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CIRCUIT BREAKER

Filed Nov. 26, 1920

Fig. 1.

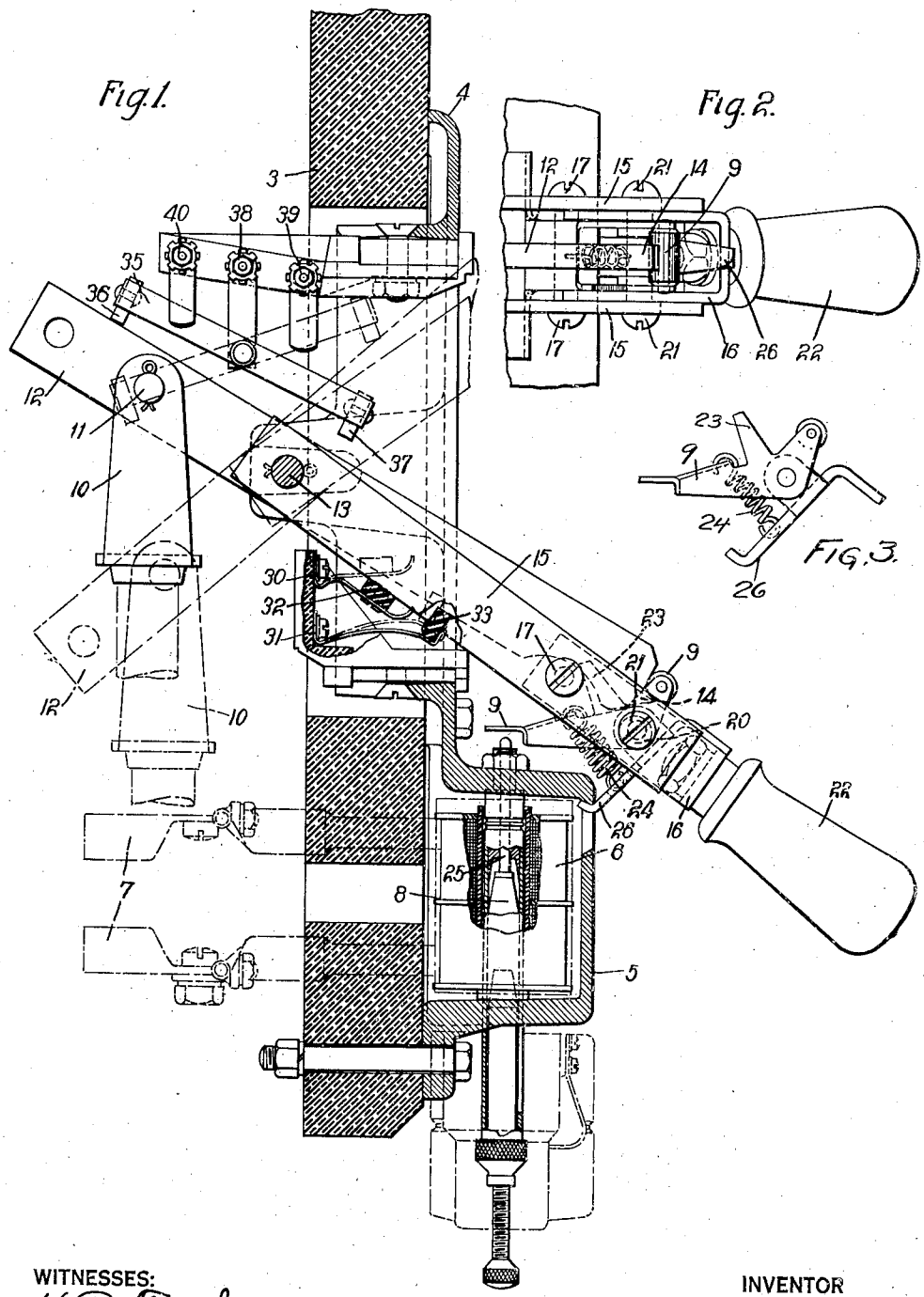


Fig. 2.

FIG. 3.

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CIRCUIT BREAKER.

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My invention relates to circuit breakers and particularly to the operating mechanism whereby the same are opened and closed, either automatically or manually.

The object of my invention is to provide an operating mechanism that shall be more simple and efficient than those heretofore employed and one wherein the automatic signalling device normally associated with apparatus of this kind may be applied in a simple and convenient manner.

Heretofore, in operating mechanisms of this character, the connections whereby signalling circuits were actuated, and the construction of the locking mechanism for the moving parts, have been complicated in design, where a high degree of efficiency was required.

One embodiment of my invention is shown in the accompanying drawing wherein—

Figure 1 is side view, partially in elevation and partially in section, of a portion of a circuit breaker, with my device embodied therein.

Fig. 2 is a detail plan view showing the manner in which the operating lever and handle are assembled, and

Fig. 3 is a detail view of a portion of the latching mechanism.

The mechanism is mounted on a panel 3, which may be of the usual form, and is supported by a cover plate 4 which, at its lower end, has a housing 5 within which is carried a solenoid 6 that receives current, through leads 7, to actuate an armature 8. The armature 8 operates in the usual manner upon the occurrence of overloads on the circuit to actuate a trip member or trigger 9 as will be hereinafter described more fully.

An operating rod 10 is pivotally connected at 11 to a usual operating lever 12 that is pivoted in the cover plate 4 at 13 and the other end of which is provided with a lug 14 in position to be engaged by the outermost end of the trigger 9. The operating lever 12, which consists of a single bar, lies between two side members 15 which constitute a part of the handle. The members 15 are also pivotally supported at 13. A yoke member 16 is pivoted at 17 to the bars 15, and is provided with a hole 20 that is larger than the pivot pin 21 which extends therethrough. The pivot pin 21 likewise extends through the side members 15 of the handle but has snug engagement therewith. In the outer end of the yoke, a grip member 22 is secured.

The trigger 9 is pivoted at 21 and has its upper end lying over the lug 14 to normally maintain the operating lever 12 in its down, or closed position. The trigger also has a projection 23 that engages the pivot member 17 to limit the downward movement thereof when the operating lever has been released. A spring 24 holds the trigger 9 under tension to prevent accidental disengagement thereof by the operating lever 12. When an overload occurs in the circuit, the solenoid 6 is energized to such degree as to cause the armature 8 to move a plunger 25 upwardly and thereby disengage the trigger 9 from the operating lever, to allow the latter to move to open position.

A latch 26 is pivotally supported on the pin 21 and has its opposite ends bent over to engage the handle and the housing member 5, respectively, and hold the handle in its closed position. By reason of the connection between the handle and the operating lever, through the trigger 9, the operating lever normally occupies the same position as the handle.

The spring 24, besides normally maintaining the trigger 9 in operative position, also maintains the latch 26 in locking engagement.

By reason of the lost-motion connection of the handle portion 16 to the pivot 21, a lifting movement on the grip member 22 will move the latch 26 about the pivot 21 and release it from engagement with the housing 5, thereby permitting the handle and operating lever to be manually raised.

Terminal members 30 and 31 are provided which are connected to an auxiliary circuit (not shown). When the circuit is completed across these terminals, a signal device, such as a bell, is actuated.

The terminal member 30 is normally in resilient engagement with the side members 15, being insulated therefrom by a block 32. The terminal member 31 has a small insulated block member 33 secured to the outer end thereof, of such size that it can pass between the side members 15 of the handle and is normally in yielding engagement with the operating lever 12.

When the parts are in the positions shown in Fig. 1, there is no connection between the terminal members 30 and 31, but, if an overload occurs and the trigger 9 releases the operating lever 12, terminal member 31 is permitted to move up into engagement with the terminal member 30, thereby closing the auxiliary circuit and causing a bell to ring, which notifies the attendant that the main circuit has been automatically opened. However, when the handle is released, it and the operating lever move upwardly in unison and the terminal members 30 and 31 do not engage with one another, but move to the positions shown in dotted lines.

Near the outer end of the operating lever 12, I mount an auxiliary switch which is automatically operated to close an auxiliary circuit for indicating, by visible signals, the position of the circuit breaker. This switch apparatus consists of a movable contact member 35 with insulated ends 36 and 37 in position to be engaged by the upper edge of the operating lever 12, as it moves up and down during the respective opening and closing movements of the circuit breaker. The movable contact member 35 alternately opens and closes the circuit between the terminals 38 and 39 and the terminals 38 and 40.

When the switch is closed, as illustrated in Fig. 1, an auxiliary circuit is closed, across the terminals 38 and 40, thereby showing, for instance, a red lamp which will indicate that the circuit breaker is closed. When the operating lever 12 is in the position indicated by dotted lines, an auxiliary circuit is closed across the terminals 38 and 39 to illuminate a white lamp for showing that the circuit breaker is open.

It will be seen that, whether the operating lever is automatically released, by reason of its release from the trigger 9, or is manually moved to open position, by reason of the handle, the visible signals will be actuated, but, when the operating lever is released automatically, by tripping of the trigger under overload, both the audible and the visible signals will be actuated.

Various modifications may be made in the device without departing from the scope of the invention, as set forth in the accompanying claims.

I claim as my invention:

1. In combination, in a circuit breaker, an operating lever normally held in closed position, a handle for manually controlling the movement of the operating lever, a trigger pivoted in the handle in position to normally lock the operating lever in closed position, magnetically-operated means for actuating the trigger, a latch pivoted in the handle and adapted to engage a fixed member to hold the handle in closed position, and a spring for normally holding the trigger and the latch in locking engagement with the operating lever and the fixed member, respectively.

2. In combination, in a circuit breaker, an operating lever normally held in closed position, a handle for normally controlling the movement of the operating lever, a trigger pivoted in the handle in position to normally lock the operating lever in closed position, magnetically operated means for actuating the trigger, a latch pivoted in the handle and adapted to engage a fixed member to hold the handle in closed position, and a lost-motion connection between the handle and the latch pivot whereby manual movement of the handle will move the latch out of locking engagement.

3. In combination, in a circuit breaker, an operating lever, a handle for manually controlling the movement thereof, said handle being made in two parts pivoted together at one point and having a lost-motion connection at another point, a latch pivoted on the outer portion of the handle and adapted to engage a fixed member to lock the handle in closed position, said handle being so mounted that movement of the outer portion of the handle will disengage the latch from the said fixed member.

4. In a circuit breaker, an operating lever, means for normally holding said lever in closed position, electro-magnetically-actuated mechanism for automatically actuating said holding means, a signal switch automatically closed by the movement of said operating lever when automatically released, and a second signal switch which is automatically closed by said lever when opened either automatically or manually.

5. In a circuit breaker, an operating lever, means for normally holding said lever in closed position, electro-magnetically-actuated mechanism for automatically releasing the lever, a manually-controlled lever for actuating the operating lever, a signal switch, means for automatically closing said switch when the operating lever is released, a second signal switch, and means for automatically closing said second switch when the operating lever is either automatically or manually moved to open position.

6. In a circuit breaker, an operating lever, a handle normally controlling the movement of said lever, means normally locking the lever in closed position, means normally locking the handle in closed position, and a spring connection between said two locking means whereby they are yieldingly held in operative position.

7. The combination with a circuit interrupter, of automatic actuating mechanism therefor, means for manually actuating the interrupter, an auxiliary switch, and means for normally operating the switch only upon the automatic actuation of the interrupter.

8. The combination with a circuit interrupter, of automatic actuating mechanism therefor, means for manually actuating the interrupter, an auxiliary switch, means for operating the said switch upon the automatic actuation of the interrupter, a second auxiliary switch, and means for operating the said second switch when the interrupter is manually operated.

9. The combination with a circuit interrupter, of two operating mechanisms therefor, two auxiliary switches, means whereby one switch is controlled by but one of the said mechanisms, and means for automatically actuating the other switch upon the operation of either of said mechanisms.

In testimony whereof, I have hereunto subscribed my name this 4th day of November 1920.

ANDREW H. BAKKEN.