

Dec. 15, 1959

J. N. GROVES ET AL  
ENCLOSED CIRCUIT BREAKER

2,917,593

Filed June 24, 1958

3 Sheets-Sheet 1

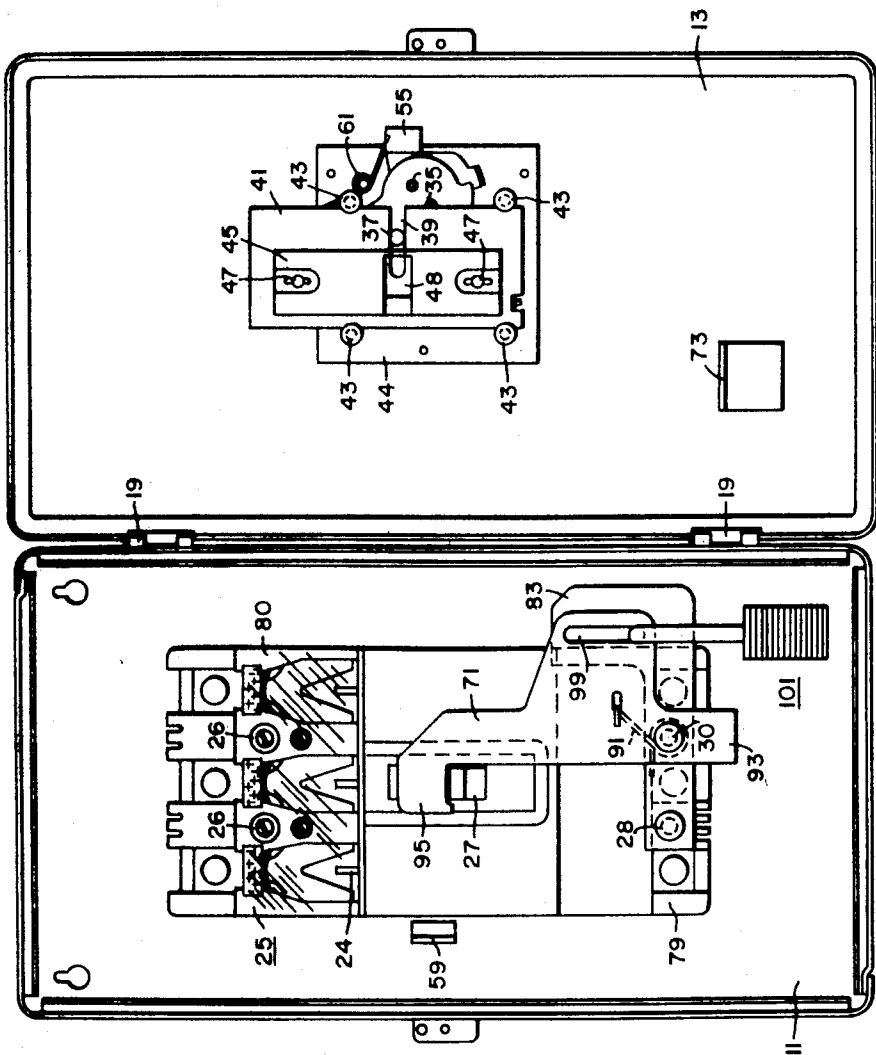


Fig. 1

WITNESSES

*John L. Sharley, Jr.*  
*James H. Young*

INVENTOR

John N. Groves &  
Donald G. Portman

BY *Paul H. Farlow*  
ATTORNEY

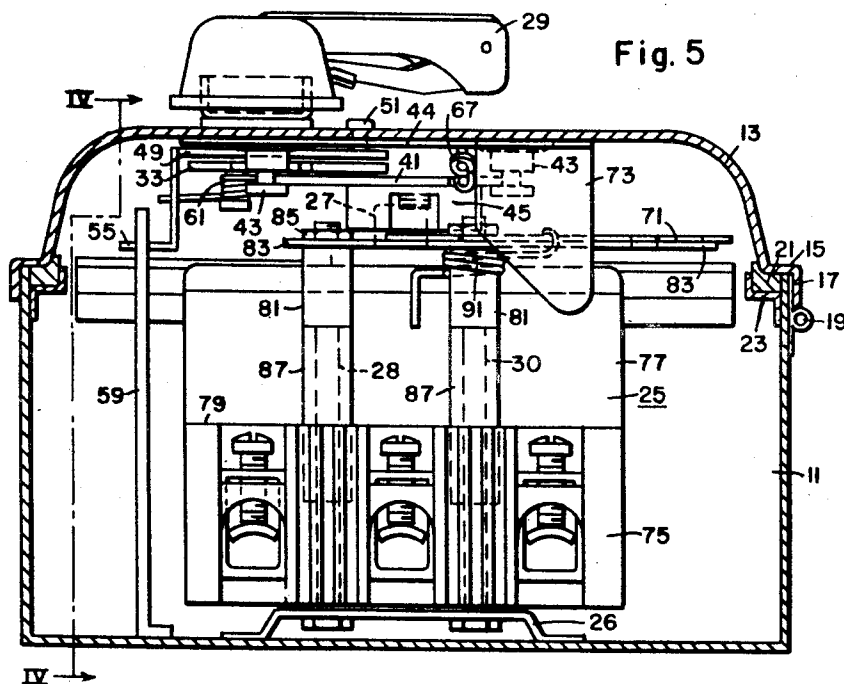
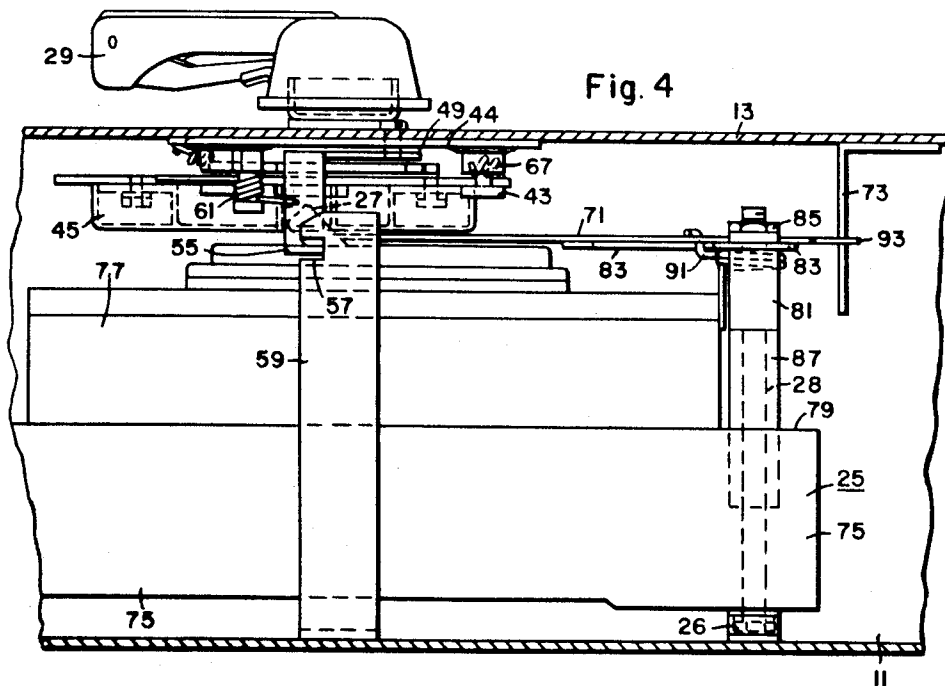
Dec. 15, 1959

J. N. GROVES ET AL  
ENCLOSED CIRCUIT BREAKER

2,917,593

Filed June 24, 1958

3 Sheets-Sheet 2



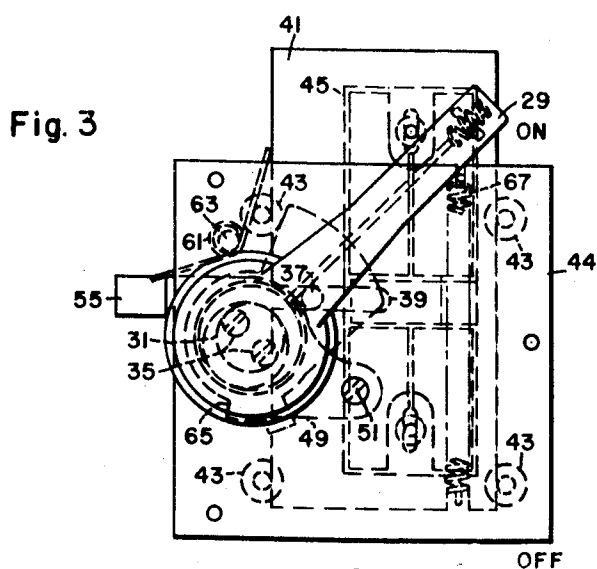
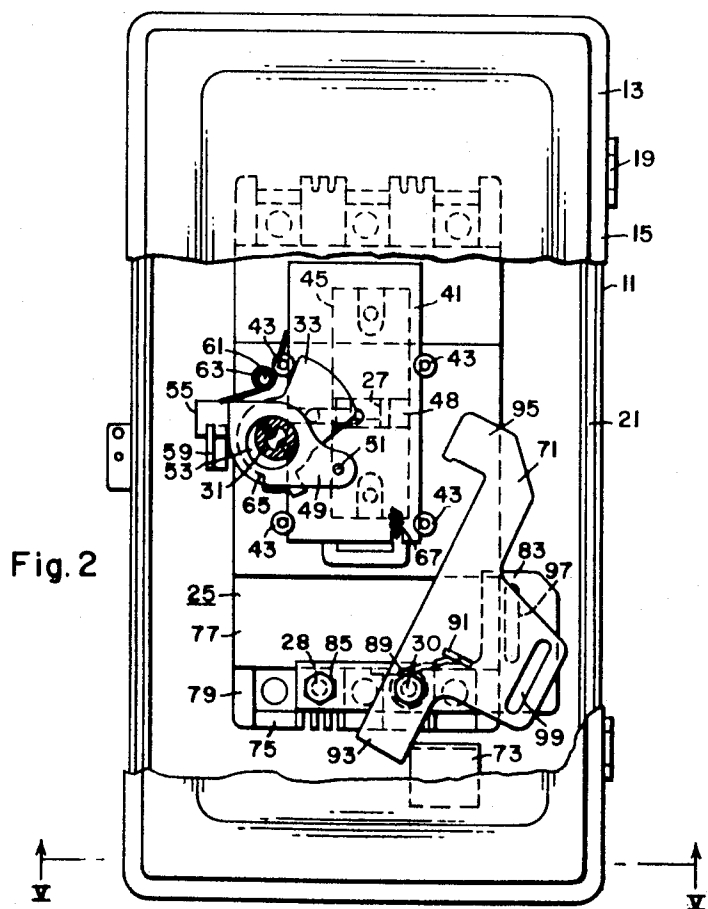
**Dec. 15, 1959**

J. N. GROVES ET AL  
ENCLOSED CIRCUIT BREAKER

**2,917,593**

Filed June 24, 1958

3 Sheets-Sheet 3



1

2,917,593

## ENCLOSED CIRCUIT BREAKER

John N. Groves, Monaca, and Donald G. Portman, Brighton Township, Beaver County, Pa., assignors to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Application June 24, 1958, Serial No. 744,114

10 Claims. (Cl. 200—50)

The invention relates to enclosed circuit breakers and more particularly to circuit breakers which are mounted inside enclosing cabinets and having an operating handle mounted on the cover of the cabinet.

An object of the invention is to provide a circuit breaker mounted in an enclosure having an openable cover with an interlock for preventing closing of the circuit breaker when the openable cover is in the open position.

Another object of the invention is to provide an interlocking device for normally preventing an enclosed circuit breaker from being closed while the cover of the enclosure is open, but which may be manually released to permit closing the circuit breaker with means for preventing manual releasing of the interlocking device.

Another object of the invention is to provide a circuit breaker mounted in an enclosure having an openable cover with an interlocking device for preventing closing of the circuit breaker when the cover is in the open position, but which may be manually released to permit closing the circuit breaker with means arranged to receive a padlock to positively prevent release of the interlocking device.

A further object of the invention is to provide a circuit breaker having an insulating housing, a portion of which at one end is transparent so that the contacts are visible, the circuit breaker being mounted in an enclosure having an openable cover on which the operating mechanism is mounted to swing away from the breaker when the cover is opened and not block the view of the contacts. An interlock is provided to prevent closing the breaker when the enclosure cover is open, the interlock being mounted at the opposite end of the breaker from the contacts so as not to block the view of the contacts and using the same mounting holes which mount the interrupter.

The invention, both as to structure and operation, together with additional objects and advantages thereof, will be best understood from the following detailed description thereof when read in conjunction with the accompanying drawings.

In said drawings:

Figure 1 is a front elevational view of a cabinet having a circuit breaker mounted therein embodying the principles of this invention, the cabinet being shown with the cover open.

Fig. 2 is a front elevational view of the cabinet with openable cover closed and partly broken away to more clearly show the operating mechanism.

Fig. 3 is a front elevational view of the operating mechanism.

Fig. 4 is a vertical sectional view taken on line IV—IV of Fig. 5, and looking in the direction of the arrows.

Fig. 5 is a vertical sectional view taken on line V—V of Fig. 2 and looking in the direction of the arrows.

Referring to the drawings, the enclosing cabinet comprises a metal casing 11 and a cooperating metal cover 13. The cover 13 is provided with a rim 15 which seats against the edges of the side and end walls of the casing

2

11 in the closed position of the cover, and has a downwardly extending edge 17 which overlaps the edges of the casing 11. The cover 13 is mounted on one side wall of the casing 11 by means of a pair of hinges 19 which permit the cover to be moved to open and closed positions. A sealing gasket 21 supported in an annular bracket 23 is engaged by the rim 15 of the cover to exclude extraneous material from the interior of the cabinet which is adapted to house an electrical switch or circuit breaker for industrial application.

A circuit breaker 25 having a pivoted handle 27 for operating the breaker mechanism (not shown), is enclosed in the cabinet and is suitably mounted by means of mounting studs 26, 28 and 30 on brackets 26 or the back wall of the casing 11. The circuit breaker 25 is preferably of the type shown in Patent No. 2,318,298, issued May 4, 1943, to H. D. Dorfman and G. J. Freese. The circuit breaker 25 is provided with separable contact means 24 (Fig. 1) and an operating mechanism (also not shown) for opening and closing the contact means by movement of the breaker operating handle 27. The circuit breaker described in the above-mentioned patent is also provided with a current responsive trip device (not shown herein) which is operable in response to predetermined overload currents to effect automatic separation of the contact means. The circuit breaker is housed in an insulating housing comprising a base and cover, the portion of the cover adjacent the contacts being transparent so that the contacts are visible from the front of the breaker.

The circuit breaker 25 is adapted to be manually opened and closed by movement of the handle 27 between an "open" position and a "closed" position. Also, in order to reclose the contacts following an automatic opening operation, it is first necessary to reset the mechanism. This is accomplished by movement of the handle 27 to a "reset" position beyond the "off" position after which the handle is moved to the "on" position to close the contact means. The circuit breaker mechanism and the trip device are fully disclosed in the above mentioned Patent No. 2,318,298 to which reference may be had for the details of the construction and operation of the circuit breaker.

In order to manually operate the circuit breaker 25 when the cover 13 is closed, an external handle 29 is rotatably mounted on the exterior of the cover. The handle 29 is attached to a short shaft 31 which may be integral with the handle 29 and which is rotatably supported in an opening in the cover. Rigidly mounted on the inner end of the shaft 31 for movement therewith is a cam-shaped plate forming a cam member 33. The cam member 33 is secured to the shaft 31 by means of screws 35 and carries a pin or anti-friction roller 37 which engages in a slot 39 in a sliding plate 41. The sliding plate 41 is slidably supported by grooved studs 43 mounted on a plate 44 which is rigidly secured to the inside of the cover 13. An actuating member 45 is adjustably secured to the under side of the sliding plate 41 by screws 47. The actuating member 45 is provided with a transverse opening 48 for engaging the breaker handle 27 in the operative position of the handle 29 in the closed position of the cover 13.

Movement of the handle 29 in clockwise direction (Fig. 3) from the "on" to the "off" position rotates the cam member 33 in the same direction and this movement, acting through the pin and slot connection 37—39, slides the plate 41 downwardly (Fig. 3) and toward the right as seen in Fig. 4. Due to the engagement of the actuating member 45 with the breaker handle 27 this movement moves the latter clockwise from the "on" to the "off" position to effect opening of the breaker contacts.

Movement of the handle 29 in a counterclockwise di-

rection from the "off" to the "on" position reverses the direction of movement of the parts just described and moves the plate 41 upwardly (Fig. 3) and toward the left (Fig. 4) to the "on" position. This movement through the engagement of the actuating member 45 with the breaker handle 27 moves the breaker handle counterclockwise (Fig. 4) to the "on" position to close the breaker contacts.

Locking means is provided for locking the cover 13 to prevent opening thereof. The locking means is effective to lock the cover closed in all positions of the operating handle 29 except when the handle is moved beyond the "off" position to a "reset" position in which position of the handle the cover may be opened. The locking means comprises a locking member 49 pivotally mounted by means of a screw 51 rigidly secured to the locking member for movement therewith. The screw 51 extends through openings in the plate 44 and in the cover 13 which openings form bearings for the screw. The locking member 49 is disposed between the cam member 33 and the plate 44 and is retained in place by the cam member. A clearance opening 53 (Fig. 2) is provided in the locking member 49 to permit movement thereof relative to the shaft 31. The locking member 49 is provided with a downwardly extending latching portion 55 (Figs. 4 and 5) which is adapted to engage in a notch 57 of a bracket 59 rigidly secured to the bottom of the casing 11 and extending upwardly therefrom. The locking member is biased to locking position by a spring 61 coiled about a pin 63 mounted on the plate 44.

The cam member 33 is provided with a shoulder 65 which is adapted to engage the locking member 49, when the handle 29 is moved beyond the "off" position, and move the locking member to the unlocking position. It will be seen that it is necessary to move the handle 29 beyond the "off" position before the cover 13 may be opened. This insures that the circuit breaker 25 is operated to the "off" or open contact position before the cover can be opened.

When the cover 13 is opened the actuating member 45 separates from the breaker handle 27 and, upon release of the handle 29, the plate 41 together with the actuating member 45 is returned to the "on" position by means of a spring 67 which is connected under tension between the sliding plate 41 and the fixed plate 44 so as to bias the plate 41 upwardly (Fig. 2) and toward the left (Fig. 4) or toward the "on" position. Movement of the plate 41 to the "on" position by the spring 67, due to the pin or slot connection 37-39 rotates the cam member 33 and the handle 29 back to the "on" position thereby serving as a warning should the cover 13 be closed with the handle 29 in a position different from the breaker handle 27. Thus the handle 29 never indicated "off" when the breaker is in the closed position.

When the cover 13 is closed and the handle 29 is moved back to the "on" position closing the circuit breaker, the cam member 33 releases the locking member 49 which is returned to the locking position by the spring 61.

Interlocking means is provided that is operable upon opening of the cover 13 to engage and prevent movement of the handle 27 of the circuit breaker to close the breaker contacts. The interlocking means comprises a pivoted interlocking member 71 (Figs. 1 and 2) mounted on the circuit breaker 25 and a cam 73 rigidly secured to the cover 13.

The circuit breaker 25 is provided with a molded insulating housing comprising a base portion 75 and a cover portion 77, the base portion 75 extend endwise beyond the cover portion forming a ledge 79 at each end of the housing. The cover portion 77 is provided with a transparent plate 80 over the area adjacent the contacts 24 so that the contacts are visible from the front of the breaker. The mounting studs 28 and 30 are elongated and extend upwardly to a point above the top

of the cover 77 as seen in Figs. 4 and 5. The upper ends of the mounting studs 28 and 30 are enlarged as at 81 and an angular plate 83 is mounted thereon and is rigidly secured to the stud 28 by a nut 85. Spacers 87 are disposed between the enlarged portions 81 of the studs 28 and 30 and are seated in counter bores in the base portion 75 of the breaker housing. The interlocking plate 71 is pivotally supported on the upper end of the mounting stud 30 at the end of the breaker opposite the contacts and is held in place by a nut 89 threaded on the upper end of the stud 30. The interlocking member 71 is biased by means of a spring 91 in a counter clockwise direction from the position shown in Fig. 2 to the locking position as shown in Fig. 1. In the closed position of the cover 13, the cam 73 on the cover engages a tail 93 on the locking member 71 and holds it in the unlocking position which permits free operation of the breaker by the external handle 29 with the cover 13 closed.

When the cover 13 is opened the cam 73 is disengaged from the tail 93 of the locking member 71 whereupon the spring 91 moves the locking member from the position shown in Fig. 2 to the locking position (Fig. 1) in which a hook-shaped locking portion 95 is in the path of closing movement of the breaker handle 27 thus preventing movement of the breaker handle to the "on" position while the cover 13 is open. When the cover 13 is closed the cam 73 engages the tail 93 and moves the locking member 71 to the unlocking position where it is held until the cover 13 is again opened.

It will be noted that the locking plate 71 in the locking position (Fig. 1), which it assumes when the cover 13 is open, does not extend over the transparent plate 80 and, therefore, does not block the view of the contacts 24.

The interlock provided by the member 71 as seen in Fig. 1 can be defeated by manually moving the member 71 out of the path of the breaker handle 27 which can then be moved to the on position. This could result in a hazardous condition for a person working on the circuit controlled by the circuit breaker. In order to prevent deliberate defeat of the interlock, means is provided for locking the member 71 in its locking position as shown in Fig. 1. This means comprises a slot 97 in the fixed plate 83 and a corresponding slot 99 in the locking member 71. As seen in Fig. 2, when the cover 13 is closed and the locking member 71 is in its retracted position the slots 97-99 are out of line. Upon opening the cover the locking member 71 is moved to locking position (Fig. 1) bringing the slots 97-99 into alignment so that the shackle of a padlock 101 may be inserted through both of the slots thereby rigidly holding the locking member 71 in locking position and preventing defeat of the interlock.

The invention provides an improved interlocking device for preventing accidental closing of an enclosed circuit breaker when the cover of the enclosure is open and also provides means for positively preventing deliberate defeat of the interlocking device.

Having described the invention in accordance with the provisions of the patent statutes, it is to be understood that various changes and modifications may be made in the structural details thereof without departing from the spirit of the invention.

We claim as our invention:

1. An enclosed circuit breaker having an operating handle movable to operate said circuit breaker, a casing in which said circuit breaker is mounted having an openable cover, operating means mounted on said cover and having means thereon for engaging and moving said operating handle, a biased member movable in a plane substantially parallel to the base of said casing to engage said operating handle to prevent closing said circuit breaker when the cover is moved to its open position, said biased member being actuated by movement of said

5

cover to the closed position to permit closing the circuit breaker when the cover is closed.

2. An enclosed circuit breaker having an operating handle movable to operate said circuit breaker, a casing in which said circuit breaker is mounted including an openable cover, operating means mounted on said openable cover having means thereon for engaging and moving said operating handle, a biased member movable in a plane substantially parallel to the base of said circuit breaker upon opening of said cover to engage said operating handle and prevent closing said circuit breaker when the cover is moved to its open position, and means on said cover engaging and actuating said member when said cover is moved to the closed position to permit closing said circuit breaker when the cover is closed.

3. An enclosed circuit breaker having an operating handle movable to operate said circuit breaker, a casing in which said circuit breaker is mounted including an openable cover, operating means mounted on said cover having means thereon engaging and moving said operating handle to open and close said circuit breaker, a biased interlocking member movable upon opening said cover to engage said operating handle and prevent closing said circuit breaker when said cover is open, said interlocking member being manually releasable to permit closing said circuit breaker when said cover is open, and means for receiving a padlock to prevent manual release of said interlocking member.

4. An enclosed circuit breaker having an operating handle movable to operate said circuit breaker to open and closed positions, a casing in which said circuit breaker is mounted including an openable cover, an operating mechanism mounted on said openable cover having means thereon for engaging and moving said operating handle, a locking member normally locking said cover closed in the position of said operating mechanism in which said circuit breaker is closed, said operating mechanism moving said locking member to unlocking position to permit opening said cover when said operating mechanism is moved to a position in which said circuit breaker is open, an interlocking member movable in a plane substantially parallel to the base of said casing to engage said operating handle to prevent closing of said circuit breaker when said cover is moved to open position, and means on said cover engaging and moving said interlocking member to unlocking position by movement of said cover to closed position.

5. An enclosed circuit breaker having an operating handle movable to operate said circuit breaker to open and closed positions, a casing in which said circuit breaker is mounted including an openable cover, an operating mechanism mounted on said openable cover having means thereon for engaging and moving said operating handle, a locking member normally locking said cover closed in the position of said operating mechanism in which said circuit breaker is closed, said operating mechanism moving said locking member to unlocking position to permit opening said cover when said operating mechanism is moved to a position in which said circuit breaker is open, an interlocking member movable to engage said operating handle to prevent opening of said circuit breaker when said cover is moved to open position, said interlocking member being manually releasable to permit closing said circuit breaker while said cover is open, means for receiving a padlock to prevent manual release of said biased member, and means on said cover engaging and moving said interlocking member to unlocking position by movement of said cover to closed position.

6. An enclosed circuit breaker having an operating handle movable to open and close said circuit breaker, a casing in which said circuit breaker is mounted including an openable cover, operating mechanism mounted on said openable cover and having means thereon for engaging and moving said operating handle, mounting means

6

mounting said circuit breaker in said casing, an interlocking member pivotally supported on said mounting means and movable in a plane substantially parallel to the base of said circuit breaker to engage said operating handle to prevent closing said circuit breaker when said cover is moved to the open position.

7. An enclosed circuit breaker having an operating handle movable to open and close said circuit breaker, a casing in which said circuit breaker is mounted including an openable cover, operating mechanism mounted on said openable cover and having means thereon for engaging and moving said operating handle, mounting means mounting said circuit breaker in said casing, an interlocking member pivotally supported on said mounting means and movable in a plane substantially parallel to the base of said casing to engage said operating handle to prevent closing said circuit breaker when said cover is moved to the open position, and a cam member mounted on said cover and disposed to engage and move said interlocking member to unlocking position when said cover is moved to the closed position.

8. An enclosed circuit breaker having an operating handle movable to open and close said circuit breaker, a casing in which said circuit breaker is mounted including an openable cover, operating mechanism mounted on said openable cover and having means thereon for engaging and moving said operating handle, mounting means mounting said circuit breaker in said casing, an interlocking member pivotally supported on said mounting means and movable to engage said operating handle to prevent closing said circuit breaker when said cover is moved to the open position, and a means comprising a member fixedly mounted on said mounting means and adapted to receive a padlock to prevent movement of said interlocking member to unlocking position.

9. An enclosed circuit breaker having visible contact means at one end of the breaker and an operating handle movable to open and close said contact means, a casing in which said circuit breaker is mounted including an openable cover, operating mechanism mounted on said openable cover to be moved away from said breaker upon opening of said cover, means on said operating mechanism engaging said handle when said cover is closed to operate said contact means, an interlocking member movable upon opening said cover to engage said operating handle and prevent closing said contact means when said cover is open, said interlocking member being mounted adjacent the end of said breaker opposite said visible contact means.

10. A circuit breaker having a two-part housing of molded insulating material comprising a base portion and a cover portion, separable contact means disposed in said housing, an operating handle movable to open and close said contact means, said cover portion adjacent said contact means being transparent so that said contact means are visible from the front of the breaker, a casing in which said circuit breaker is mounted including an openable cover, operating mechanism mounted on said openable cover having means for engaging and moving said operating handle, said operating mechanism being moved away from said circuit breaker upon opening of said openable cover, an interlocking member mounted at the end of said breaker opposite said contacts and movable upon opening of said openable cover to engage said operating handle and prevent movement of said handle to close said contacts when said cover is open.

#### References Cited in the file of this patent

#### UNITED STATES PATENTS

2,512,505	Rowe	June 20, 1950
2,695,934	Wills	Nov. 30, 1954
2,813,162	Wallace et al.	Nov. 12, 1957
2,832,860	Matthias	Apr. 29, 1958