

Nov. 13, 1945.

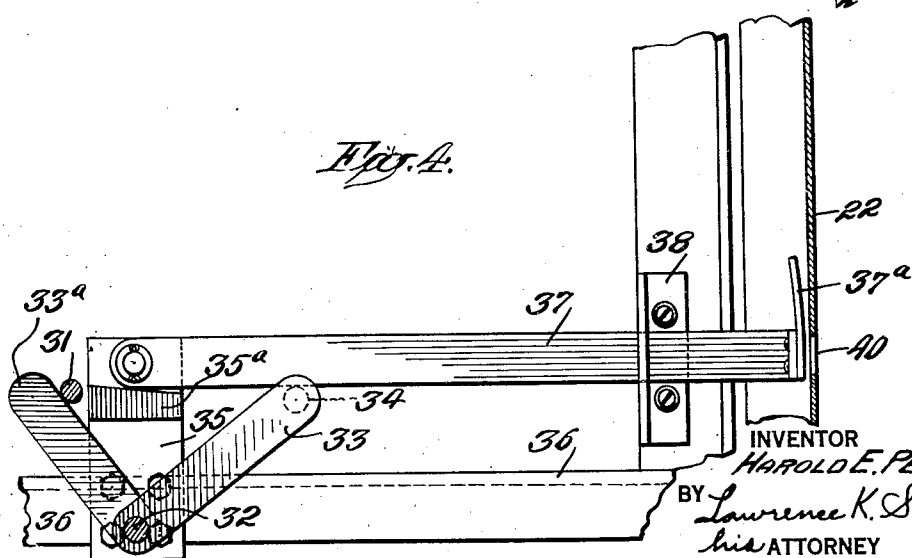
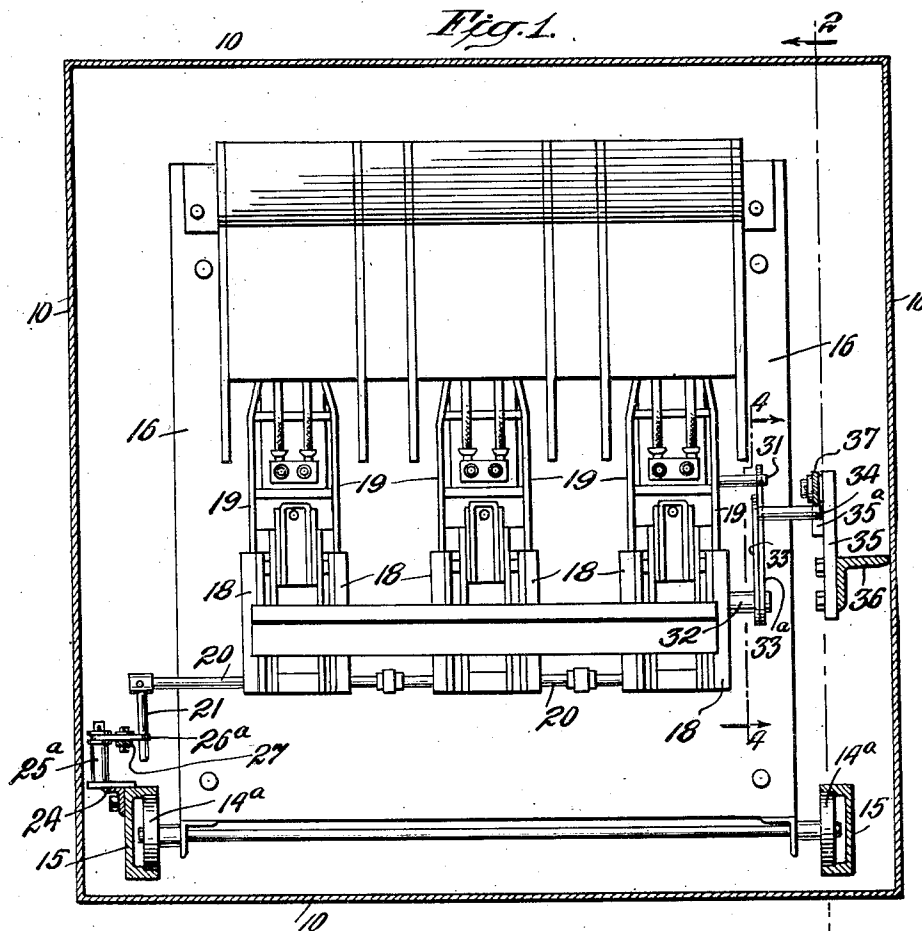
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2,388,934

CIRCUIT BREAKER CONTROL MECHANISM

Filed Feb. 27, 1942

-3 Sheets-Sheet 1



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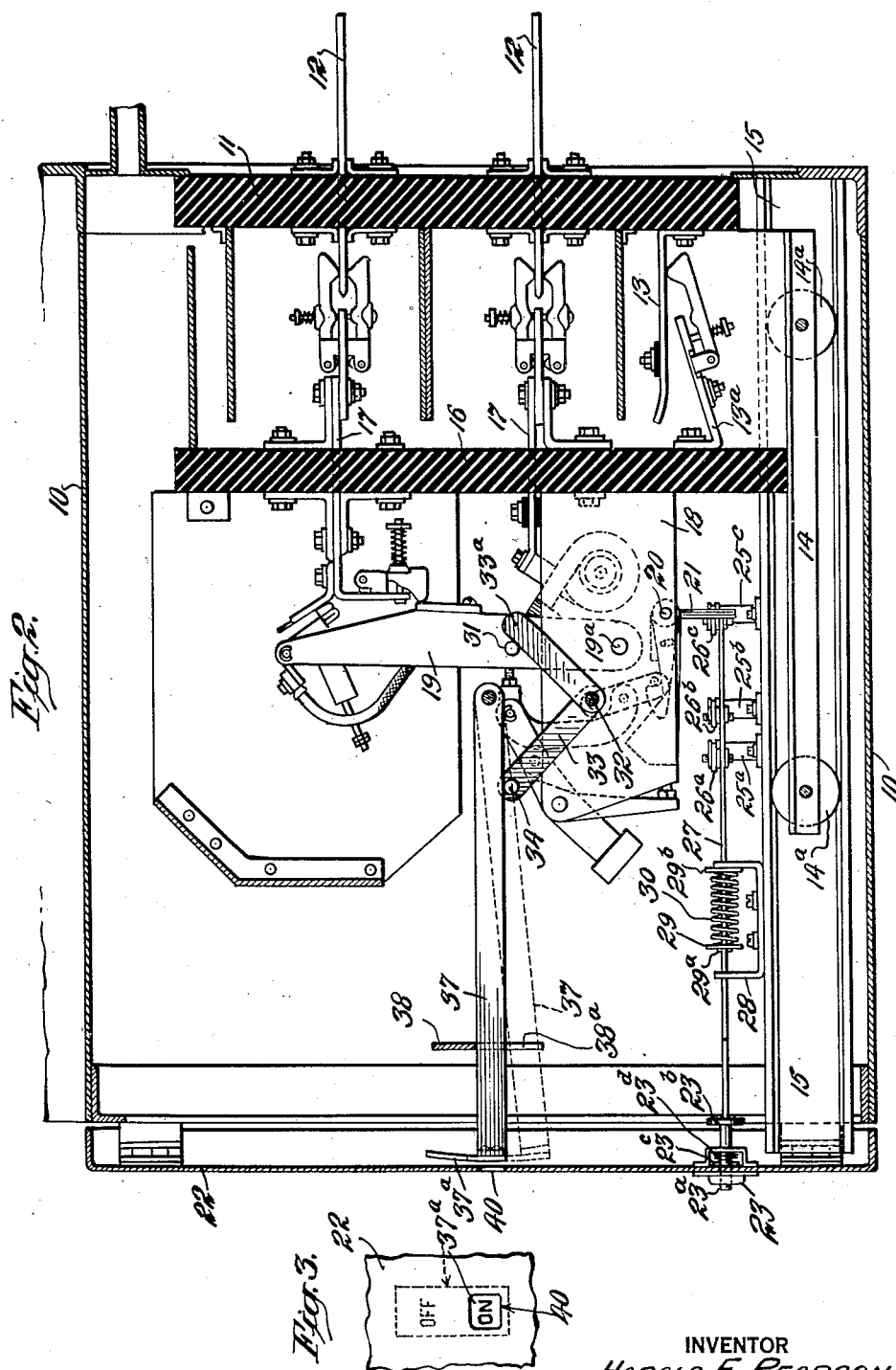
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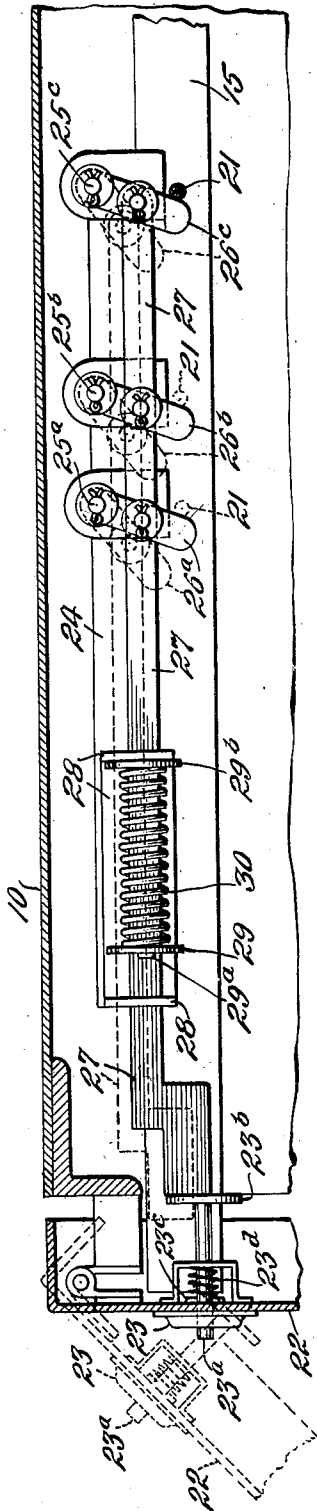
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UNITED STATES PATENT OFFICE

2,388,934

CIRCUIT BREAKER CONTROL MECHANISM

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New Jersey

Application February 27, 1942, Serial No. 432,571

13 Claims. (Cl. 200-168)

This invention relates to circuit breakers which are housed in compartments and wherein the front of each compartment is closed by a door or a removable panel. The circuit breaker in each of such compartments is mounted on a movable frame or truck in order that the breaker may be conveniently withdrawn or replaced. The movable unit carries yieldable contacts which engage fixed contacts at the rear of the compartment for connecting the circuit breaker to the buses and carries auxiliary contacts for engaging contacts mounted at the rear of the unit for control purposes. When the breaker unit is moved from its normal operating position outwardly from the compartment, the main circuit breaker contacts are interrupted while the auxiliary control contacts are still maintained. This is known as the test position. Upon further outward movement of the unit, the connections and the auxiliary control circuits are broken and all parts of the unit are disconnected from the fixed contacts of the compartment and this position is known as the disconnected position of the unit.

In each of these three positions, it is desirable to be able to open the breaker from the outside of the compartment when the door of the compartment is closed, particularly in the operative and in the test positions. It is also desirable in each of these positions to provide mechanism which will indicate at the front of the compartment whether the breaker is open or closed. These compartments are usually stacked one above the other and side by side and the door at the front is the usual means of access to each compartment.

Certain disclosures hereof and not claimed herein are covered in my divisional application Serial No. 485,438, filed May 3, 1943.

One object of this invention is to provide means whereby the breaker may be tripped to open position manually from the front of the door when the same is closed and to be able to accomplish this regardless of the position of the breaker unit as regards the operative, test or disconnected position. Another object is to provide for the removal of such tripping means from the path of movement of the breaker parts when the door is opened. Other objects and advantages will be understood from the following description and accompanying drawings which illustrate one embodiment of the invention.

Fig. 1 is a front elevation, partly in section, showing the breaker in its compartment; Fig. 2 is a side elevation of the breaker within its compartment, partly in section, on the line 2-2 of

Fig. 1; Fig. 3 is a front view of the indicator through the door; Fig. 4 is an enlarged side view, partly in section, on the line 4-4 of Fig. 1; Fig. 5 is an enlarged plan view, partly in section of the auxiliary tripping control mechanism; and Fig. 6 is an enlarged plan view, partly in section of the indicator control mechanism.

The invention is applicable to any type of draw-out circuit breaker and although in the drawings an air break circuit breaker of the form disclosed in the J. D. Wood Patent No. 2,129,723 granted September 13, 1938 is indicated, any other form or type of circuit breaker might be used and the present invention applied thereto. The compartment is shown provided with side walls and top and bottom walls 10 preferably made of sheet steel. The rear end of the compartment, as shown in Fig. 2, is provided with an insulating panel 11 which supports the main conductors 12 which lead to the buses. These conductors pass through the panel 11 and are adapted to be engaged by the yieldable main contacts of the circuit breaker. On the front of this panel is mounted a series of conductors 13 which are connected to auxiliary control circuits and which extend forwardly beyond the ends of the conductors 12. The conductors 13 are adapted to be engaged by yieldable contacts carried by the movable unit which contacts are connected to the various control relays of the circuit breaker.

The movable unit is supported on a truck frame 14 provided with wheels 14a which are in turn supported and guided by rails 15 positioned at the bottom of the compartment and at each side thereof. These rails permit the truck and breaker carried thereby to be moved forwardly to the test or to the disconnected position within the compartment from the operative position shown in Fig. 2. The truck supports a vertically extending insulating panel 16 which supports the circuit breaker and its controlling parts. The breaker shown is of the three-pole type, as shown in Fig. 1, and is provided with fixed contacts connected to conductors 17 which pass through the panel rearwardly and carry the yieldable contacts which are adapted to engage the conductors 12 when the breaker is in the operating position. The panel supports the frames 18 which extend forwardly and support the main movable contact arms 19 of the breakers which are pivoted on the cross rod 19a. The various parts of the breaker mechanism need not be particularly described as they are shown the same as disclosed in said patent, it being sufficient to state that upon the automatic opening of any one of the poles of the

breaker, the latch rod 20 is turned in a counter-clockwise direction, looking at Fig. 2, which results in tripping all three poles of the breaker and causing them to move to their open position. A series of conductors 13a is mounted on the panel 16 and these conductors are connected to the various control circuits of the breaker and are provided with yieldable contacts which are adapted to engage the conductors 13 respectively when the movable unit is in the operative position or in the test position.

As shown in Fig. 1, the latch shaft 20 is extended to the left beyond the panel 16 and at the end of the latch shaft is fixed a downwardly extending rod 21. It is evident that if this rod 21 be forced rearwardly, it would result in the tripping and opening of the circuit breakers. The door 22 of the compartment is hinged at its left-hand side, as shown in Figs. 2 and 5, and the lower left-hand corner of the door is provided with a push button 23 for manually tripping the breaker when the door is closed. This push button is provided with a push rod 23a carrying the disk 23b at its inner end on the inner side of the door. This rod is provided with a cross pin 23c and between it and the supporting frame of the push button and encircling the rod is a spring 23d for normally holding the rod in its outermost position.

On top of the left-hand rail 15, as shown in Figs. 1 and 5, is mounted a plate 24 which extends along a considerable portion of the length of the rail 15 and also overhangs the rail at the left-hand side. On this supporting plate near the inner end thereof are mounted three posts 25a, 25b and 25c which extend upwardly from the plate, as well shown in Fig. 2. On the top of each of these posts are pivotally supported the arms 26a, 26b and 26c, as well shown in Fig. 5. These arms extend over and are pivotally connected to a flat strip of metal 27 which extends forwardly and its front end is offset to come opposite the plate 23b of the trip rod. At an intermediate portion of the strip 27 and secured to the plate 24 is located a U-shaped metal element 28 with the two arms of the U extending upwardly. The strip 27 passes freely through horizontal slots in the upper ends of the element 28, the length of these slots being sufficient to permit the strip 27 to move sideways therein. A disk 29 is mounted on the strip 27 and is held in place thereon by the pin 29a. A similar disk 29b is also mounted on the strip 27 and is freely movable thereon. A spring 30 encircles the strip 27 between the disks 29 and 29b which holds the disk 29b against the rear arm of the element 28 and tends to force the disk 29 and strip 27 forwardly against the other arm of the element 28.

When the door of the compartment is closed, as shown in Fig. 2 and in full lines in Fig. 5, the trip rod 23a forces its plate 23b against the front end of the strip 27 and holds this strip in the full line position shown in Fig. 5 against the pressure of the spring 30. This brings the pivoted arm 26c in front of the rod 21 and it is evident that when the push rod 23a is pushed inwardly it will result in forcing the strip 27 further inwardly against the pressure of the spring 30 and push the rod 21 rearwardly and thereby cause the opening of the circuit breakers. Thus with the door closed, the breakers may be tripped manually from the outside of the door when the movable circuit breaker unit is in its operating position. When the movable unit is in the test position, the rod 21 is then adjoining the pivoted

arm 26b, as shown in dotted lines in Fig. 5, and it is evident that in this position the circuit breakers may be tripped manually with the door closed by pushing the trip rod 23a. Likewise when the movable unit is in the disconnected position, the rod 21 will adjoin the arm 26a and the breakers may then be opened when the door is closed. Thus a common means serves to open the breakers when the door is closed in each of the three positions of the movable unit.

When the door of the compartment is opened, the strip 27 is relieved from the pressure of the trip rod and the spring 30 then causes the strip to be moved forwardly; but by reason of the fact that this strip is connected with the pivoted arms 26a, 26b and 26c, the strip 27 is swung sideways to the left of the compartment and the parts then assume positions as shown by the dotted lines in Fig. 5. This action causes the arms 26a, 26b and 26c to be swung on their pivots towards the left-hand side of the compartment and moves them out of the path of the rod 21. Consequently, when the door is opened for the purpose of moving the movable unit from one position to another, the arms 26a, 26b and 26c will be out of the path of movement of the rod 21 and not be affected by them, or any one of them, to trip the breaker or to interfere with the free movement of the movable breaker unit forwardly or rearwardly. Upon closing the door of the compartment, the push rod 23a will again engage the front end of the strip 27 and cause the arms 26a, 26b and 26c to assume the full line position of Fig. 5 for effecting when desired the tripping of the breaker in any position of the movable unit. Obviously this improvement is adapted to control the opening of the breakers in more than three different positions if desired, by the addition of more controlling arms properly spaced from each other to engage the rod 21 in any position of the movable unit; and less than three controlling arms may be used if desired.

The control for indicating on the outside of the door whether the breaker is open or closed in any position of the unit is, in the particular instance shown, governed by a pin 31 fixed to one of the circuit breaker contact arms 19 and which extends sideways therefrom, as shown in Figs. 1 and 6. A sideways extending pin 32 is fixed to one of the side portions 18 of the circuit breaker frame. A pair of arms 33, 33a are pivotally mounted on the pin 32 and the arms are fixed to each other forming a bell crank lever. The arm 33a is engaged on its front edge by the pin 31; and the arm 33 at its front end is provided with a pin 34 which extends sideways toward the right-hand side of the compartment.

A plate 35 is fixed to a frame support 36 which is at the right-hand side of the compartment. A metal strip 37 is pivoted at its rear end on the support 35 and extends forwardly close to the inner side of the door and is provided at its front end with an indicating plate 37a located opposite an opening in the door. The pin 34 extends under the lower edge of the strip 37 in the region between the pivotal support of the strip and the front end of the strip. The support 35 is provided with a lug 35a on its inner side and its top surface is inclined, as shown in Fig. 4, for limiting the extent of the downward movement of the strip 37 when released by the pin 34. Fixed to a portion of the frame of the compartment is a bent plate 38 of sheet metal and it serves as a guide for the front portion of the strip 37, the

latter being freely movable in a slot 38a in the inwardly extending portion of the plate 38. This slot is open-ended at its bottom to permit downward movement of the strip 37 until it engages the inclined surface of the lug 35a.

Referring to Fig. 2, there is provided at the right-hand side of the door opposite the indicator plate 37a a small opening 40. The plate 37a bears a label "Off" at its upper portion and a label "On" at its lower portion. One or the other of these labels is visible through the opening 40 depending upon whether the breaker is open or closed.

With the door closed and with the breaker in its closed position, as shown in Fig. 2, the pin 31 is in engagement with the arm 33a which causes the arm 33 and its pin 34 to hold the strip 37 in its upper position and thereby hold the movable indicator plate in its upper position to indicate that the breaker is closed. When the breaker moves to its open position, the pin 31 no longer retains the arm 33a in the position shown in Fig. 2 which permits the strip 37 to drop to its lowest position indicated by the dotted lines in Fig. 2. This permits the indicator plate 37a to drop to its lowest position and thereby exposes the label "Off" on the front of the upper portion of the plate through the opening for indicating that the breaker is open. Upon closing the breaker, the pin 31 will turn the arms 33 and 33a in a clockwise direction, looking at Fig. 2, and thereby raise the movable indicator plate to indicate that the breaker is closed.

When the movable breaker unit is moved forwardly to the test position or to the disconnected position, the pin 34 is carried with the breaker unit under the strip 37 and it follows that in either of these positions, the indicator will be controlled in the same manner as already described to indicate whether the breaker is open or closed. Thus a common controlling means is provided for indicating the closed or open position of the breaker through the opening in the door in any location of the movable breaker unit.

The improvements herein described may be applied to any form or type of circuit breaker having any number of poles and of the air break or oil type circuit breaker, as well as to breakers which are manually or automatically closed. Various modifications may be made without departing from the scope of the invention in adapting the same to particular types and to particular applications.

I claim:

1. The combination of a movable circuit breaker unit, a movable element of said unit for tripping the breaker to open position upon actuation thereof, a compartment including a door for enclosing said unit, movable means within the compartment extending towards the door and including a portion adapted to engage said movable element and located in the path of movement of said movable element upon movement of said unit, said means being disassociated from said door, manually operable means mounted on the door and operable from the front of the door for actuating said movable means to trip the breaker, and means for moving said portion out of the path of movement of said movable element upon opening the door.

2. The combination of a movable circuit breaker unit, a movable element of said unit for tripping the breaker to open position upon actuation thereof, a compartment including a door for enclosing said unit, movable means within the compartment extending towards the door and including a portion adapted to engage said movable

element and located in the path of movement of said movable element upon movement of said unit, said means being disassociated from said door, manually operable means mounted on the door and operable from the front of the door for actuating said movable means to trip the breaker, and means for moving said portion out of the path of movement of said movable element upon opening the door, said manually operable means engaging said movable means for moving said portion in the path of movement of said movable element upon closing the door.

3. The combination of a movable circuit breaker unit, a movable element of said unit for tripping the breaker to open position upon actuation thereof, a compartment including a door for enclosing said unit, movable means within the compartment extending towards the door and including a plurality of portions each respectively adapted to engage said movable element in different positions of said unit and located in the path of movement of said movable element upon movement of said unit, manually operable means mounted on the door and operable from the front of the door for actuating said movable means to trip the breaker in the different positions of said unit, and means for moving said plurality of portions out of the path of movement of said movable element upon opening the door.

4. The combination of a movable circuit breaker unit, a movable element of said unit for tripping the breaker to open position upon actuation thereof, a compartment including a door for enclosing said unit, movable means within the compartment extending towards the door and including a plurality of portions each respectively adapted to engage said movable element in different positions of said unit and located in the path of movement of said movable element upon movement of said unit, manually operable means mounted on the door and operable from the front of the door for actuating said movable means to trip the breaker in the different positions of said unit, and means for moving said plurality of portions out of the path of movement of said movable element upon opening the door, said manually operable means engaging said movable means for moving said plurality of portions in the path of movement of said movable element upon closing the door.

5. The combination of a movable circuit breaker unit, a movable element of said unit for tripping the breaker to open position upon actuation thereof, a compartment including a door for enclosing said unit, a slidable element within the compartment and extending towards the door and including a plurality of portions each respectively adapted to engage said movable element in different positions of said unit, manually operable means mounted on the door and operable from the front of the door for actuating said slidable element to trip the breaker in the different positions of said unit, and a spring engaging said slidable element for moving said plurality of portions out of the path of movement of said movable element upon opening the door, said manually operable means actuating said slidable element to move said plurality of portions in the path of movement of said movable element upon closing the door.

6. The combination of a movable circuit breaker unit, a movable element for tripping the breaker, a compartment for enclosing said unit, means within the compartment extending towards the front of the compartment for tripping the breaker

to its open position, said means including a plurality of spaced portions for respectively engaging said movable element for tripping the breaker in different positions of the movable unit and including a common element for actuating said portions, and manually operable means mounted at the front of the compartment for actuating said common element for tripping the breaker in any one of said positions.

7. The combination of a movable circuit breaker unit, a movable element for tripping the breaker, a compartment including a door for enclosing said unit, means within the compartment extending towards the door for tripping the breaker to its open position, said means including a plurality of spaced portions for respectively engaging said movable element for tripping the breaker in different positions of the movable unit and including a common element for actuating said portions, and manually operable means mounted on the door and operable from the front of the door for engaging said common element for actuating said first named means to trip the breaker in any one of said positions.

8. The combination of a movable circuit breaker unit, a movable element for tripping the breaker, a compartment including a door for enclosing said unit, means within the compartment extending towards the door for tripping the breaker to its open position, said means including a plurality of spaced portions for respectively engaging said movable element for tripping the breaker in different positions of the movable unit and including a common element for actuating said portions, and manually operable means mounted on the door and operable from the front of the door for engaging said common element for actuating said first named means to trip the breaker in any one of said positions, said manual means being disconnected from said first named means by the opening of the door.

9. A circuit breaker unit arranged for movement to a plurality of positions comprising, in combination, a compartment including a door for enclosing said unit, means for manually closing said breaker, and auxiliary means for manually opening said breaker in any one of said positions, said auxiliary means comprising a tripping element supported upon and movable with said door, said element being manually operable from the front of said door, a plurality of spaced arms adapted for tripping said breaker in any one of said positions, said arms being operatively connected with said tripping element, and circuit breaker latching means responsive to movement of said arms for opening said breaker in any one of said positions.

10. A circuit breaker unit arranged for movement to a plurality of positions comprising, in combination, a compartment including a door for enclosing said unit, means for manually closing said breaker only while said door is opened,

and auxiliary means for opening said breaker, said auxiliary means comprising a tripping element supported upon and operable from the front of said door, a plurality of individual arms adapted for respectively tripping said breaker in any one of said positions, said arms being operatively connected with said tripping element, and circuit breaker latching means responsive to movement of said arms for opening said breaker.

11. A circuit breaker unit arranged for movement to a plurality of positions comprising, in combination, a compartment including a door for enclosing said unit, means for closing said breaker only while said door is opened, and auxiliary means for manually opening said breaker while said door is closed, said auxiliary means comprising a tripping element supported upon and movable with said door, said element being manually operable from the front of said door, a plurality of spaced arms adapted for tripping said breaker in any one of said positions, said arms being operatively connected with said tripping element only at predetermined positions of said circuit breaker, and circuit breaker latching means responsive to said arms for opening said breaker in any one of said positions.

12. A circuit breaker unit arranged for movement to a plurality of positions, comprising, in combination, a compartment, including a door for enclosing said breaker unit, and control means for tripping said breaker, said control means comprising a tripping element supported upon and movable with said door, said element being manually operable from the front of said door, a plurality of spaced arms adapted for tripping said breaker in any one of said positions, a common member for operatively connecting said arms with said tripping element only while said door is closed, and circuit breaker latching means responsive to movement of said arms for respectively opening said breaker in any one of said positions.

13. A circuit breaker unit arranged for movement from an operating position to a test position or vice versa comprising, in combination, a compartment including a door for enclosing said unit, and control means for manually opening said breaker only while said door is closed, said control means comprising a tripping element supported upon and movable with said door, said means being manually operable from the front of said door, a plurality of spaced arms adapted for tripping said breaker respectively in the operating and test positions of said breaker, a member for operatively connecting said arms with said tripping element, said arms being rendered ineffective intermediate the test and operating positions, and circuit breaker latching means responsive to movement of said arms for opening said breaker in any one of said positions.

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