a switch member movable a predetermined distance in opposite directions for engaging the contact members, spring means for reversing movement of the switch member after it has been moved to an operative contact engaging position and has been released for disengaging the switch member from the contact member, and a positioning member for limiting reverse movement of the switch member from either of its operative positions and for arresting its movement before it reaches an intermediate position.

8. Switch mechanism comprising a pair of contact members, a switch member movable a predetermined distance in opposite directions for engaging the contact mem-

bers, an operating member connected to the notch member and movable a predetermined distance to effect engagement of the switch member with the contact members and having an indicating means thereon for indicating the position of the switch member, means for reversing the movement of the operating member and switch member when released for disengaging the switch member from the contact member, and means for arresting reverse movement of the operating member and the switch member after they have moved a predetermined distance, less than half the distance between operative positions, whereby the indicating means is positioned to indicate the last operation of the switch member.

In testimony whereof, we have hereunto subscribed our names this 15th day of June, 1928.

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BENJAMIN I. HAYFORD.