Nov. 12, 1957 J. B. WALLACE ET AL 2,813,162

INTERLOCKING DEVICE FOR ENCLOSED ELECTRIC SWITCH

Filed March 9, 1956 2 Sheets-Sheet 1

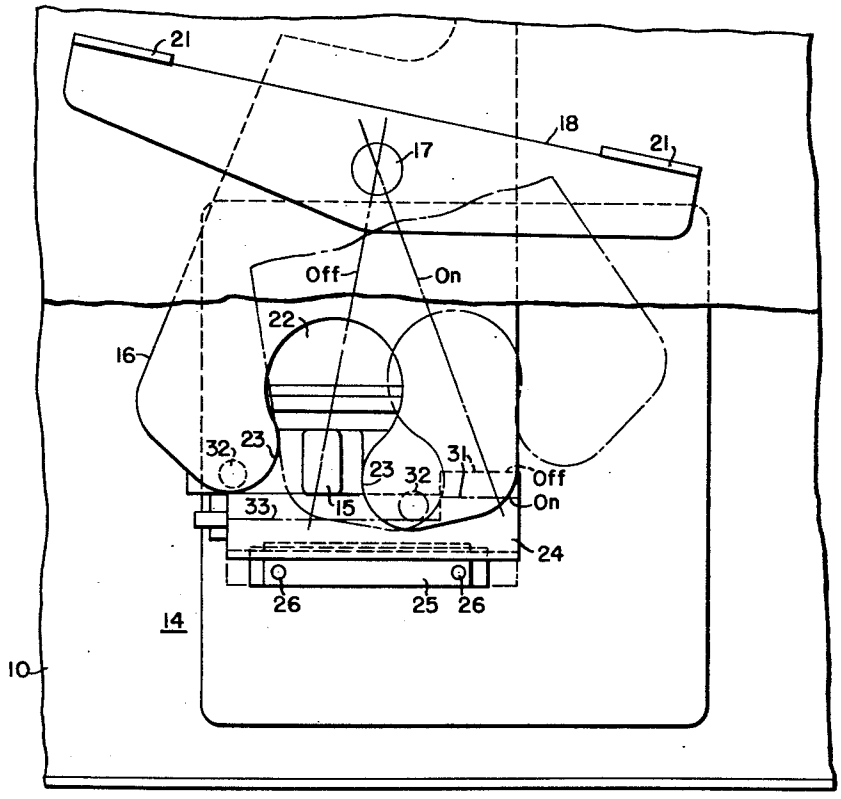


Fig. 1.

WITNESSES

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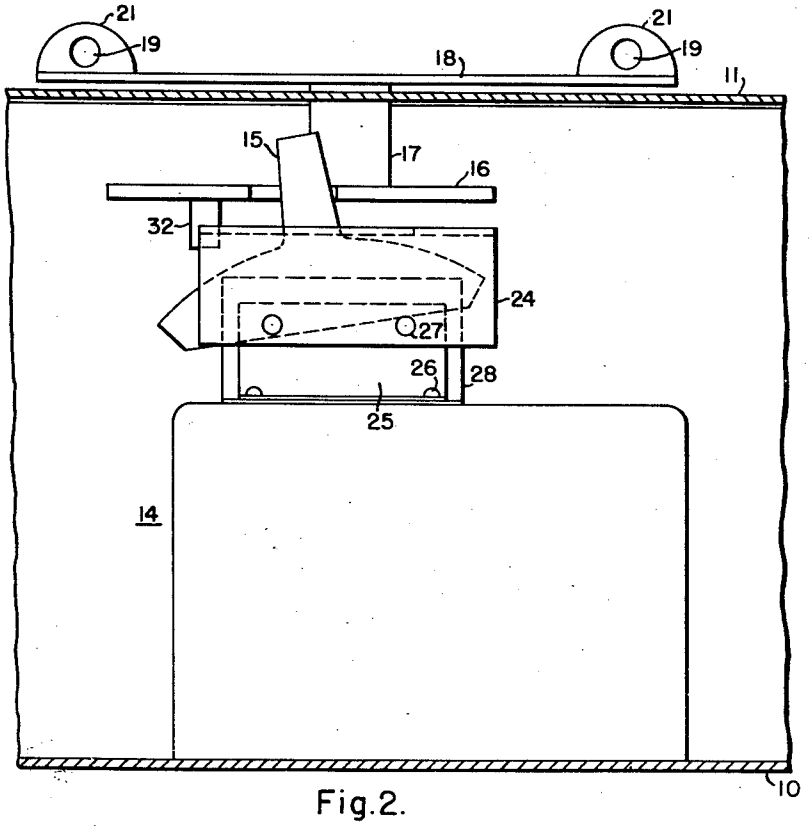


Fig.2.

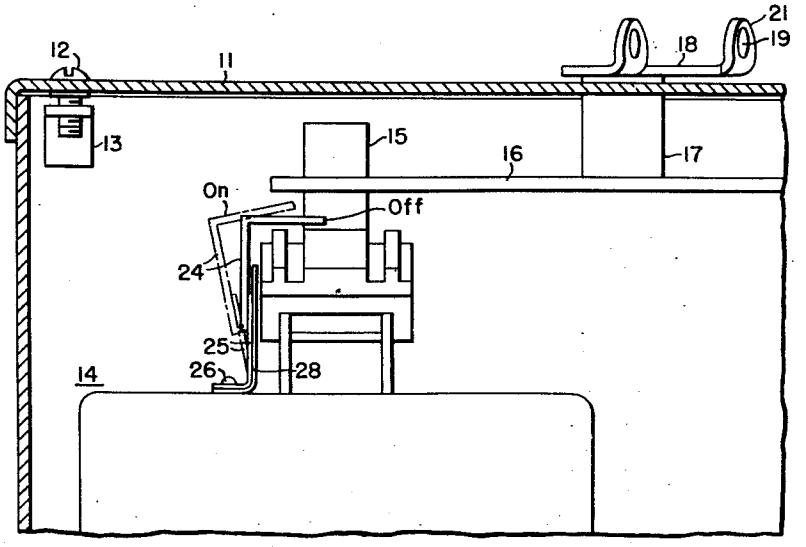


Fig.3.

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INTERLOCKING DEVICE FOR ENCLOSED ELECTRIC SWITCH

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7 Claims. (Cl. 200—50)

Our invention relates, generally, to enclosed electric switches or circuit breakers and, more particularly, to interlocking devices for controlling the operation of switches or circuit breakers which are enclosed in cabinets having openable covers.

Heretofore, interlocking devices have been provided to prevent the door of the enclosing cabinet from being opened while the circuit interrupter is in the closed position. Interlocking devices have also been provided for preventing the closing of the circuit interrupter while the cover is open. However, the prior interlocking devices have been somewhat complicated in structure and have not been suitable for use with operating mechanisms of certain types.

An object of our invention, generally stated, is to provide an interlocking device for controlling the operation of an enclosed circuit interrupter which shall be simple and efficient in operation and which may be economically manufactured and installed.

A more specific object of our invention is to provide an interlocking device for an enclosed circuit interrupter which shall prevent the interrupter from being accidentally closed while the cover of the enclosure is open.

Another object of our invention is to provide an interlocking device which directly engages the operating handle of an enclosed circuit interrupter to prevent closing the interrupter while the cover of the enclosure is open.

A further object of our invention is to provide an interlocking device which normally prevents an enclosed circuit interrupter from being accidentally closed while the cover of the enclosure is open, but which may be manually released to permit closing the interrupter.

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, a spring-mounted interlocking member is disposed to engage the operating handle of an enclosed circuit interrupter to prevent closing the interrupter when the cover of the enclosure is open. When the cover is closed a part of the operating member carried by the cover moves the interlocking member out of the path of the interrupter handle as the operating member is moved to actuate the interrupter handle, thereby permitting the interrupter to be 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 drawings, in which:

Figure 1 is a view, in plan, of a portion of an enclosed electric switch embodying the principal features of the invention;

Fig. 2 is a view, partly in side elevation and partly in section, of the structure shown in Fig. 1; and

Fig. 3 is a view, partly in section and partly in end elevation, of the switch structure.

Referring to the drawings, the structure shown therein comprises a portion of a sheet metal cabinet **10** having an openable cover **11** which may be hinged at one end and fastened in the closed position by screws **12** (only one of which is shown) which may be threaded into angle brackets **13** secured to an end wall of the cabinet. If desired, the cover may be fastened by means of a spring-loaded latch in place of the screws **12**. As shown, a circuit interrupter **14** is mounted on the back wall or bottom of the cabinet **10**. The interrupter **14** may be a manually operable switch, or an automatic circuit breaker of the general type described in Patent 2,047,739, issued July 14, 1936, to H. J. Lingal, and assigned to the Westinghouse Electric Corporation.

The circuit interrupter unit **14** is provided with an operating handle **15** which is moved about a pivot in one direction to close the contact members of the interrupter and in the other direction to open the contact members. If the circuit interrupter unit is an automatic circuit breaker the handle **15** will be automatically moved to a tripped position when the contact members of the circuit breaker are opened automatically by overload conditions.

An operating member or plate **16** is secured to one end of a stub shaft **17** which is rotatably mounted in the cover **11** and extends through the cover. An actuating lever **18** is secured to the outer end of the stub shaft **17**. The lever **18** is of a type which is suitable for operation by means of a hook stick which may be inserted into openings **19** provided in oppositely disposed ears **21** on the lever **18**. It will be understood that an actuating lever or handle of a type suitable for direct engagement by the hand of an operator may be utilized if desired.

As shown most clearly in Fig. 1, the operating member **16** is provided with an opening **22** for receiving the handle **15** of the interrupter **14** when the cover **11** is closed. In this manner the circuit interrupter may be operated from the exterior of the cabinet by actuating the lever **18** about its pivot point which causes the operating plate or member **16** to actuate the interrupter handle **15**, thereby operating the circuit interrupter. In order to reduce the friction between the operating member **16** and the handle **15** and also to reduce the torque exerted on the handle **15**, the edges of the plate **16** which engage the handle **15** are rounded at **23** as shown in Fig. 1.

An interlocking device (not shown) of a type described in Patent 2,215,299, issued September 17, 1940, to G. R. Runke and H. S. Gano and assigned to the Westinghouse Electric Corporation may be provided to prevent opening the cover **11** when the handle **15** of the circuit interrupter is in the closed position. Thus, the cover **11** normally cannot be opened while the contact members of the circuit interrupter are closed and access to energized parts of the structure is prevented.

In addition to the foregoing interlocking device, it is also desirable to provide an interlock which will prevent the interrupter from being accidentally closed while the cover **11** is open. Interlocking devices for performing this function have been provided previously. However, the prior devices have been somewhat complicated in structure and in their manner of operation. In order to simplify the structure and operation of such interlocking devices, we have devised the present interlocking device.

As shown, one leg of an angle-shaped interlocking member **24** is attached to one leg of an angle-shaped spring member **25**, the other leg of which is attached to the interrupter unit **14** by bolts or rivets **26**. The angle member **24** may be composed of a fibrous impregnated material and it is attached to the spring member **25** by means of bolts or rivets **27**. The spring member **25** may be composed of spring steel or other material having the desired characteristics. A sheet of insulating material **28** may be disposed between the member **25** and the handle **15** to prevent a phase-to-phase short circuit on overload, the switch **14** being a three-phase switch.

As shown most clearly in Fig. 1, the one leg of the interlocking member **24** has a projection **31** which will be disposed in the path of movement of the handle **15** when the cover **11** is open, thereby blocking movement of the handle **15** to the "on" position to close the contact members of the interrupter. When the cover **11** is closed and the operating member **16** is moved to actuate the handle **15** to the closed or "on" position, a pin or part **32**, which is secured in the member **16**, bears against the edge **33** of the angle member **24** to move the projection **31** out of the path of movement of the handle **15** as shown by the broken lines in Figs. 1 and 3.

Thus, the circuit interrupter may be closed by operating the lever **18** in the normal manner when the cover **11** is secured in its closed position by means of the screws **12**. However, if the cover **11** is not fully closed, the pin **32** will not engage the interlocking member **24** to move it out of the position to which it is biased by the spring member **25** to block movement of the interrupter handle **15** to its "on" position to close the contact members of the interrupter.

In this manner accidental closing of the circuit interrupter while the cover **11** is open is prevented since movement of the interrupter handle **15** on the "on" position is prevented by the projection **31** on the interlocking member **24** being in the path of movement of the handle. If it is desired to deliberately close the circuit interrupter while the cover **11** is open, the interlocking member **24** may be moved out of the path of the handle **15** by an operator.

It will be noted that a portion of the interlocking member **24** is disposed directly in the path of movement of the handle **15** and engages the handle directly to prevent closing the interrupter. Furthermore, the pin **32**, which engages the interlocking device directly to release the interlock, is carried by the operating member **16** and moves with the operating member. Thus, the interlocking device engages the operating handle **15** directly to prevent closing the interrupter, and the operating member **16** engages the interlocking device directly to release the interlocking device. In this manner the structure and operation of the interlocking device are simplified as compared with prior interlocking devices for performing the same function.

From the foregoing description it is apparent that we have provided a simplified and improved interlocking device for preventing accidental closing of an enclosed circuit interrupter when the cover of the enclosure is open. The present interlocking device may be coordinated with interlocking devices which normally function to prevent opening the cover of the enclosure while the circuit interrupter is closed.

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 the matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim as our invention:

1. In an electric switch, in combination, a cabinet having an openable cover, a circuit interrupter unit disposed in the cabinet and having an operating handle, an operating member carried by the cover and engaging the operating handle when the cover is closed, a spring-mounted member disposed to engage the operating handle to prevent closing the interrupter when the cover is open, and said spring-mounted member being actuated by movement of said operating member to permit closing the interrupter when the cover is closed.

2. In an electric switch, in combination, a cabinet having an openable cover, a circuit interrupter unit disposed in the cabinet and having an operating handle, an operating member carried by the cover and engaging the operating handle when the cover is closed, a spring biased member

mounted on the interrupter unit and disposed to engage the operating handle to prevent closing the interrupter when the cover is open, and said operating member moving said spring biased member to permit closing the interrupter when the cover is closed.

3. In an electric switch, in combination, a cabinet having an openable cover, a circuit interrupter unit disposed in the cabinet and having an operating handle, an operating member carried by the cover and engaging the operating handle when the cover is closed, an interlocking member mounted on the interrupter unit, spring means for moving the interlocking member into the path of the operating handle to prevent closing the interrupter when the cover is open, and said operating member moving the interlocking member out of the path of the operating handle when the operating member is actuated to close the interrupter when the cover is closed.

4. In an electric switch, in combination, a cabinet having an openable cover, a circuit interrupter unit disposed in the cabinet and having an operating handle, an operating member carried by the cover and engaging the operating handle when the cover is closed, an interlocking member mounted on the interrupter unit, spring means for moving the interlocking member into the path of the operating handle to prevent closing the interrupter when the cover is open, and said operating member engaging the interlocking member to move it out of the path of the operating handle as the operating member is being actuated to close the interrupter when the cover is closed.

5. In an electric switch, in combination, a cabinet having an openable cover, a circuit interrupter unit disposed in the cabinet and having an operating handle, an operating member carried by the cover and engaging the operating handle when the cover is closed, an interlocking member mounted on the interrupter unit, spring means for moving the interlocking member into the path of the operating handle to prevent closing the interrupter when the cover is open, and means on the operating member for moving the interlocking member out of the path of the operating handle each time the operating member is actuated to close the interrupter when the cover is closed.

6. In an electric switch, in combination, a cabinet having an openable cover, a circuit interrupter unit disposed in the cabinet and having an operating handle, an operating member carried by the cover and engaging the operating handle when the cover is closed, a spring biased member mounted on the interrupter unit and disposed in the path of the operating handle to prevent closing the interrupter when the cover is open, and means on the operating member engaging said spring biased member to move it out of the path of the operating handle when the operating member is actuated to close the interrupter when the cover is closed.

7. In an electric switch, in combination, a cabinet having an openable cover, a circuit interrupter unit disposed in the cabinet and having an operating handle, an operating member carried by the cover and engaging the operating handle when the cover is closed, a spring-mounted member disposed in the path of the operating handle to prevent closing the interrupter when the cover is open, and projecting means on the operating member engaging said spring-mounted member to move it out of the path of the operating handle as the operating member is being actuated to close the interrupter when the cover is closed.

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