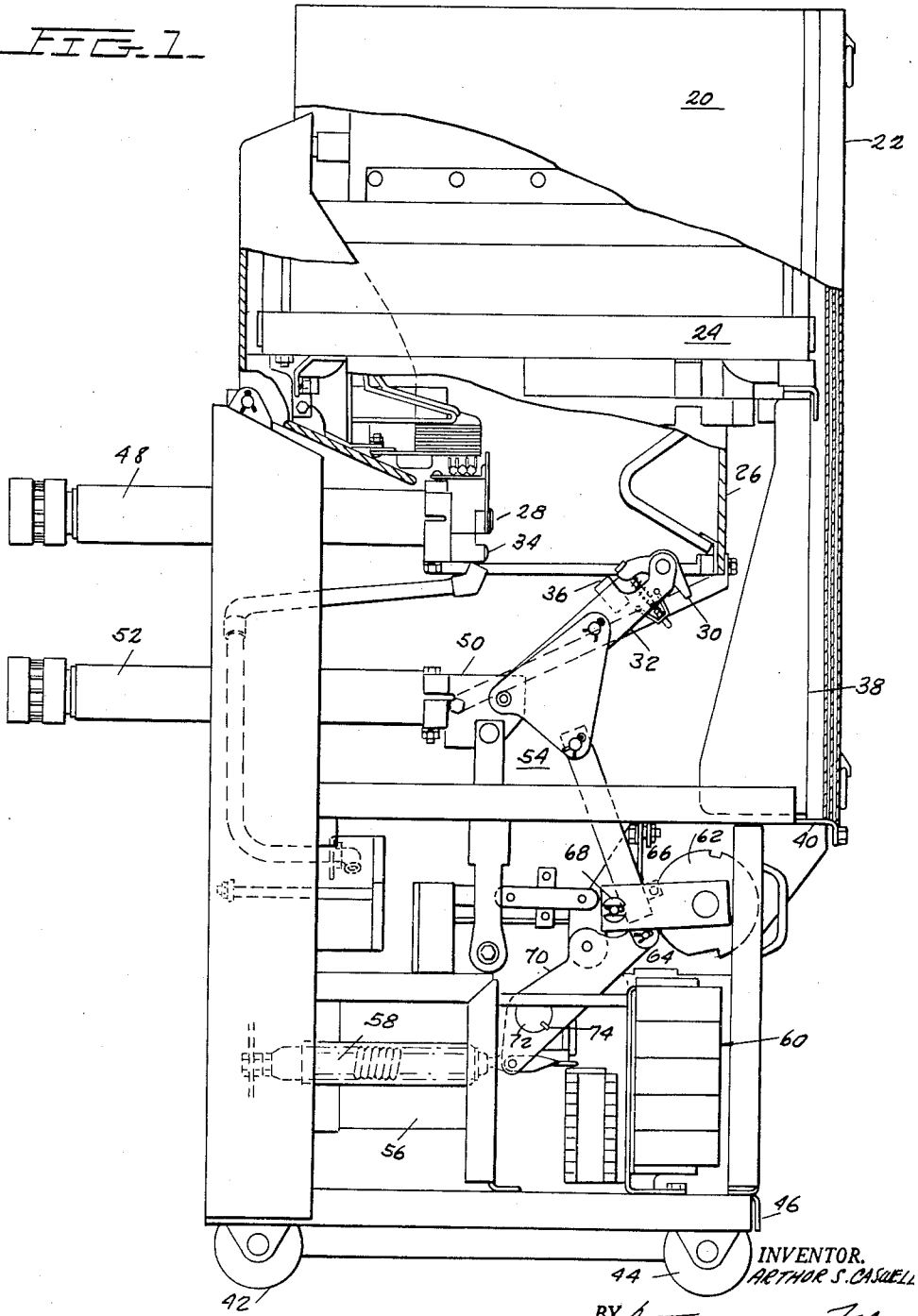
June 24, 1958 A. S. CASWELL 2,840,653

CIRCUIT BREAKER RACKING MECHANISM

Filed Dec. 19, 1956 4 Sheets-Sheet 1

FIG. 1



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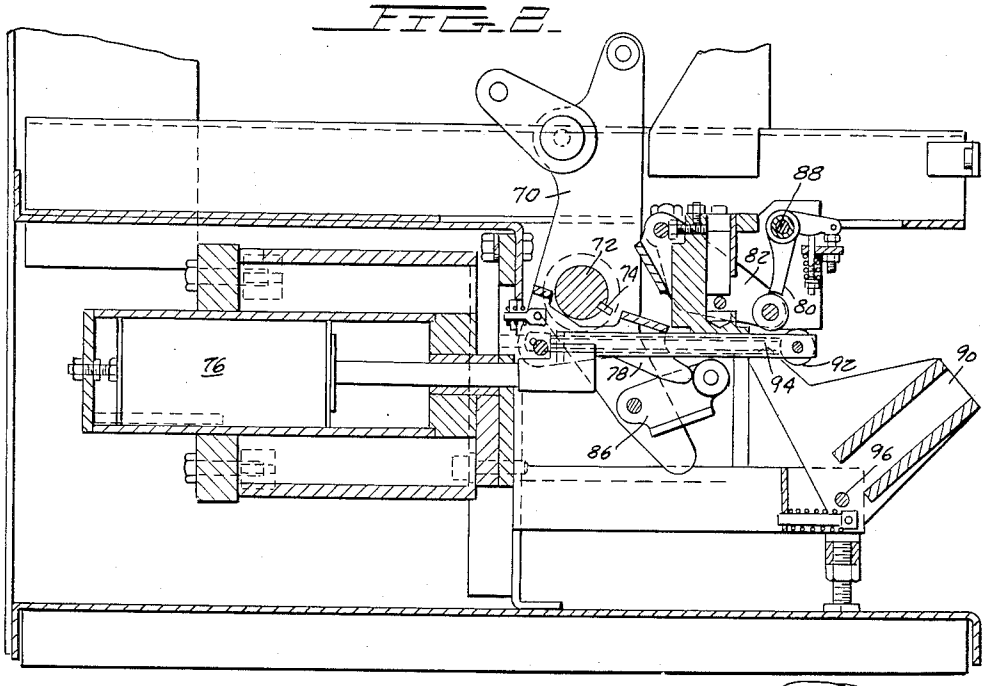
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June 24, 1958 A. S. CASWELL 2,840,653

CIRCUIT BREAKER RACKING MECHANISM

Filed Dec. 19, 1956 4 Sheets-Sheet 2

FIG. 2.



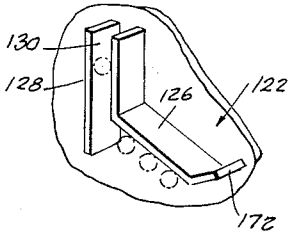
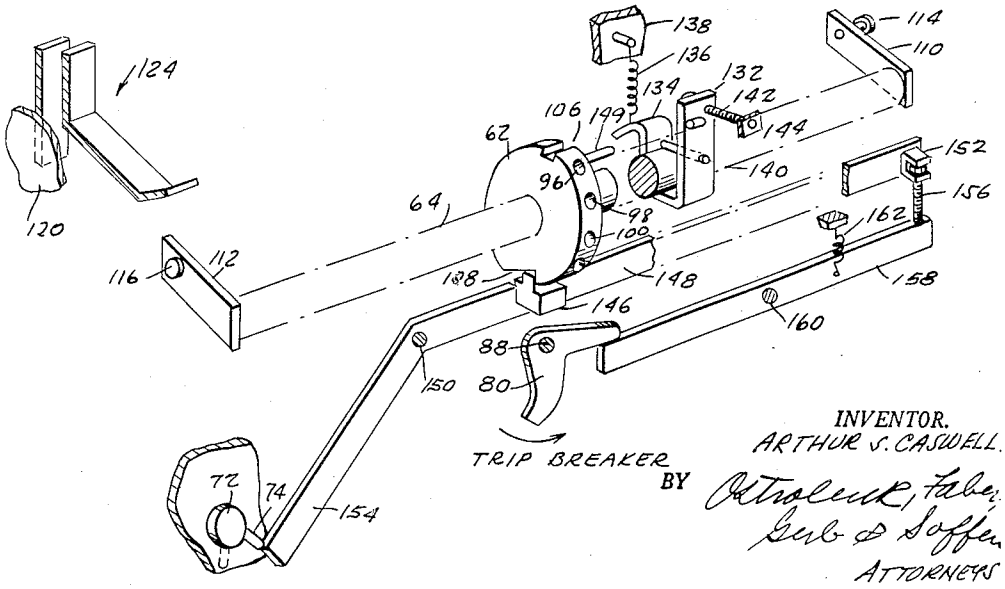


FIG. 3.



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June 24, 1958 A. S. CASWELL 2,840,653

CIRCUIT BREAKER RACKING MECHANISM

Filed Dec. 19, 1956 4 Sheets-Sheet 3

FIG. 4

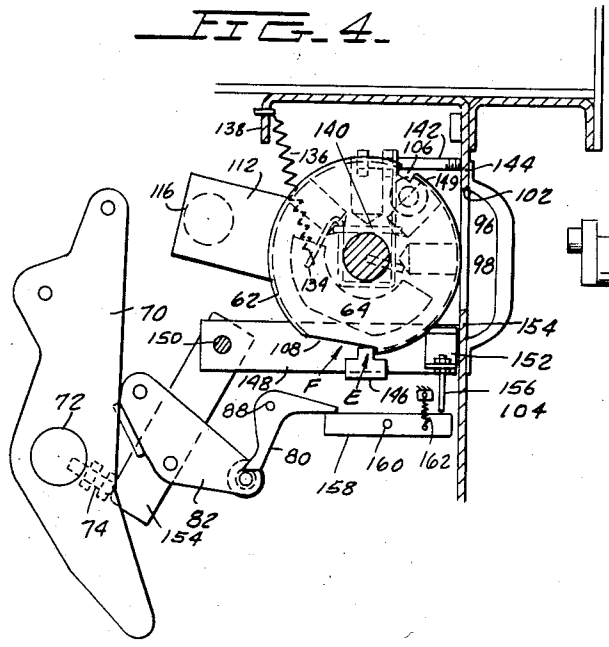


FIG. 5

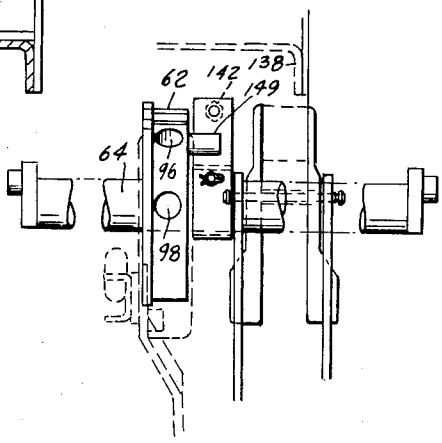


FIG. 6

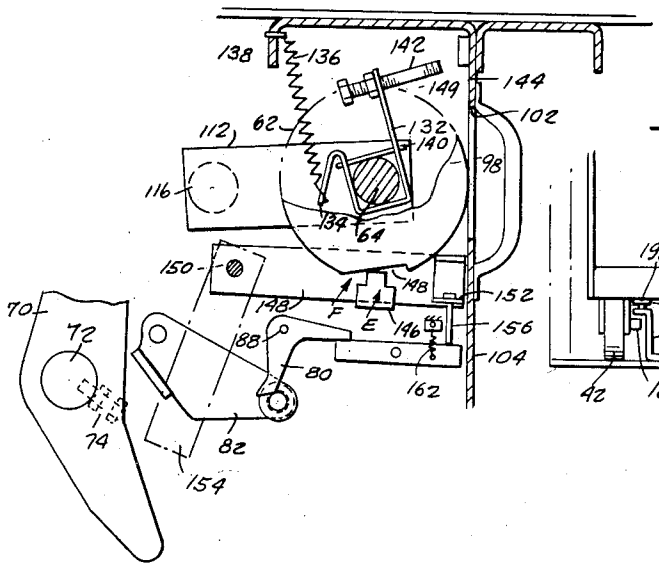
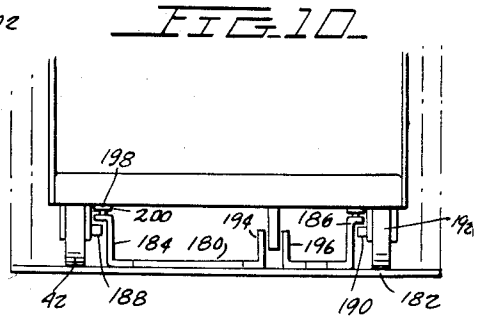


FIG. 10



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June 24, 1958 A. S. CASWELL 2,840,653

CIRCUIT BREAKER RACKING MECHANISM

Filed Dec. 19, 1956 4 Sheets-Sheet 4

FIG. 7

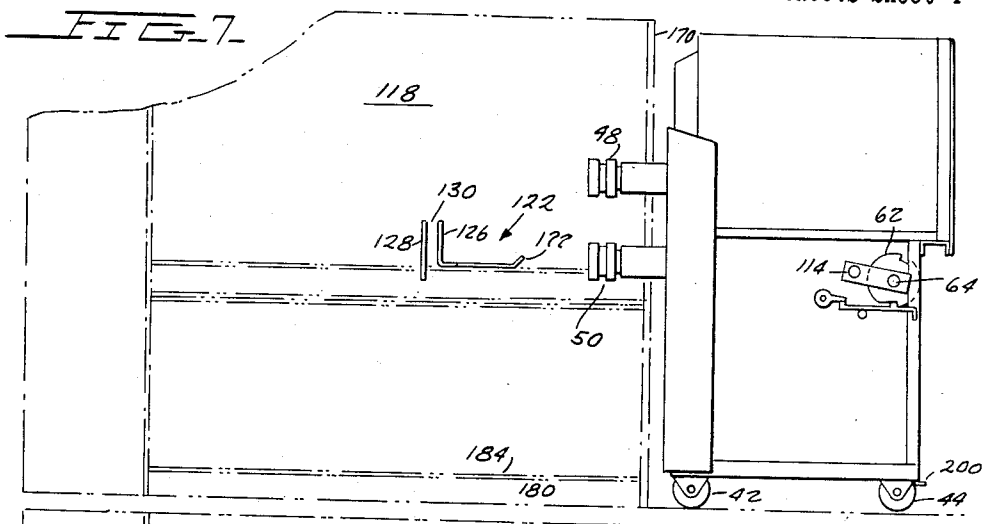
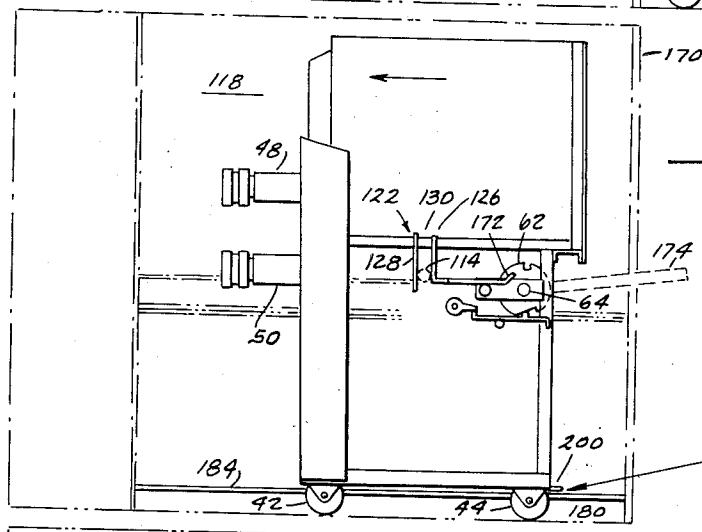


FIG. 8



ENLARGED VIEW

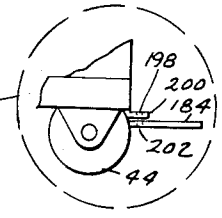
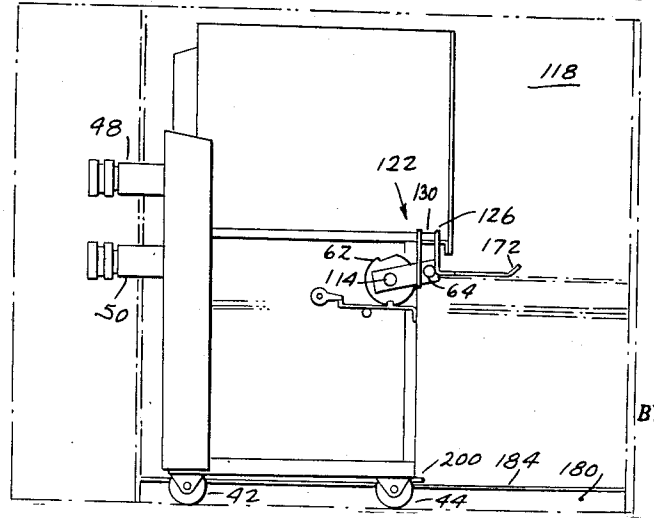


FIG. 9



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United States Patent Office 2,840,653 Patented June 24, 1958

2,840,653

CIRCUIT BREAKER RACKING MECHANISM

Arthur S. Caswell, Glenside, Pa., assignor to I-T-E Circuit Breaker Company, Philadelphia, Pa., a corporation of Pennsylvania

Application December 19, 1956, Serial No. 629,391

13 Claims. (Cl. 200—50)

My invention relates to a novel racking mechanism for metal-clad switch gear wherein the circuit controlling device such as a circuit breaker being moved into the switch gear cell is automatically latched in a test position, and racking between test and operating positions is prevented while the contacts of the circuit controlling device are in the engaged position.

My novel mechanism further provides an ease of adjustment of the racking unit so as to allow interchangeability between the various units, and also provides a simple means for locking the breaker to the cubicle floor in the test position by providing a latch plate which serves the plurality of functions of reinforcing the enclosure floor, providing guide means for guiding of the circuit controlling device in its motion within the cubicle, and provides latch plate means for padlocking the circuit controlling device to the cubicle floor.

The racking operation for moving a circuit breaker or circuit controlling device between an operating position where primary disconnect contacts of the circuit controlling device are in engagement with cooperating contacts fastened within the circuit controlling device enclosure and a test position where the primary disconnects are disengaged and secondary control contacts are engaged is well known in the art.

In the past, this operation has been accomplished by cranking, wherein a pair of cooperating gears effect movement of the circuit controlling device with respect to the cubicle. This type of racking, however, is undesirable since it is slow, laborious, and can become troublesome when used in very dusty environments.

Another type of racking is the handle lever type wherein a racking handle which rotates as racking disk can be removed and reinserted a plurality of times into holes of a racking disk until the corresponding circuit controlling device is in its desired position. Here again, however, the racking is slow and laborious. Furthermore, in each of the above cases when the breaker is moved to its test position it is possible for the breaker to be moved out of this test position.

The essence of the instant invention is to provide a novel racking mechanism which is so constructed that the breaker will be automatically latched in a test position when pushed into the switchgear cubicle and allows easy racking only when the circuit control device is opened.

That is, my novel invention provides an interlock means between the racking mechanism and the circuit breaker or circuit controlling device contacts which prevents operation of the racking mechanism while the circuit breaker contacts are in their engaged position. In view of this interlock, it is impossible to rack the circuit breaker into, or out of, the operating position when the cooperating contacts are in their engaged position, and thereby assures that the primary disconnect contacts will not be subjected to a circuit making or circuit interrupting function. It is important to note that my novel interlock system, while protecting the primary disconnect contacts, also protects operating personnel from injury due to the interruption of current at the primary disconnect contacts.

Furthermore, my novel racking mechanism may be further interlocked with the tripper bar of the circuit controlling device so that the depression of the racking release latch (which would normally be prevented by interference means so long as the circuit breaker contacts are in an engaged position) will operate the circuit breaker tripper bar and thus automatically move the circuit breaker contacts to a disconnected position prior to attempted racking of the circuit breaker.

Accordingly, the primary object of my invention is to provide a novel racking mechanism for metal-clad switchgear which is simple in construction, and latches the breaker in its test position when pushed into the switchgear cubicle.

Another important object of my invention is to provide a novel simple racking mechanism which is interlocked with a circuit controlling device cooperating contacts so that racking between the test and operating positions is not permissible when the cooperating contacts are in their engaged position.

A still further object of my invention is to provide a novel racking mechanism having a racking release latch which must be operated prior to racking of the circuit controlling device, wherein operation of the racking release latch will operate the trip means of the circuit controlling device prior to release of the latch, whereby an operator is assured that the circuit controlling device contacts are disengaged prior to any attempted racking.

Another object of my invention is to provide a novel racking mechanism which requires a minimum of force and time to operate it.

Another object of my invention is to provide a novel racking mechanism for metal-clad switchgear which is rugged and low in cost, and is adjustable for efficient operation.

When the circuit controlling device of a metal-clad switchgear system is racked to the test position so that various tests may be made or that work be done on the line, it is desirable that the circuit controlling device is securely locked in the test position to thereby prevent the reinsertion of the circuit controlling device to the operating position and thus subject maintenance personnel to considerable hazard.

I have found that I can provide a novel padlocking means for padlocking the circuit breaker in its test position wherein the latch plate receiving the padlock is part of a cubicle floor plate which serves the further functions of strengthening the cubicle floor and providing a guide means for guiding the motion of the circuit breaker, or circuit controlling device within its cubicle.

More specifically, my novel combined floor plate and padlock means is positioned at the bottom of the cubicle floor and extends into the cubicle with its ends adjacent to the cubicle side walls being outwardly flanged so as to be positioned slightly above protruding axles of the truck wheels of the circuit controlling device. Hence while this plate serves as the means for imparting stiffness to the cubicle floor, it further serves to prevent tilting of the circuit breaker, when being moved into its operating position, by a foreign object in the path of one of the wheels, since when the wheel is lifted from the floor in rolling over the foreign object, its axle will engage the outwardly flanged portion of the floor and prevent further motion of the circuit breaker into the cubicle.

By this means, both the primary and secondary disconnect contacts are protected from damage by mismatch between their cooperating members in view of the tilting of the circuit breaker.

The floor plate is further provided with a guide-rail means which cooperates with a cooperating guide-rail attached to the movable circuit controlling device. By virtue of the cooperation between these two guide-rail means it is clearly seen that the circuit interrupting device will be guided along a predetermined path in its motion in the cubicle.

A third important function served by this novel floor plate is that it can support a latch plate for cooperating with a second latch plate attached to the truck of the movable circuit interrupting device so that a padlock means may be inserted to maintain the circuit interrupting device in any predetermined position with respect to the cubicle floor. By way of example, my novel padlocking means can allow the circuit interrupting means to be padlocked in a test position.

Accordingly, another important object of this invention is to provide a novel floor plate means for metal-clad switchgear which allows padlocking of the movable circuit controlling device in any predetermined position.

Another object of my invention is to provide a novel floor plate which provides means for padlocking the circuit breaker to the floor and in the test position, as well as providing guiding means for guiding the motion of the circuit breaker within the cubicle, and guide-rail means for preventing the motion of the circuit breaker within the cubicle when the circuit breaker is tilted from a predetermined position.

These and other objects of my invention will now be apparent from the following description when taken in connection with the drawings, in which:

Figure 1 shows a side view taken through one phase of a multiphase circuit breaker of the type to which my novel invention could be applied.

Figure 2 shows an enlarged portion of the operating mechanism and solenoid assembly of Figure 1 when the contacts of the circuit interrupting devices are in their engaged position, and further shows the latching mechanism for latching the breaker in its engaged position.

Figure 3 is in an exploded perspective view which specifically illustrates my novel racking mechanism, and shows the manner in which it cooperates with the slot means fastened to the enclosure wall.

Figure 4 is a side cross-sectional view of the racking mechanism seen in Figure 3 with the racking mechanism in the test position.

Figure 5 is a front elevation of the racking mechanism of Figure 4.

Figure 6 shows the racking mechanism of Figure 4 when the racking roller is cammed down prior to entrance of the circuit interrupting device to the test position.

Figure 7 schematically illustrates the racking mechanism operation prior to entrance of the circuit controlling device to the cooperating cubicle.

Figure 8 is similar to Figure 7 and shows the racking mechanism immediately after entrance of the racking mechanism into the cubicle and prior to entrance to the test position.

Figure 9 is similar to Figures 7 and 8 and shows the racking mechanism after racking from the test position to the operating position.

Figure 10 is a side view of Figure 9 and particularly illustrates my novel floor plate and padlock means construction.

Figure 1 sets forth a typical type of circuit interrupting device to which my novel racking mechanism could be applied. It is to be understood, however, that Figure 1 is set forth here for illustrative purposes only, and that my novel racking mechanism could be applied to any type of enclosed switchgear function.

The circuit breaker set forth in Figure 1 is specifically adapted for operation on voltages of the order of 15 kilovolts and is generally comprised of an interphase barrier assembly **20** for isolation of adjacent phases, a front cover assembly **22**, and a blowout structure **24**.

Clearly, the blowout structure **24** cooperates with an arc-chute **26** which serves to elongate and cool the arc drawn between the stationary arcing contact **28** and the movable arcing contact **30** when the movable bridge assembly **32** is driven to a disengaged position so as to disengage the stationary main contact **34** and the movable main contact **36**.

The device of Figure 1 further includes front support **36** and the front insulation barrier sheet **40**, and the entire structure is supported from four truck wheels, two of which are seen in Figure 1 as the truck wheels **42** and **44** which are fastened to the truck assembly seen generally at **46**.

The operating mechanism seen generally at **54** is operatively connected to a solenoid assembly **56** for movement of the contact bridge **32** between its engaged and disengaged position against the force of the accelerating spring **58**.

The main current path of the circuit interrupting device shown in Figure 1 from the upper primary disconnect **48**, stationary main contact **34**, movable bridge assembly **32**, the lower terminal **50**, and the lower disconnect contact **52**.

In order to rack the circuit breaker of Figure 1 between its test position, where the secondary disconnect contacts **60** are in engagement with cooperating secondary contacts supported from the enclosure, and the operating position, where the primary disconnect contacts **48** and **52** are engaged with the cooperating disconnects supported from the enclosure (not shown), a racking mechanism which is seen in Figure 1 as including the disk **62** and forms the essential portion of this disclosure is operatively connected through shaft **64** to an operating member **66** having a racking roller **68** attached at one end thereof.

As will be set forth more fully hereinafter, racking roller **68** engages a slot arrangement fastened to the cubicle wall so that rotation of the shaft **64** by means of the racking disk **62** will move roller **68** within a vertical slot means in the enclosure wall to thereby drive the complete circuit breaker equipment between predetermined positions within the cubicle.

As will be further set forth hereinafter, the closing arm assembly **70** of the operating mechanism **54** is mounted on rotatable shaft **72** which has an interference screw **74** protruding therefrom. This interference screw **74** provides a novel interlock means between the racking mechanism and the circuit breaker contacts wherein racking is prevented so long as the circuit breaker contacts are in their engaged position.

The operating mechanism **54** of Figure 1 is best seen in Figure 2 which shows the operating mechanism in its closed position rather than in the open position of Figure 1, and it is seen that the solenoid plunger **76** is moved to the right to drive the closing arm **70** and its shaft **72** in an anticlockwise direction so as to drive movable bridge assembly **32** (Figure 1) to its engaged position. Closing arm **70** is maintained in its closed position by the prop-latch **78** and the trip-latch **80** which operates through the trip free linkage, including the linkages **82**, **84** and **86**. The trip-latch **80** which is mounted on the shaft **88** may have various trip mechanisms associated therewith for achieving instantaneous and time delayed trips, or manual trip actuated by manually operable means from the front of the panel.

These mechanisms, however, have not been shown, since they are well known in the art.

Manual closing means are also provided by way of the closing socket **90** which can receive an operating rod and which cooperates with roller **92** of shaft **94** which has its other end operatively connected to the closing arm **70**, whereby a clockwise rotation of manual closing means **90** about its pivot point **96** will effect the closing of the circuit breaker contacts.

My novel racking mechanism seen in Figure 1 as in

cluding racking disk 62, member 66 and roller 68 is best seen in the exploded perspective view of Figure 3, and the side and front views of Figures 4 and 5.

Referring now to Figures 3, 4 and 5, shaft 64 has the racking disk 62 rigidly fastened thereto by any desired means such as force-fitting, keying, or any other desired means so that the racking disk 62 will rotate with the shaft 64. Racking disk 62 has apertures such as the apertures 96, 98 and 100 of Figure 3 around its periphery which permit the entrance of a racking handle through the aperture 102 (Figure 4) of the lower front panel 104 for the subsequent racking operation.

Racking disk 62 is further provided with latch notches 106 and 108 which correspond to the operating and test positions respectively. Each end of the shaft 64 is then provided with extensions or members 110 and 112 respectively (Figures 3 and 5) which are secured to the shaft in any desired manner, and have engaging means such as rollers 114 and 116 respectively mounted off the axis of shaft 64.

As is best seen in Figure 3, the cubicle sidewalls 118 and 120 have cooperating engaging means such as the slot means 122 and 124 respectively fastened thereto in any desired manner, the slot means 122, by way of example, being formed of the two structural members 126 and 128 which are welded to the cubicle wall. These members are so positioned and formed with respect to one another that they will form a vertical channel 130 for receiving roller 114 when the breaker is moved into the cubicle.

The outer portion of member 126 is curved upwardly so as to receive roller 114 as it is moved into the cubicle and cam it down against the force of a biasing means, to be described hereinafter, so that when the roller 114 reaches the slot 130 at a point which corresponds to the test position for the circuit breaker, the roller 114 will automatically move into the slot 130 and latch the breaker in the test position.

As is best seen in Figures 3 and 5, the U-shaped member 132 is positioned adjacent to racking disk 62 and has a downwardly bent tip 134 for receiving the tension spring 136 at one end thereof, the other end being fastened to a fixed portion of the structure 138.

More specifically, the U-shaped member 132 is rotatably mounted with respect to shaft 64 by means of the pin 140 which prevents the U-shaped structure from slipping off the shaft 64. Normal clockwise rotation of member 132 is prevented by means of the adjustment screw 142 which is threaded through a U-shaped member 132, and butts against stationary structural member 144.

As will be more apparent hereinafter, when the racking disk 62 is initially rotated in a counter-clockwise direction or in a direction opposite to the direction of angular rotation for racking from the test to the operating position, the projection 149 will pick up the extended arm of member 132, as is best seen in Figure 3, so as to cause this member to rotate with the racking disk and extend the spring 136. More specifically, this condition occurs as the circuit breaker is inserted within the cubicle and the roller 114 is cammed down by the upwardly extending cammed surface of member 126 This condition is specifically shown in the Figure 6 wherein the shaft 64 has been rotated in a counterclockwise direction, and spring 136 extended to bias the shaft 64 in a clockwise direction.

Thus, while the entire mechanism is being moved so that the roller 114 approaches the channel 130, the engagement between roller 114 and the under surface of member 126 will prevent clockwise rotation of shaft 64 by the spring 136. When, however, roller 114 reaches the channel 130, the spring 136 will move the roller 114 upwardly by rotating shaft 64 through the member 132, member 148 and racking disk 62.

Accordingly, the racking mechanism operates to latch the circuit breaker in test position when it is initially moved into the cubicle.

As has been described hereinbefore, the racking disk 62 is provided with latching notches 106 and 108. These racking notches cooperate with a latch member 146 which is fastened in any desired manner to the racking release arm 148. Racking release arm 148 is pivotally mounted at pivot point 150, as seen in Figures 3 and 4, and its right-hand end has a U-shaped operating member 152 which is operable through an aperture (not shown) in the lower front panel of 104. The left-hand portion 154 of racking release lever 148 is then positioned adjacent to the interference screw 74 of the closing arm shaft 72 so that rotation of racking release lever 148 in a clockwise direction about its pivot point 150, will be prevented by the interference screw 74, so long as the shaft 72 is in a position which corresponds to contact engagement.

When the contacts are in a disengaged position, however, shaft 72 will rotate to the position shown in dotted lines in Figure 3, whereby the racking release lever may be rotated in a clockwise direction to remove the latch 146 from either of the latch notches 106 or 108.

If desired, operation of the racking release lever 148 could be coordinated with the trip latch 80 (Figure 2) of the circuit breaker, whereby, prior to engagement of the interference screw 74, the circuit breaker will be automatically tripped to its disengaged position so as to prevent damage to the racking release lever by a forceful engagement with the interference screw 74.

This structure is set forth in Figures 3 and 4, and is comprised of a member 156 which is fastened to the racking release lever 148 and is movable therewith and is movable into engagement with a trip arm 158 which is pivotally mounted at pivot point 160, and biased in a counter-clockwise direction by the tension spring 162.

The left-hand edge of the trip arm 158 is positioned adjacent an extension of the trip latch 80 so that an attempted depression of the racking release arm 148 will cause rotation of trip arm 158 and its pivot point 160 in a clockwise direction, and the left-hand end of the trip arm will rotate trip latch 80 in a counter-clockwise direction about its shaft 88 to trip the breaker.

Further depression of the racking release arm 148 is then permissible, since the interference screw 74 is in its dotted position, as seen in Figure 3, in view of the disengaged contacts.

Figures 7, 8 and 9 schematically illustrate portions of the racking mechanism described in conjunction with Figures 3, 4 and 5, and are particularly well adapted in describing the operation thereof.

In Figures 7, 8 and 9 a circuit breaker, which could be of the type set forth in Figure 1, is seen to be movable into and out of engagement with the enclosure having the side wall 118 (see Figure 3) and a front panel 170. Each of Figures 7, 8 and 9 further show the slot means 122 of the wall 118 as including the members 126 and 128 of Figure 3 for defining the slot 130.

It is to be noted that the complete cubicle is not shown in Figures 7, 8 and 9, and it will be readily understood by those skilled in the art that the rear of the cubicle will be adapted with primary disconnect contacts which cooperate with the disconnects 48 and 50 of the circuit breaker, and will similarly have contacts for cooperating with the secondary contacts (see Figure 1) carried by the circuit breaker. Furthermore, the interlocking linkage between the racking disk 62, the racking release lever 148 and trip latch 80 are shown in Figures 7, 8 and 9 in a schematic form for the sake of simplicity, but, nevertheless, operate in a manner identical with that set forth for the structures in Figures 3, 4 and 5.

The operation of my novel racking mechanism proceeds as follows:

When the circuit breaker is completely removed from the enclosure as seen in Figure 7, the racking mechanism

will be in the position shown in Figures 3, 4 and 5. As the circuit breaker is wheeled into the cubicle, as seen in Figure 8, the roller **114** will engage the cam plate **172** of member **126** so as to cause rotation of shaft **64** in a counter-clockwise direction. In view of this counter-clockwise rotation, spring **136** (Figures 3 and 4) will be extended and the mechanism will assume the position shown in Figure 6. In moving to this position, the latch **146** will be cammed downwardly by means of the sloped notch **108** so as to cause the racking release lever to rotate about its pivot point **150** (Figure 3) and thereby assure that the circuit breaker is tripped in view of the interconnection between the racking release lever **148** and the trip latch **80**.

It is to be noted, however, that if this interconnection were not present and the circuit breaker contacts were closed, that the camming action of the latch **146** would not be possible when the roller **114** (as well as the roller **116** which would cooperate in an identical manner with a slot in the other wall of the cubicle) engages the cammed plate **172** of member **126**, since the interference screw **74** would not permit rotation of the racking release lever **148**. Accordingly, operating personnel would realize that the circuit breaker contacts are engaged, and would then be able to trip the circuit breaker prior to movement to the test position.

The circuit breaker is then moved into the cubicle as seen in Figure 8, until the roller reaches the stop plate **128**, and the extended spring **136** (Figure 6) drives the racking disk shaft **64** in a clockwise direction, in view of the connection from the biasing spring **136** to the U-shaped member **132** and the pin **149** of racking disk **62**, so that the roller **114** will be moved to the dotted position seen in Figure 8, and the breaker will be latched in the test position. That is to say, it will not be possible now to move the breaker from the test position without using the racking handle **174** to rotate the racking disk **64** in such a direction as to bring the roller **114** out of the slot **130**.

If it is now desired to move the circuit breaker from the test position to a position outside of the cubicle, the racking handle **174** is inserted in one of the holes in the racking disk such as the hole **100** of Figure 3, and the racking disk is moved upwardly to move the roller **114** downward and out of slot **130**, and the circuit breaker may be thereafter pulled out of the cubicle.

When moving from the test position (shown by the dotted view of roller **114** of Figure 8) to the operating position of Figure 9, the racking release arm is depressed by a manually depressing member **152**. Thus, when the circuit breaker contacts are in their engaged position, the engagement between extension **156** and trip bar **158** will cause operation of the trip latch **80** to trip the breaker and prevent interference between extension **154** of racking release arm **148** and interference screw **74**. If there is no interconnection between the trip latch **80** and the racking release arm **148**, then the disengagement of latch **146** from notch **108** will be defeated in view of the interference screw **74**, and the operator will have to physically trip the breaker from a manual trip means before racking to the operating position.

The racking handle **174** may then be inserted into an appropriate racking hole, and the racking disk **62** and the shaft **64** is rotated in a clockwise direction. In view of this rotation, the racking roller **114** will move upward in the slot **130** and the circuit breaker will be moved inwardly.

It is to be noted that when rotating the racking shaft **64** in a clockwise direction, that the projection **149** of Figures 3 and 4 are moved away from the U-shaped member **132** and that this member does not interfere with the racking operation from test to operating position.

Thus, the handle is operated, removed and reinserted into the next appearing holes in the racking disk **62** until the circuit breaker is positioned in its operating position within the cubicle, as seen in Figure 9, and the primary disconnect contacts **48** and **50** are in engagement with cooperating primary disconnect contacts supported from the cubicle.

Note that when the circuit breaker achieves the operating position, the latch notch **106** (Figures 3, 4 and 5) moves into engagement with latch **146** of racking release arm **148**, and the racking disk **62** and racking shaft **64** are latched in this position.

Therefore, in order to rack the circuit breaker from the operating position of Figure 9 to the test position of Figure 8, it is once again necessary to depress member **152** of racking release arm **148** and defeat the latch engagement between notch **106** and latch **146**. Here again, however, the circuit breaker contacts must be disengaged in view of the interference screw **74**.

Thus, if the mechanism is provided with the automatic linkage between the racking release lever **148** and trip latch **80**, the breaker will be automatically tripped on operation of the racking release lever **148**. If, however, this linkage is not present it will be impossible to press racking release latch **148**, and circuit breaker will have to be manually tripped.

Once the latch engagement between notch **103** and **146** has been defeated, the operator inserts the racking handle **174** in an exposed notch in the racking disk **62** and rotates racking disk **62** and its shaft **64** in a counter-clockwise direction to cause roller **114** to move upwardly in the slot **130**, and move the circuit breaker to the test position of Figure 8, as seen by the dotted position of roller **114**.

In the foregoing it is seen that racking between the test and operating positions may be accomplished only with the circuit breaker contacts in their disengaged position by virtue of the interference screw **74** and racking disk latch. Thus, the racking mechanism of my novel invention provides an extremely simple interlock structure which may be operated with relatively little force and in a relatively quick time.

Furthermore, this racking mechanism provides the extremely desirable advantages of automatically latching the circuit breaker in its test position when it is moved into the cubicle.

It is to be noted that my novel structure offers easy adjustment which renders the components interchangeable from unit to unit. This adjustment feature is best seen in Figure 3, and comprises the adjustment of the angular position of U-shaped member **132** by means of the adjusting screw **142** which butts against the stationary structural member **144**. By adjusting the angular position of member **132**, the point at which protrusion **149** of racking disk **62** picks up member **132** when the circuit breaker is being moved into the cubicle will determine the counter-clockwise biasing force imparted to the shaft **64** by the extended spring **136**, and thus determines the positioning or automatic latching of roller **114** in the slot **130** when the device is moved to the test position, as seen in Figure 8.

As has been described hereinbefore, my novel invention provides a novel floor plate means which serves the plurality of functions of adding strength to the cubicle floor, prevents tilting of the circuit breaker when being moved within the cubicle, and serves as a means of padlocking the circuit breaker in a predetermined position such as the test position.

This structure is best seen in Figure 10 which shows a front view of the bottom portion of the cubicle of Figures 7, 8 and 9, and the cooperating circuit breaker. More specifically, Figure 10 shows the cubicle floor as having the floor plate **180** which may be welded to the bottom cubicle plate **182**, the floor plate **180** having the upwardly extending flanges **184** and **186**. The upwardly extending flanges **184** and **186** are so constructed as to overlap the inwardly extending axles **188** and **190** of

wheels 42 and 192 so as to prevent an upward motion of wheels 42 and 192 as well as the wheels in front of wheels 42 and 192 which have similar inwardly extending axles.

Thus, when moving the breaker within the cubicle, if one of the wheels should roll over a foreign object accidentally left in the cubicle floor, the wheel will be lifted and its axles will engage the underside of the corresponding extending flange 180.

By way of example, if wheel 42 were to run over a screwdriver accidentally left on the floor, the axle 188 would be lifted up to engage extending flange 184 so as to prevent further motion of the circuit breaker within the cubicle. In this manner, operating personnel are assured that the cooperating primary and secondary disconnect contacts will meet in their predetermined alignments and will not be mismatched, which condition could cause damage to the contacts.

Furthermore, the floor plate 180 adds a considerable degree of stiffness to the cubicle floor which is subjected to relatively high stresses due to the high weight of the circuit interrupting equipment rolled thereon.

The floor plate can be further adapted with the guide-rails 194 and 196 (Figure 10) which rails could be simple channel members fastened to the floor plate in any desired manner, or could be an integral part of the floor plate. Rails 194 and 196 more specifically define a slot within which a protruding guide-rail 187 which is fastened to the circuit breaker truck is disposed. Thus, the circuit breaker truck, when being moved within the cubicle, will be rigidly guided in its longitudinal motion, and proper matching of the primary and secondary disconnect contacts is assured.

A further and extremely important function served by the floor plate 180 is that apertures can be drilled along the length thereof in cooperating horizontal relationship with an aperture such as aperture 198 within the latch plate 200 carried by the circuit breaker truck, as is seen in Figures 9 and 10. Thus, by providing the aperture 202 in flange 184 of floor plate 180 in a position that would align with the test position of the circuit breaker (see Figure 8), the circuit breaker may be padlocked in its test position by passing a padlock through the cooperating apertures 198 and 202 to thereby insure operating personnel that it is safe to proceed with any required maintenance on the line.

Although I have described preferred embodiments of my novel invention, many variations and modifications will now be obvious to those skilled in the art, and I prefer therefore to be limited not by the specific disclosure herein but only by the appended claims.

I claim:

1. In a circuit controlling device movable between a test and operating position within a cubicle, said circuit controlling device having a pair of cooperable contacts movable between an engaged and a disengaged position, a racking mechanism fastened to said circuit controlling device for racking said circuit controlling device between said test and operating positions; said racking mechanism comprising a racking disk operatively connectable to a portion of said cubicle to move said circuit controlling device with respect to said cubicle responsive to operation of said racking disk, and a racking disk latch means; said racking disk latch means being movable into and out of latching engagement with respect to said racking disk when said circuit controlling device is in said test and said operating positions for preventing and allowing respectively operation of said racking disk; interference means movable responsive to movement of one of said pair of cooperable contacts, said interference means being positioned to prevent movement of said racking disk latch means out of latching engagement with respect to said racking disk when said pair of cooperable contacts are in said engaged position, said interference means being positioned to allow movement of said racking disk latch means out of said latching engagement with respect to said racking disk when said pair of cooperable contacts are in said disengaged position.

2. In a circuit controlling device movable between a test and operating position within a cubicle, said circuit controlling device having a pair of cooperable contacts movable between an engaged and a disengaged position, a racking mechanism fastened to said circuit controlling device for racking said circuit controlling device between said test and operating positions, said racking machanism comprising a racking disk operatively connectable to a portion of said cubicle to move said circuit controlling device with respect to said cubicle responsive to operation of said racking disk, and a racking disk latch means; said racking disk latch means being movable into and out of latching engagement with respect to said racking disk when said circuit controlling device is in said test and said operating positions for preventing and allowing respectively operation of said racking disk; trip mechanism operatively connected to at least one of said pair of cooperable contacts, operation of said trip mechanism allowing movement of said pair of cooperable contacts to said disengaged position, said trip mechanism being operatively connectable to said racking disk latch means, said trip mechanism being operated by said racking disk latch means when said racking disk latch means is moved out of latching engagement with respect to said racking disk to actuate movement of said pair of cooperable contacts to said disengaged position prior to racking by said racking disk.

3. In a circuit controlling device movable between a test and operating position within a cubicle, said circuit controlling device having a pair of cooperable contacts movable between an engaged and a disengaged position, a racking mechanism fastened to said circuit controlling device for racking said circuit controlling device between said test and operating positions; said racking mechanism comprising a racking disk operatively connectable to a portion of said cubicle to move said circuit controlling device with respect to said cubicle responsive to operation of said racking disk, and a racking disk latch means; said racking disk latch means being movable into and out of latching engagement with respect to said racking disk when said circuit controlling device is in said test and said operating positions for preventing and allowing respectively operation of said racking disk; interference means movable responsive to movement of one of said pair of cooperable contacts, said interference means being positioned to prevent movement of said racking disk latch means out of latching engagement with respect to said racking disk when said pair of cooperable contacts are in said engaged position, said interference means being positioned to allow movement of said racking disk latch means out of said latching engagement with respect to said racking disk when said pair of cooperable contacts are in said disengaged position; trip mechanism operatively connected to at least one of said pair of cooperable contacts, operation of said trip mechanism allowing movement of said pair of cooperable contacts to said disengaged position, said trip mechanism being operatively connectable to said racking disk latch means, said trip mechanism being operated by said racking disk latch means when said racking disk latch means is moved out of latching engagement with respect to said racking disk to actuate movement of said pair of cooperable contacts to said disengaged position prior to racking by said racking disk; said trip mechanism being operated by said racking disk latch before said racking disk latch engages said interference means.

4. In a circuit controlling device movable between a test and operating position within a cubicle, said circuit controlling device having a pair of cooperable contacts movable between an engaged and a disengaged position, a racking mechanism fastened to said circuit controlling

device for racking said circuit controlling device between said test and operating positions; said racking mechanism comprising a racking disk fastened to a shaft mounted on said circuit controlling device, at least one end of said shaft being terminated with an extending arm having an engaging means positioned thereon and displaced from the axis of said shaft; cooperating engaging means fastened to the wall of said cubicle for cooperating with said engaging means of said extending arm, rotation of said extending arm when said engaging means engages said cooperating engaging means fastened to said cubicle wall moving said circuit controlling device within said cubicle between said operating and test position; a racking disk latch means; said racking disk latch means being movable into and out of latching engagement with respect to said racking disk when said circuit controlling device is in said test and said operating position for preventing and allowing respectively operation of said racking disk; interference means movable responsive to movement of one of said pair of cooperable contacts, said interference means being positioned to prevent movement of said racking disk latch means out of latching engagement with respect to said racking disk when said pair of cooperable contacts are in said engaged position, said interference means being positioned to allow movement of said racking disk latch means out of said latching engagement with respect to said racking disk when said pairs of cooperable contacts are in said disengaged position.

5. In a circuit controlling device movable between a test and operating position within a cubicle, said circuit controlling device having a pair of cooperable contacts movable between an engaged and a disengaged position, a racking mechanism fastened to said circuit controlling device for racking said circuit controlling device between said test and operating positions; said racking mechanism comprising a racking disk fastened to a shaft mounted on said circuit controlling device, at least one end of said shaft being terminated with an extending arm having an engaging means positioned thereon and displaced from the axis of said shaft; cooperating engaging means fastened to the wall of said cubicle for cooperating with said engaging means of said extending arm, rotation of said extending arm when said engaging means engages said cooperating engaging means fastened to said cubicle wall moving said circuit controlling device within said cubicle between said operating and test position; a racking disk latch means; said racking disk latch means being movable into and out of latching engagement with respect to said racking disk when said circuit controlling device is in said test and said operating positions for preventing and allowing respectively operation of said racking disk; trip mechanism operatively connected to at least one of said pair of cooperable contacts, operation of said trip mechanism allowing movement of said pair of cooperable contacts to said disengaged position, said trip mechanism being operatively connectable to said racking disk latch means, said trip mechanism being operated by said racking disk latch means when said racking disk latch means is moved out of latching engagement with respect to said racking disk to actuate movement of said pair of cooperable contacts to said disengaged position prior to racking by said racking disk.

6. In a circuit controlling device movable between a test and operating position within a cubicle, said circuit controlling device having a pair of cooperable contacts movable between an engaged and a disengaged position, a racking mechanism fastened to said circuit controlling device for racking said circuit controlling device between said test and operating positions; said racking mechanism comprising a racking disk fastened to a shaft mounted on said circuit controlling device, at least one end of said shaft being terminated with an extending arm having an engaging means positioned thereon and displaced from the axis of said shaft; cooperating engaging means fastened to the wall of said cubicle for cooperating with said

engaging means of said extending arms, rotation of said extending arm when said engaging means engages said cooperating engaging means fastened to said cubicle wall moving said circuit controlling device within said cubicle between said operating and test position; a racking disk latch means; said racking disk latch means being movable into and out of latching engagement with respect to said racking disk when said circuit controlling device is in said test and said operating position for preventing and allowing respectively operation of said racking disk; in a first angular direction for racking from said test to said operating position, said racking disk being further constructed to move said racking disk latch means to said unlatched position responsive to rotation of said racking disk in an opposite angular direction; and biasing means operatively connected to said racking disk when said racking disk is rotated in said opposite angular direction to bias said racking disk in said first angular direction; said cooperating engaging means comprising a slot means for receiving said engaging means and a cam plate means in front of said slot means, said cam plate means engaging said engaging means when said circuit controlling device is inserted in said cubicle and causing rotation of said extending arm and racking disk in said opposite angular direction against the force of said biasing means, said engaging means being biased to move into said slot means when said slot means is reached by said engaging means by the bias of said biasing means to latch said circuit controlling device in position, said circuit controlling device being thereafter moved within said cubicle by rotation of said racking disk.

7. The device of claim 6 which further comprises interference means movable responsive to movement of one of said pair of cooperable contacts, said interference means being positioned to prevent movement of said racking disk latch means out of latching engagement with respect to said racking disk when said pair of cooperable contacts are in said engaged position, said interference means being positioned to allow movement of said racking disk latch means out of said latching engagement with respect to said racking disk when said pair of cooperable contacts are in said disengaged position; initial movement of said circuit controlling device being prevented when said cooperating contacts are engaged and said interference means prevents movement of said racking disk latch means to said unlatched position responsive to rotation of said racking disk in said opposite direction.

8. The device of claim 6 which further comprises trip mechanism operatively connected to at least one of said pair of cooperable contacts, operation of said trip mechanism allowing movement of said pair of cooperable contacts to said disengaged position, said trip mechanism being operatively connectable to said racking disk latch means, said trip mechanism being operated by said racking disk latch means when said racking disk latch means is moved out of latching engagement with respect to said racking disk to actuate movement of said pair of cooperable contacts to said disengaged position prior to racking by said racking disk; initial movement of said circuit controlling device causing movement of said racking disk release latch to said unlatched position and disengagement of said cooperating contacts prior to movement of said circuit controlling device to said test position.

9. The device of claim 7 which further comprises trip mechanism operatively connected to at least one of said pair of cooperable contacts, operation of said trip mechanism allowing movement of said pair of cooperable contacts to said disengaged position, said trip mechanism being operatively connectable to said racking disk latch means, said trip mechanism being operated by said racking disk latch means when said racking disk latch means is moved out of latching engagement with respect to said racking disk to actuate movement of said pair of cooperable contacts to said disengaged position prior to racking

by said racking disk; initial movement of said circuit controlling device causing movement of said racking disk release latch to said unlatched position and disengagement of said cooperating contacts prior to movement of said circuit controlling device to said test position.

10. In a circuit controlling device movable between a test and operating position within a cubicle, said circuit controlling device having a pair of cooperable contacts movable between an engaged and a disengaged position, a racking mechanism fastened to said circuit controlling device for racking said circuit controlling device between said test and operating positions; said racking mechanism comprising a racking disk operatively connectable to a portion of said cubicle to move said circuit controlling device with respect to said cubicle responsive to operation of said racking disk, and a racking disk latch means; said racking disk latch means being movable into and out of latching engagement with respect to said racking disk when said circuit controlling device is in said test and said operating positions for preventing and allowing respectively operation of said racking disk; interference means movable responsive to movement of one of said pair of cooperable contacts, said interference means being positioned to prevent movement of said racking disk latch means out of latching engagement with respect to said racking disk when said pair of cooperable contacts are in said engaged position, said interference means being positioned to allow movement of said racking disk latch means out of said latching engagement with respect to said racking disk when said pair of cooperable contacts are in said disengaged position; and floor plate means for said cubicle for allowing locking of said circuit controlling device in said test position, said floor plate means extending across

the floor of said cubicle to reinforce said cubicle and having guide means and track means for cooperating with said cubicle, a first latch plate means fastened to said floor plate and second latch plate means fastened to said circuit controlling device, said first and second latch plate means being positioned to allow padlocking of said circuit controlling device in said test position.

11. The device of claim 9 which further comprises floor plate means for said cubicle for allowing locking of said circuit controlling device in said test position, said floor plate means extending across the floor of said cubicle to reinforce said cubicle and having guide means and track means for cooperating with said cubicle, a first latch plate means fastened to said floor plate and second latch plate means fastened to said circuit controlling device, said first and second latch plate means being positioned to allow padlocking of said circuit controlling device in said test position.

12. The device of claim 6 which further comprises padlock means associated with the floor of said cubicle for allowing padlocking of said controlling device in said test position.

13. The device of claim 6 which further includes adjusting means for adjusting the angular position at which said biasing means is operatively connected to said racking disk.

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