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ENCLOSED CIRCUIT INTERRUPTERS

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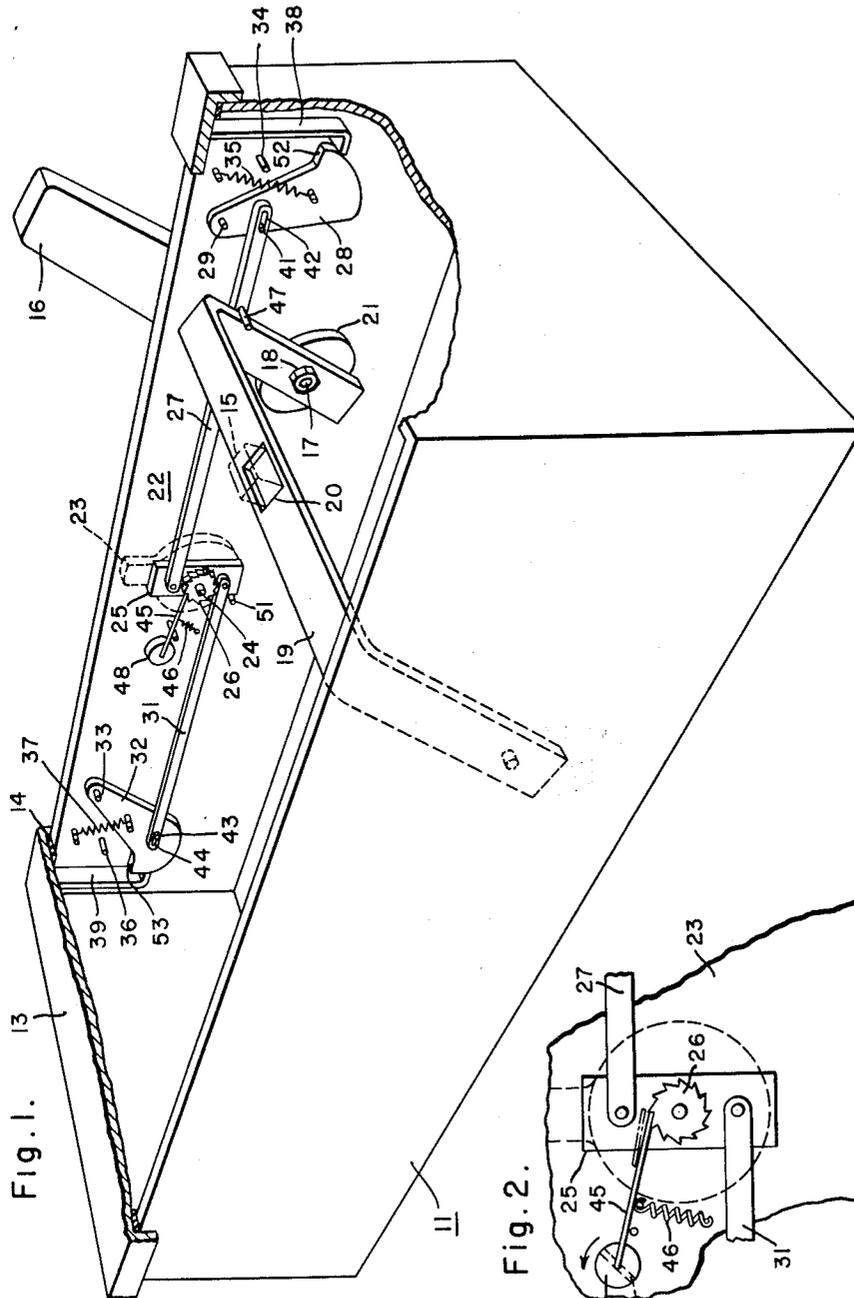


Fig. 1.

Fig. 2.

WITNESSES:

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1

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ENCLOSED CIRCUIT INTERRUPTERS

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This invention relates, generally, to circuit interrupters and, more particularly, to circuit interrupters, such as automatic circuit breakers and manually operable switches, which may be mounted inside enclosing cabinets having an operating handle mounted on the outside of the cabinet.

Usually, the operating handles for enclosed circuit breakers and disconnect switches have been mounted on the front cover for the enclosing cabinet. The external operating handle was also utilized as a cover opening handle. Mechanical interlocking required the breaker or switch to be in the "off" or "open cover" position to release the cover for opening. When the cover was open the external operating handle and the breaker or switch were disengaged from each other.

An object of this invention is to provide an enclosed circuit interrupter having an external operating handle mechanically connected to the actuating member of the interrupter at all times.

A further object of the invention is to make it necessary to utilize a tool, other than the handle of the latching mechanism, in order to open the cover.

Still another object of the invention is to prevent opening the cover while the interrupter is closed.

A still further object of the invention is to provide for mounting the external operating handle on the side of the enclosing cabinet.

Other objects of the invention will be explained fully hereinafter or will be apparent to those skilled in the art.

In accordance with one embodiment of the invention, the external operating handle for an enclosed circuit interrupter is pivotally mounted on the side of the cabinet and is continuously connected to the actuating member of the interrupter. A separated tool is required to open the cover by releasing a ratchet device which retains the latching mechanism in the cover closing position. Mechanical interlocking means prevents opening the cover while the interrupter is closed.

For a better understanding of the nature and objects of the invention, reference may be had to the following detailed description, taken in conjunction with the accompanying drawing, in which:

FIGURE 1 is a view, in perspective, of a cabinet and mechanism for operating a circuit interrupter mounted inside the cabinet; and

FIG. 2 is a detail view of the ratchet device which is part of the cover closing mechanism.

Referring to the drawing, and particularly to FIG. 1, the structure shown therein comprises a sheet metal cabinet 11 of dust tight or liquid tight construction inside of which a circuit interrupter (not shown) may be mounted. Additional apparatus, such as a motor starter, may also be mounted inside the cabinet 11. The cabinet 11 has a cover 13, only a portion of which is shown, which may be hinged on the cabinet in a manner well-known in the art. A gasket 14 may be provided between the cover 13 and the upper edge of the cabinet 11. The cabinet may be mounted on a vertical panel or other suitable supporting member.

The circuit interrupter may be a manually operable switch of the type described in Patent 2,849,572, issued August 26, 1958 to A. R. Cellerini et al. As described in the aforesaid patent, the contact members of the switch

2

are open and closed by a toggle mechanism which is actuated by an oscillating operating member 15.

If desired, the circuit interrupter may be a circuit breaker of the type described in Patent 2,047,739, issued July 14, 1936 to H. J. Lingal. The contact members of the circuit breaker may be manually opened and closed by oscillatory movement of an operating member. The circuit breaker may be provided with a tripping mechanism which is operable in response to predetermined overload currents to effect automatic opening of the contact members.

An external operating handle 16 is pivotally mounted on one side of the cabinet 11. The handle 16 may be attached by means of a bolt 17 and a nut 18 to one leg of a generally U-shaped actuating member 19 disposed inside the cabinet 11. The bolt 17 extends through a spacing washer 21 disposed between the member 19 and the side wall of the cabinet 11. Thus, the actuating member 19 moves with the handle 16, and the operating member 15 of the circuit interrupter is continuously connected to the handle 16 regardless of the position of the cover 13 of the cabinet. As shown, the operating member 15 extends through an opening 20 in the member 19. Therefore, it is impossible to move the interrupter operating member 15 if the external handle 16 is locked, even though the door 13 may be opened.

A latching mechanism 22 is provided to force the door or cover 13 to its fully closed position in which the gasket 14 is sealed against the edge of the cabinet. As shown, the cover latching mechanism comprises a cover closing handle 23 which is externally mounted on the same side of the cabinet as the handle 16. The handle 23 is attached by means of a bolt or rivet 24 to a lever 25 and a ratchet wheel 26 disposed on the inside of the cabinet

11. Thus, the lever 25 and the ratchet wheel 26 move with the handle 23. One end of the lever 25 is connected by means of a rod 27 to a cam 28 which is pivotally attached to the side of the cabinet 11 by means of a pin 29. The other end of the lever 25 is connected by means of a rod 31 to a cam 32 which is pivotally attached to the side of the cabinet 11 by means of a pin 33. The cam 28 is biased toward a stop pin 34 by means of a spring 35. Likewise, the cam 32 is biased toward a stop pin 36 by means of a spring 37. The cam 28 engages a bracket 38 attached to the under side of the cover 13. Likewise, the cam 32 engages a bracket 39 attached to the cover 13.

It will be seen that the cams 28 and 32 can be utilized to draw the cover 13 to its fully closed position against the gasket 14 by actuating the handle 23 in a direction to force the cams 28 and 32 against the brackets 38 and 39, respectively, by means of the rods 27 and 31. The outer end of the rod 27 is connected to the cam 28 by means of a pin 41 which is disposed in a slot 42 in the rod 27. Likewise, the outer end of the rod 31 is connected to the cam 32 by means of a pin 43 which is disposed in a slot 44 in the rod 31.

It will be noted that the ratchet wheel 26 and its latching member 45 do not interfere with the movement of the handle 23 in a direction to force the cams 28 and 32 against the brackets 38 and 39, respectively. The latching member 45 is biased against the teeth of the ratchet wheel 26 by means of a spring 46.

An interlocking pin 47 is provided in the connecting rod 27 to prevent the cover 13 from being opened while the interrupter is closed. If it is desired to open the cover 13, the handle 16 is thrown to the off position to disengage the actuating member 19 from the pin 47 and to open the circuit interrupter. A separate tool, such as a screw driver, is then utilized to rotate a member 48 disposed in the side of the cabinet 11 by inserting the blade of the screw driver in a slot 49 in the member 48, thereby turning the member 48 to disengage the latch 45 from

3

the teeth of the ratchet wheel 26. The member 48 is attached to one end of the latch 45.

After the latch 45 is disengaged from the ratchet wheel 26, the handle 23 is moved in a direction to disengage the cams 28 and 32 from the brackets 38 and 39, respectively, thereby permitting the cover 13 to be opened. After the cover 13 is opened and the handle 23 released, the springs 35 and 37 will move the cams 28 and 32, respectively, against the stop pins 34 and 36, respectively.

A stop pin 51 is disposed to engage one end of the lever 25 to limit clockwise movement of the lever 25. Thus, when the cover 13 is being closed the lower ends of the brackets 38 and 39 engage sloping surfaces 52 and 53 on the cams 28 and 32, respectively, thereby moving the pins 41 and 43 in the slots 42 and 44, respectively, and permitting the brackets to pass underneath the cams without it being necessary to disengage the latch 45 from the ratchet wheel 26. The handle 23 is then moved in a direction to force the cams against the brackets on the cover thereby drawing the cover to its fully closed position. After the cover is fully closed, the handle 16 is thrown to the "on" position, thereby closing the circuit interrupter by means of its operating member 15.

From the foregoing description, it is apparent that the switch operating mechanism and the cover closing mechanism cooperate to require that the circuit interrupter be opened before the cover can be opened. Furthermore, the cover closing mechanism must be released by means of a separate tool, other than the cover closing handle, before the cover can be opened. In this manner accidental opening of the cover is prevented. Furthermore, the external operating handle is continuously connected to the operating member of the circuit interrupter to prevent movement of the operating member when the external handle is locked thereby preventing operation of the circuit interrupter even though the cover may be opened.

Since numerous changes may be made in the above described construction, and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In combination, a circuit interrupter having a movable operating member for opening and closing the interrupter, a cabinet in which the interrupter is mounted, said cabinet having a front, a back and four sides, an external operating handle pivotally mounted on one side of the cabinet for actuating said operating member, an

4

openable cover mounted on the front of the cabinet, said operating handle being connected to said operating member regardless of the position of the cover, a cover latching mechanism disposed inside the cabinet, a cover closing handle pivotally mounted on said one side of the cabinet for actuating the latching mechanism to force the cover to its fully closed position, an actuating member connecting said operating member and said external operating handle, and said actuating member cooperating with said latching mechanism to prevent opening the cover while the circuit interrupter is closed.

2. In combination, a circuit interrupter having a movable operating member for opening and closing the interrupter, a cabinet in which the interrupter is mounted, an external operating handle pivotally mounted on one side of the cabinet for actuating said operating member, an openable cover for the cabinet, said operating handle being connected to said operating member regardless of the position of the cover, a cover latching mechanism disposed inside the cabinet, manually operable means pivotally mounted on the outside of the cabinet for actuating the latching mechanism to force the cover to its fully closed position, and a ratchet device cooperating with the cover latching mechanism to retain the cover in its closed position.

3. In combination, a circuit interrupter having a movable operating member for opening and closing the interrupter, a cabinet in which the interrupter is mounted, an external operating handle pivotally mounted on one side of the cabinet for actuating said operating member, an openable cover for the cabinet, said operating handle being connected to said operating member regardless of the position of the cover, a cover latching mechanism disposed inside the cabinet, manually operable means pivotally mounted on the outside of the cabinet for actuating the latching mechanism to force the cover to its fully closed position, a ratchet device cooperating with the cover latching mechanism to retain the cover in its closed position, and means operable from outside the cabinet for releasing the ratchet device to permit opening of the cover.

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