

Dec. 5, 1944.

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2,364,480

CIRCUIT BREAKER COMPARTMENT DOOR OPERATED TRIPPING DEVICE

Filed Nov. 6, 1942

4 Sheets-Sheet 1

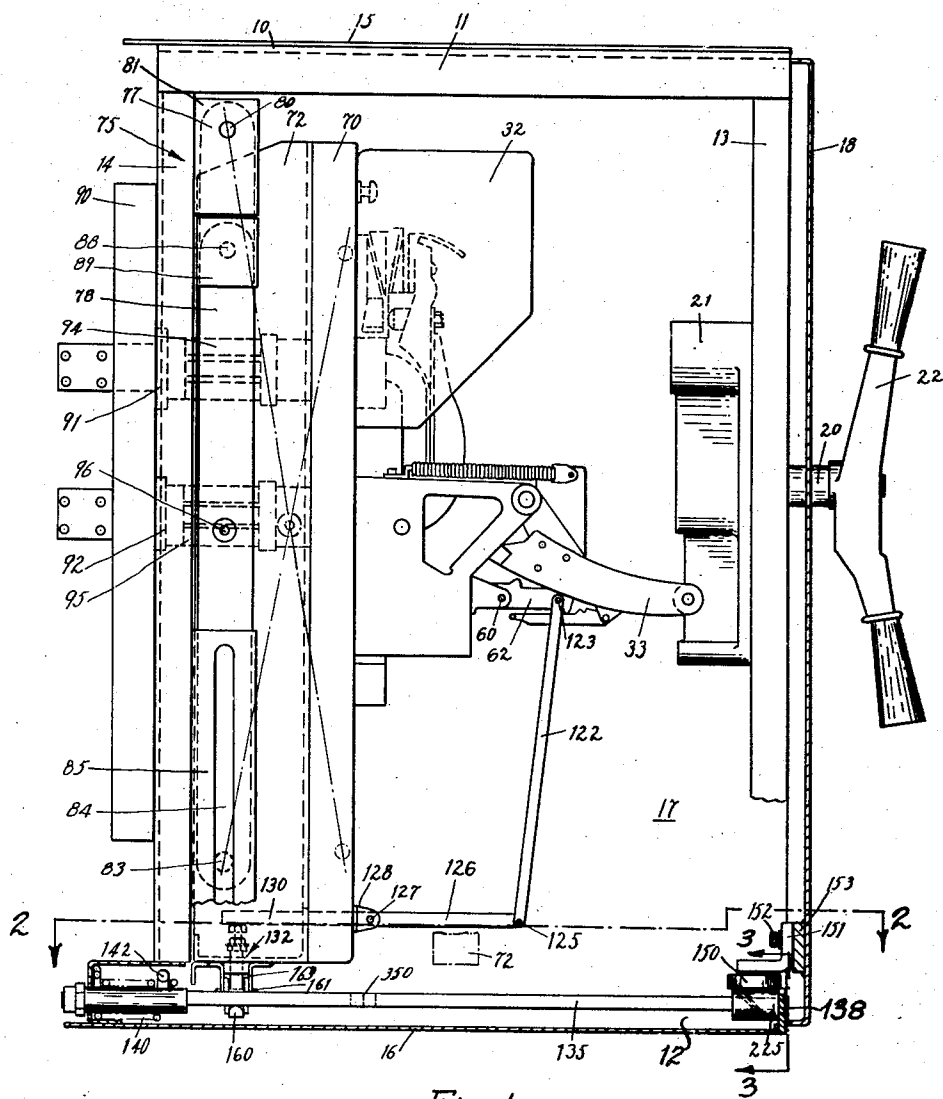


Fig. 1

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4 Sheets-Sheet 2

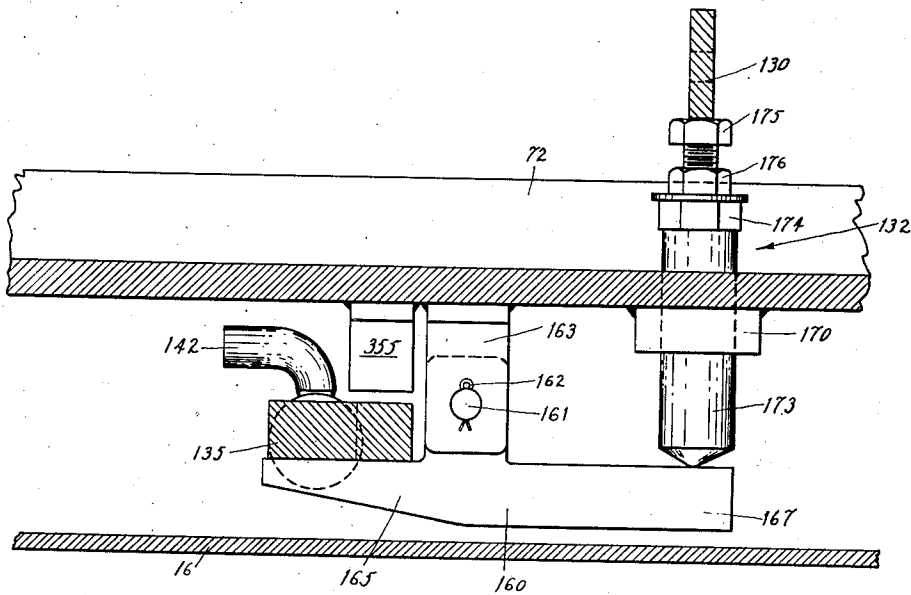


Fig. 7

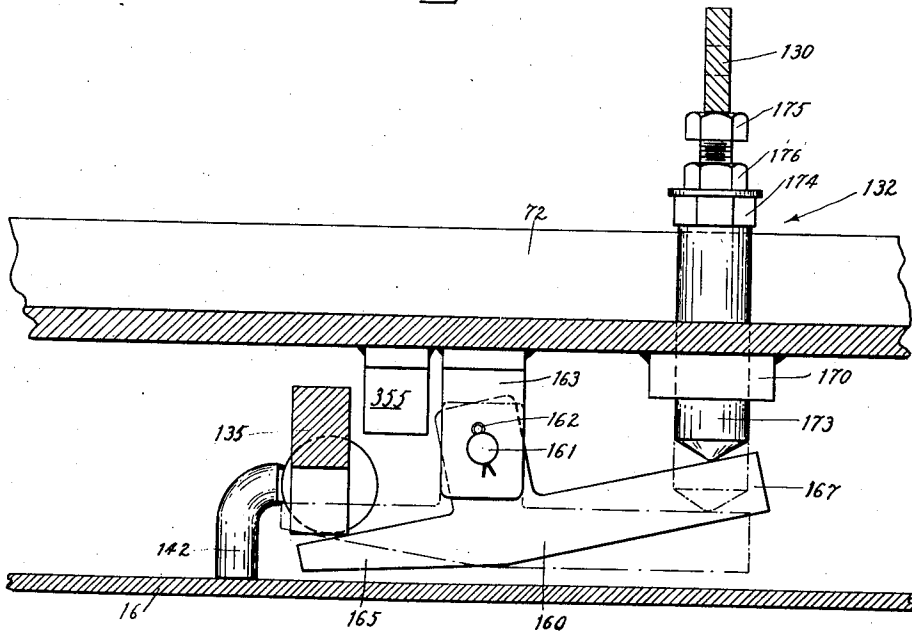


Fig. 8

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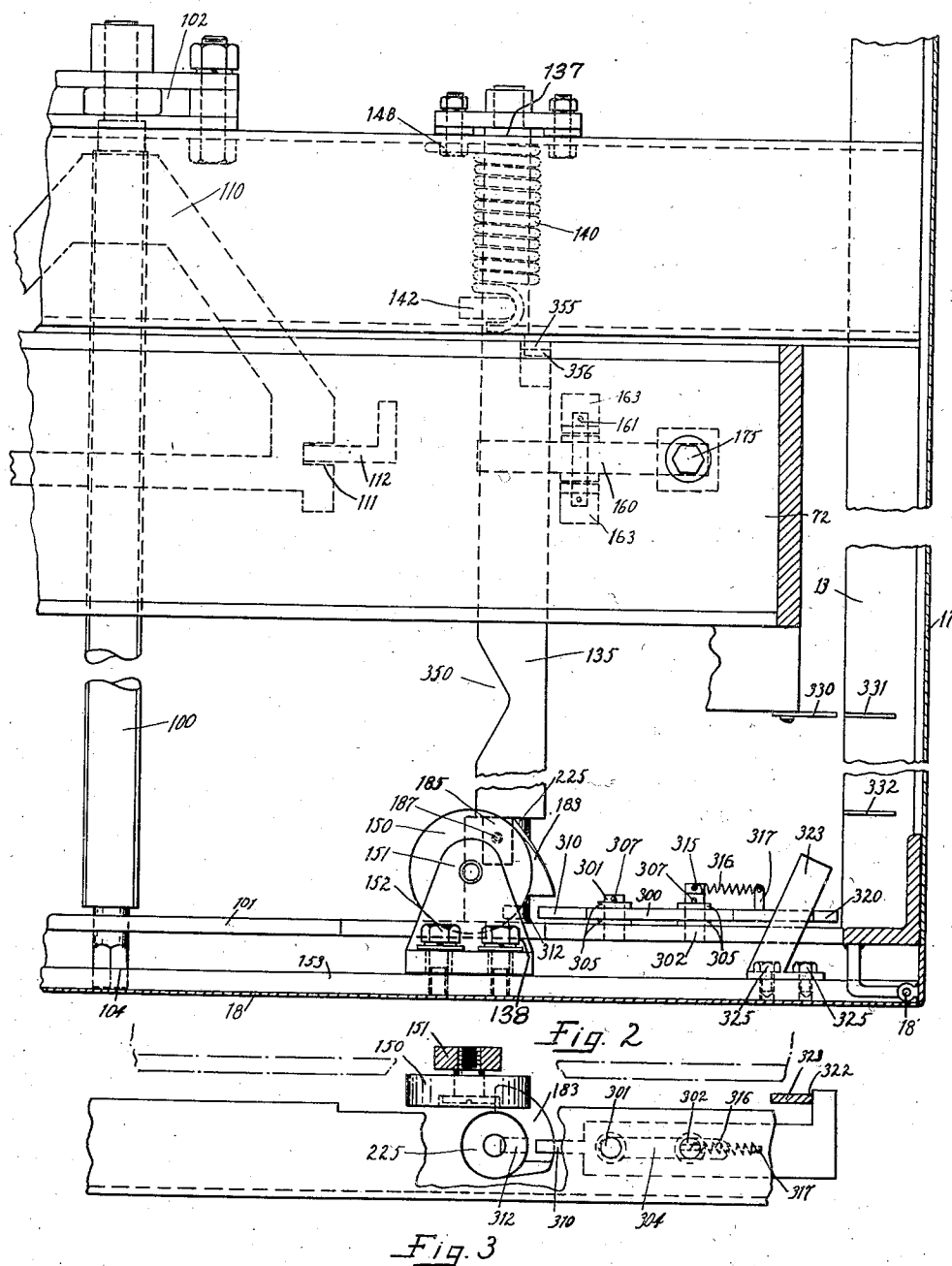
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CIRCUIT BREAKER COMPARTMENT DOOR OPERATED TRIPPING DEVICE

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4 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,364,480

CIRCUIT BREAKER COMPARTMENT DOOR
OPERATED TRIPPING DEVICEWalter Haines Schymik, Oreland, Pa., assignor
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phia, Pa., a corporation of Pennsylvania

Application November 6, 1942, Serial No. 464,754

10 Claims. (Cl. 200—50)

This invention relates to circuit breakers and switch gear, and more particularly to protective devices for fully enclosed switch gear having a swinging front panel or door wherein the circuit breaker is tripped upon the opening of the door and means are provided to prevent energization of the circuit breaker elements until the door is closed.

In the maintenance and operation of enclosed circuit breakers, it has sometimes been found that a careless operator will open the enclosing structure before the circuit breaker has been tripped. The tripping of the circuit breaker after the door has been opened and the consequent flash has at times caused injury. Also, when the enclosing structure has been opened after the circuit breaker has been properly tripped, then it has also been possible for a careless operator to close the circuit breaker while the door is open and place the same in service position, thus jeopardizing his own safety as well as others.

The primary object of the present invention, therefore, is the provision of an enclosing structure for a circuit breaker or other switch gear wherein opening of the door or front panel results in a tripping open of the circuit breaker and wherein this tripping operation occurs during the initial door opening movement.

Another object of my invention is the arrangement of an enclosing structure for a circuit breaker in such a manner that the circuit breaker contacts cannot be closed and the circuit breaker itself cannot be moved into engagement with energized contacts while the door or front panel is open.

These and many other objects of my invention will be apparent and where not apparent will be pointed out in the following description and drawings, in which:

Figure 1 is a side view of the circuit breaker compartment partly in section with the near enclosing sheet removed.

Figure 2 is a plan view showing the bottom of the compartment of Figure 1 and is taken on line 2—2 of Figure 1 looking in the direction of the arrows.

Figure 3 is a fragmentary view taken on line 3—3 of Figure 1 looking in the direction of the arrows and showing the operating cam for the door interlock.

Figure 4 is a view corresponding to that of Figure 3, showing however, another position of the operating members thereof.

Figure 5 is a view in perspective of the actuating cam.

Figure 6 is an enlarged view of the lower portion of Figure 1, showing another position thereof.

Figure 7 is a cross-sectional view taken on line 7—7 of Figure 6, looking in the direction of the arrows.

Figure 8 is a cross-sectional view taken on line 8—8 of Figure 6, looking in the direction of the arrows.

Referring now to Figure 1, I have here shown a circuit breaker enclosing structure consisting of a compartment or cell in a switch board structure. The compartment 10 comprises upper and lower frame members 11 and 12 and vertical frame members 13 and 14 which serve as a supporting structure for the upper and lower enclosing sheets 15 and 16 and the side wall members 17.

The front of the cell or compartment 10 is closed by a hinged door or panel 18 which is suitably swingingly supported on one of the side frame members 13.

The front panel 18 is provided with a handle member 22 which is mounted on the outer end of shaft 20 which in turn is rotatable in a suitable bearing in the front panel or door 18. The inner end of the shaft 20 on the interior of the panel 18 carries a cam 21 which is engageable with the operating lever 33 of the circuit breaker 32. The type of cam operating structure herein shown is that which is more fully disclosed in Graves Patent No. 1,955,287 assigned to the assignee of the present application.

The cam 21 is so arranged that when it is rotated in one direction it will lift the operating handle 33 and when rotated in the opposite direction it will lower the same, the movement serving respectively to open or close the circuit breaker. The specific form of the circuit breaker forms no part of the present invention and hence will not be more fully described herein.

It is sufficient here to point out that the circuit breaker is held in closed position by the latch member 62 which is pivoted at 60 on the housing of the circuit breaker itself. The latch member 62 is so designed that when it is lowered, the operating elements of the circuit breaker are designed to be tripped and the circuit breaker will trip open. Any suitable automatic means such as a tripping solenoid may be provided to lower the latch member 62.

The entire circuit breaker 32 is supported on a panel 19 which in turn is secured to a vertical

frame member 72 which is slidable horizontally towards the door 18, in its upright position, to selected positions in the compartment 10. The slidable supporting frame 72 is carried by a suitable extensible supporting structure 75 which comprises a pair of pantograph links 77 and 78 on each side. Link 77 is pivotally supported on the pin 80 which in turn is carried by the bracket 81 welded to the compartment structure.

The opposite end of link 77 is provided with a pin 83 slidable in a slot 84 in a bracket member 85 carried by the vertical frame supporting structure 72. Link 78 is pivotally carried by pin 88 on bracket 89 which in turn is carried by the frame 72. The opposite end of link 78 is provided with a pin and is supported in a slotted bracket similar to bracket 85 which, however, is secured to the compartment frame.

The mid-point of the two links 77 and 78 are joined by the pin 96 so that as the frame 72 and the circuit breaker panel 70 are moved towards the right, the links 77 and 78 assume an X form as their lower pivot pins move upward in their respective slots. This mechanism will maintain the circuit breaker panel 70 in a vertical position during its horizontal movement.

This type of pantograph circuit breaker supporting structure is more clearly shown and described in Graves Patent No. 1,955,287, as well as in application Serial No. 377,605, both of which are assigned to the assignees of this application. The particular type of slidable supporting structure forms no part of the present invention. Although various operations of the present invention relate to the maintenance of the door in open position while the circuit breaker is in a test position within the compartment, any type of sliding structure which will support the circuit breaker panel in erect condition while it is moved to various positions in the compartment may, however, be used and this invention is not limited to the pantograph structure herein set forth.

The rear end of the compartment structure is provided with an insulating panel 90 which carries suitable stationary disconnect contacts 91 and 92 which in turn are at their left hand ends connected to any suitable source of current supply. The stationary disconnect contacts project through the front of the panel and engage suitable movable disconnect contacts 94 and 95 which in turn are carried by the circuit breaker panel 70 and thus provide means for carrying current to the circuit breaker structure 32.

The specific disconnect contacts herein described form no part of the present invention and may have any suitable form such as the form shown in application Serial No. 421,734, assigned to the assignee of this application. It is obvious, however, that when the circuit breaker structure is moved to the right, the movable disconnect contacts 94 and 95 disengage from the stationary disconnect contacts 91 and 92 thus making it possible to test the operation of the circuit breaker while no current flows therethrough.

The circuit breaker may be moved horizontally within the compartment structure in any suitable manner. At the left hand side of Figure 2, I have shown a simplified means for effecting this operation consisting of a threaded member 100 rotatable in a suitable bearing in a front bracket 101 supported at the lower end of the compartment structure and at the opposite end rotatable in a suitable thrust bearing 102. The front end of the threaded member is squared at 104 to receive the end of a socket wrench or similar mem-

ber to effect rotation of the threaded member 100. A nut 110 is mounted on the threaded member and is provided with slots 111 on each side which receive flanges 112 secured to the lower end of the movable frame supporting structure 72.

Accordingly, when the threaded member 100 is rotated in an appropriate direction, the nut 110 is moved outwardly towards the front of the compartment thus moving the flange 112 and thus the frame member 72, thereby moving the circuit breaker panel horizontally and extending the pantograph supporting mechanism. When the threaded member is rotated in the opposite direction, then the circuit breaker panel and its supporting frame are moved inwardly and the pantograph supporting structure is correspondingly collapsed.

The door structure is so arranged that when the same is opened various linkage mechanisms hereinafter described must be actuated in such a manner as to trip the circuit breaker. The tripping action will, of course, be obtained by the dropping of the latch 62.

In order to integrate the circuit breaker structure with the compartment structure so that on the opening of the door, the circuit breaker will be tripped, a link 122 is pivotally connected at 123 to one end of the latch member and at the opposite end, the said lever is at 125 pivotally connected to the end of the lever 126 which in turn is rotatably mounted on the fulcrum pin 127 which is carried by a bracket 128 secured to the panel 70 of the circuit breaker. The lever 126 projects through a suitable opening slot or notch in the lower end of the panel 70 and comprises an arm 130 projecting beyond the rear end of the panel. This arm rests upon the upper end of a suitable tappet 132.

It will now be obvious that raising the tappet 132 will cause the arm 130 of the lever 126 to rise, thus depressing the pin 125 at the opposite end of the lever, thus pulling the link 122 down and hence pulling the latch 62 down, thus tripping the circuit breaker open.

The door opening structure is so arranged that during the initial door opening movement, the tappet 132 is caused to rise. A tripping bar 135 is provided in the lower part of the compartment (Figures 1, 2 and 6). The said tripping bar 135 is rotatably supported at the back in the back bearing 137 and at the front in bearing 138. This bar is of rectangular or substantially rectangular cross-section over all of its length.

The tripping bar 135 is normally biased to the position shown in Figure 8 by means of a torsion spring 140 one end of which is engaged in a suitable lug 148 on the back frame of the compartment, the other end of which engages a lug 142 on the tripping bar 135.

The bias of the spring is such as to tend to rotate the tripping bar from the position shown in Figure 7 towards the position shown in Figure 8.

The lug 142 (Figures 7 and 8) around which one end of the spring is engaged, is an angular member which, when the tripping bar is rotated to the position shown in Figure 8, bears against the bottom surface of the compartment, thus limiting further rotation thereof and maintaining the tripping bar in tripped position.

The tripping bar is operated into the non-trip position against the bias of the spring 142 by means of the roller 150 carried by the bracket 151 which is secured in any suitable manner, as for instance by the bolts 152 to a reinforcement 153 on the front panel 18. The front end of the trip-

ping bar is provided as is readily seen in Figures 2, 5 and 6, with a cam 225. The end of the tripping bar is squared off to be received in the square opening 185 in the cam 225, and is securely held therein by a set screw 187 passing through a tapped perforation.

The fin 183 of the cam is provided with a sinusoidal cam surface and the opposite side thereof is buttressed in any suitable manner as for instance by the additional thickness of metal 183'. The roller 150 carried by the door 18 is so arranged that when the door is closed, the roller bears against the fin 183 of the cam 225 and rotates the cam and hence the trip bar from the position shown in Figure 8 to the position shown in Figure 7.

When the door is swung open on its hinges 18' then the roller 150 is removed from engagement with the cam surface 183 and no resistance is then offered to the bias of the torsion spring 140 which then rotates the tripping bar 135 from the position shown in Figure 7 to the position shown in Figure 8.

Accordingly, on initiation of the door opening operation, and when the door has only been slightly opened, the tripping bar 135 is permitted to rotate to tripping position, thus tripping the circuit breaker open before the door can be fully opened.

Closing of the door resets the tripping bar once more and moves it from the position of Figure 8 back to the position of Figure 7 thereby permitting operation of the circuit breaker once more.

In Figure 7 is shown the position of the tripping bar when the circuit breaker is in closed position or when it is so arranged that the circuit breaker may readily be moved to closed position. In Figure 8, the tripping bar is shown in a position which is rotated 90° counterclockwise from the position of Figure 7 where it has actuated the tripping elements.

The manner in which the various positions of the tripping bar 135 affect the operation of the tappet 132 to effect a tripping of the circuit breaker through the links 126 and 122 is more clearly shown in Figures 7 and 8. A tripping lever 160 is pivotally supported on a pin 161 and is secured thereon by means of the cotter pin 162. The pin 161 is carried by a bracket 163 secured to the under side of the frame 72. One arm 165 of the tripping lever 160 is engaged beneath the tripping bar 135. The opposite arm 167 bears against the lower end of the tappet 132.

Tappet 132 is slidably positioned by the reinforcing bracket 170, an opening being provided through bracket 170 and in the lower end of the frame 72. The tappet consists of a cylindrical rod 173, the upper end of the said rod being at 174 hexagonal in shape and is tapped to receive the adjusting screw 175 which is locked in position by the lock nut 176. The head 175 of the adjusting screw bears against the under surface of the arm 130 of the lever 126 as above described. The adjusting screw 175 provides for simplified means of adjustment for any variation in the dimension of the parts so that these variations may be compensated for.

In Figure 7, the tripping bar 135 is shown in horizontal position corresponding to that of Figures 1 and 2 which is the normal operating position in which current can be sent through the circuit breaker and in which the tappet 132 is permitted to remain in its lowered position to avoid a tripping of the latch 62.

In Figure 8 the tripping bar 135 has been ro-

tated 90° counterclockwise. In this position, the compartment door has been opened thus tripping the circuit breaker. This counterclockwise rotation of the tripping bar 135 has depressed the end 165 of the tripping lever 160 and has thus raised the end 167 thereby raising the tappet 132, and also raising the end 130 of the lever 126; in this way the latch 62 of the circuit breaker has been pulled down, thus tripping the circuit breaker open.

The end 104 of the threaded element 100, the operation of which will move the circuit breaker to various positions within the compartment, is uncovered when the door is opened so that a socket wrench may be used to draw the circuit breaker out to its test position in which case the disconnect contacts are separated at a safe distance.

A pointer 330 is secured to the movable frame 72 in any suitable manner as shown in Figure 2. This pointer may register with two marks 331 and 332, indicating respectively the service and the test position of the circuit breaker, the latter position being that wherein the circuit breaker has been safely deenergized.

When the circuit breaker has reached the test position wherein the pointer 330 registers with the mark 332, the tripping lever 160 moves opposite the notch 350 in the tripping bar 135. As seen particularly by the dotted line positions of Figure 6, the notch 350 thus permits the tripping lever 150 to rise to normal position, thus also permitting the tappet 132 to drop to its lowered position so that the circuit breaker may be manually closed to permit observation of its functioning by an inspector. This is necessary since the tripping bar 135 is so arranged that when the circuit breaker has been moved away from the service position, the tripping bar can under no circumstances return to its horizontal position of Figure 7, but remains in the position of Figure 8. This is accomplished by the provision of an angle clip 355 welded to the bottom of the frame 72 and extending immediately behind the shoulder 356 of the tripping bar 135 when the circuit breaker is in service position.

By reason of this position of the angle clip 355, the tripping bar 135 may in the service position of the circuit breaker be readily rotated to any desired position. When the circuit breaker is withdrawn from the service position as shown in Figures 6 and 8, then on the initial movement of the panel, the lower end of the angle clip 355 moves alongside of the upper part of the tripping bar 135 and thus prevents the bar from being moved clockwise to its normal position of Figure 7. This arrangement assures the maintenance of the tripping lever 160 in tappet raising position during movement of the circuit breaker between the test and serve positions. The notch 350 is provided with sloping sides so that if in the test position the circuit breaker has been closed and the operator starts to move it either towards the front of the compartment or towards the serve position, the end 165 of the lever 160 will be depressed and the circuit breaker latch will be released.

A locking mechanism may then be provided to prevent any unauthorized revolving of the tripping bar 135, especially while the door is opened.

This locking mechanism may more clearly be seen in Figures 2, 3 and 4 and consists of a plunger shaped bar 300 secured to the front structural member 101 by means of pins 301, 302 which extend through the slot 304 in the bar 300. Hold-

ing washers 305, 305 are mounted on the pins on either side of the plunger bar 300 and maintained in place by cotter pins 307, 307, thus securing the plunger bar 300 in sliding position upon the pins 301—302.

The end 310 of bar 300 is narrowed to be received by the locking slot 312 in the cam sleeve 225. The end of the pin 302 is machined at 315 to receive and hold one end of the tension spring 316, the opposite end of which is supported by bracket 317 on the right hand end of the plunger bar 300. The bar 300 is thus continuously biased towards the slot 312.

The bar 300 has at its outermost right hand end a vertical shoulder 320 which will receive the surface 322 of the angle bracket 323 which is secured to the door panel 18 in any suitable manner as for instance by the screws 325. When the door 18 is swung open, the bracket 323 will move outwardly and will slip away from the shoulder 320 of the plunger bar 300. The spring 316 will thus urge the plunger bar 300 towards the supporting cylinder member 225 of the cam 183 and thus urge the end 310 of the bar against the surface thereof.

When a full 90° rotation has been reached as shown in Figures 4 and 8, the end 310 of the plunger bar will enter into the slot 312 of the sleeve 225 and thus lock the cam 183 and hence the trip bar 135 against any rotation whatever. When the door is closed again, the angle bracket 323 will engage the shoulder 320 and draw the bar 300 to the right against the bias of spring 316 thus drawing the end 310 thereof out of the locking slot 312 and thereby unlock the tripping bar 135 so that it may be rotated.

When the door is open, the locking element 310 engages the slot 312 and prevents any operation whatever of the tripping bar 135 until the door is closed whereupon the locking element 310 is withdrawn.

The dimensions of the elements are so designed that, as the door is opened, roller 150 is withdrawn from cam 183 before the bar 300 is moved so that its end 310 enters opening 312. As the door is closed, the end 310 of the bar 300 is withdrawn from the opening 312 just before roller 150 engages cam 183.

From the foregoing, it will be obvious that the compartment operating mechanism has been so arranged that the circuit breaker will be tripped upon opening of the door and is maintained in that position under all conditions except when the circuit breaker is in predetermined test position. On movement in either direction away from test position, if the circuit breaker has been left closed, it will be automatically tripped when such movement is initiated.

Since it is desired that the circuit breaker which is to be used in connection with the mechanism herein described be of the trip-free type, it will be impossible to make the contacts touch upon an attempted closure of the circuit breaker while the tripping mechanism is in the actuated position of Figure 8.

The operation of this device is both simple and safe. Should the inspector or operator attempt to open the door before the circuit breaker has been tripped, then in the process of opening the door and before the door is appreciably open, the circuit breaker is tripped open so that thereafter the door may be completely opened with safety.

The circuit breaker may be operated manually while the door is open only when it has been racked into a test position where it is completely

disconnected from the back contact assembly so that it is safely deenergized.

Should the circuit breaker be racked in in closed position from the test to the service position, then on initiation of this movement, the circuit breaker will be tripped so that at no time can the circuit breaker contacts be energized or closed while the door is open. After the circuit breaker has been returned to service position and the door has been closed, the locking device of Figure 8 is released so that the trip bar may be operated to its non-tripping position and the circuit breaker placed into service once more.

In the foregoing, I have set forth my invention in connection only with a preferred embodiment thereof and in connection with a type of circuit breaker which I have found readily adaptable to cooperation with the elements of my invention. Many variations both in the type of circuit breaker and in the manner of connection with the tripping elements thereof should now be obvious to those skilled in the art, and also many variations in the elements of my protective interlocking system which functions to increase the safety of the operator or the inspector should now be obvious to those skilled in the art. Accordingly, I prefer not to be bound by the disclosure herein, but only by the appended claims.

I claim:

1. A circuit interrupter, an enclosure therefor comprising a movable panel, means outside of said enclosure effective, when said panel is in enclosing position, for opening and closing the contacts of said interrupter and means independent of said first named means for opening said contacts in response to the initial opening movement of said panel, a rotatable shaft in said enclosure, resilient means for rotating said shaft in one direction for tripping said interrupter and means on said panel cooperating with an element of said shaft effective, during final closing movement of said panel, to rotate said shaft to a non-tripping position and hold said shaft in said last named position while said panel is closed.

2. A circuit interrupter, an enclosure therefor comprising a movable panel, means outside of said enclosure effective, when said panel is in enclosing position, for opening and closing the contacts of said interrupter and means independent of said first named means for opening said contacts in response to the initial opening movement of said panel, a rotatable shaft in said enclosure, resilient means for rotating said shaft in one direction for tripping said interrupter and means on said panel cooperating with an element of said shaft effective, during final closing movement of said panel, to rotate said shaft to a non-tripping position and hold said shaft in said last named position while said panel is closed, said element of said shaft comprising a helical cam and said means on said panel comprising a roller adapted to engage the helical face of said cam when said panel is in the closed position.

3. In combination with a circuit interrupter mounted on a panel of insulating material, a stationary enclosure, contacts rigidly mounted in said enclosure, said panel movable in said enclosure and having contacts engageable with and disengageable from said rigidly mounted contacts, said enclosure having a closure panel movable to permit inspection of said interrupter, means operable from the outside of said enclosure for tripping and closing the contacts of said interrupter, a tripping member within said enclosure independent of said first named trip-

ping means and biased toward tripping position, and means on said closure panel cooperating with an element of said member effective during the final closing movement of said panel to move said member against said bias to a non-tripping position and to hold said member in said last named position while said panel is in said closed position, the initial opening movement of said panel permitting said member to move under the influence of said bias to said tripping position.

4. In combination with a circuit interrupter mounted on a panel of insulating material, a stationary enclosure, contacts rigidly mounted in said enclosure, said panel movable in said enclosure and having contacts engageable with and disengageable from said rigidly mounted contacts, said enclosure having a closure panel movable to permit inspection of said interrupter, means operable from the outside of said enclosure for tripping and closing the contacts of said interrupter, a tripping member within said enclosure independent of said first named tripping means and biased toward tripping position, and means on said closure panel cooperating with an element of said member effective during the final closing movement of said panel to move said member against said bias to a non-tripping position and to hold said member in said last named position while said panel is in said closed position, the initial opening movement of said panel permitting said member to move under the influence of said bias to said tripping position, means for opening said panel and permitting said member to trip said interrupter, means for moving said interrupter to separate said disconnecting contacts and means effective upon the initial movement of said interrupter for locking said member in said tripping position.

5. In combination with a circuit interrupter mounted on a panel of insulating material, a stationary enclosure, contacts rigidly mounted in said enclosure, said panel movable in said enclosure and having contacts engageable with and disengageable from said rigidly mounted contacts, said enclosure having a closure panel movable to permit inspection of said interrupter, means operable from the outside of said enclosure for tripping and closing the contacts of said interrupter, a tripping member within said enclosure independent of said first named tripping means and biased toward tripping position, and means on said closure panel cooperating with an element of said member effective during the final closing movement of said panel to move said member against said bias to a non-tripping position and to hold said member in said last named position while said panel is in said closed position, the initial opening movement of said panel permitting said member to move under the influence of said bias to said tripping position, means for opening said panel and permitting said member to trip said interrupter, means for moving said interrupter to separate said disconnecting contacts and means effective upon the initial movement of said interrupter for locking said member in said tripping position, said means becoming ineffective upon movement of said panel to a predetermined position, said disengageable contacts being separated a distance to render said independent tripping means ineffective.

6. In combination with a circuit interrupter mounted on a panel of insulating material, a stationary enclosure, contacts rigidly mounted in said enclosure, said panel movable in said enclosure and having contacts engageable with and

disengageable from said rigidly mounted contacts, said enclosure having a closure panel movable to permit inspection of said interrupter, means operable from the outside of said enclosure for tripping and closing the contacts of said interrupter, a tripping member within said enclosure independent of said first named tripping means and biased toward tripping position, and means on said closure panel cooperating with an element of said member effective during the final closing movement of said panel to move said member against said bias to a non-tripping position and to hold said member in said last named position while said panel is in said closed position, the initial opening movement of said panel permitting said member to move under the influence of said bias to said tripping position, means for opening said panel and permitting said member to trip said interrupter, means for moving said interrupter to separate said disconnecting contacts and means effective upon the initial movement of said interrupter for locking said member in said tripping position, said means becoming ineffective upon movement of said panel to a predetermined position, said disengageable contacts being separated a distance to render said independent tripping means ineffective, means movable with said panel and means in said enclosure for indicating said predetermined position.

7. In combination with a circuit interrupter mounted on a panel of insulating material, a stationary enclosure, contacts rigidly mounted in said enclosure, said panel movable in said enclosure and having contacts engageable with and disengageable from said rigidly mounted contacts, said enclosure having a closure panel movable to permit inspection of said interrupter, means operable from the outside of said enclosure for tripping and closing the contacts of said interrupter, a tripping member within said enclosure independent of said first named tripping means and biased toward tripping position, and means on said closure panel cooperating with an element of said member effective during the final closing movement of said panel to move said member against said bias to a non-tripping position and to hold said member in said last named position while said panel is in said closed position, the initial opening movement of said panel permitting said member to move under the influence of said bias to said tripping position, means for opening said panel and permitting said member to trip said interrupter, means for moving said interrupter to separate said disconnecting contacts, and means effective upon the initial movement of said interrupter for preventing closure of said panel.

8. In combination with a circuit interrupter mounted on a vertical panel of insulating material, a stationary enclosure, contacts rigidly mounted in said enclosure, said panel movable horizontally in said enclosure and having contacts engageable with and disengageable from said rigidly mounted contacts, said enclosure having a closure panel movable to permit inspection of said interrupter, means operable from the outside of said enclosure for tripping and closing the contacts of said interrupter, a tripping member within said enclosure independent of said first named tripping means and biased toward tripping position, and means on said closure panel cooperating with an element of said member effective during the final closing movement of said panel to move said member against said bias to

a non-tripping position and to hold said member in said last named position while said panel is in said closed position, the initial opening movement of said panel permitting said member to move under the influence of said bias to said tripping position.

9. In combination with a circuit interrupter mounted on a vertical panel of insulating material, a stationary enclosure, contacts rigidly mounted in said enclosure, said panel movable horizontally in said enclosure and having contacts engageable with and disengageable from said rigidly mounted contacts, said enclosure having a closure panel movable to permit inspection of said interrupter, means operable from the outside of said enclosure for tripping and closing the contacts of said interrupter, a tripping member within said enclosure independent of said first named tripping means and biased toward tripping position, and means on said closure panel cooperating with an element of said member effective during the final closing movement of said panel to move said member against said bias to a non-tripping position and to hold said member in said last named position while said panel is in said closed position, the initial opening movement of said panel permitting said member to move under the influence of said bias to said tripping position, means for opening said panel and permitting said member to trip said interrupter, means for moving said interrupter horizontally to separate said disconnecting contacts and means effective upon the initial hori-

zontal movement of said interrupter for locking said member in said tripping position.

10. In combination with a circuit interrupter mounted on a vertical panel of insulating material, a stationary enclosure, contacts rigidly mounted in said enclosure, said panel movable horizontally in said enclosure and having contacts engageable with and disengageable from said rigidly mounted contacts, said enclosure having a closure panel movable to permit inspection of said interrupter, means operable from the outside of said enclosure for tripping and closing the contacts of said interrupter, a tripping member within said enclosure independent of said first named tripping means and biased toward tripping position, and means on said closure panel cooperating with an element of said member effective during the final closing movement of said panel to move said member against said bias to a non-tripping position and to hold said member in said last named position while said panel is in said closed position, the initial opening movement of said panel permitting said member to move under the influence of said bias to said tripping position, means for opening said panel and permitting said member to trip said interrupter, means for moving said interrupter horizontally to separate said disconnecting contacts and means effective upon the initial movement of said interrupter for preventing closure of said panel.

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