

Jan. 19, 1960

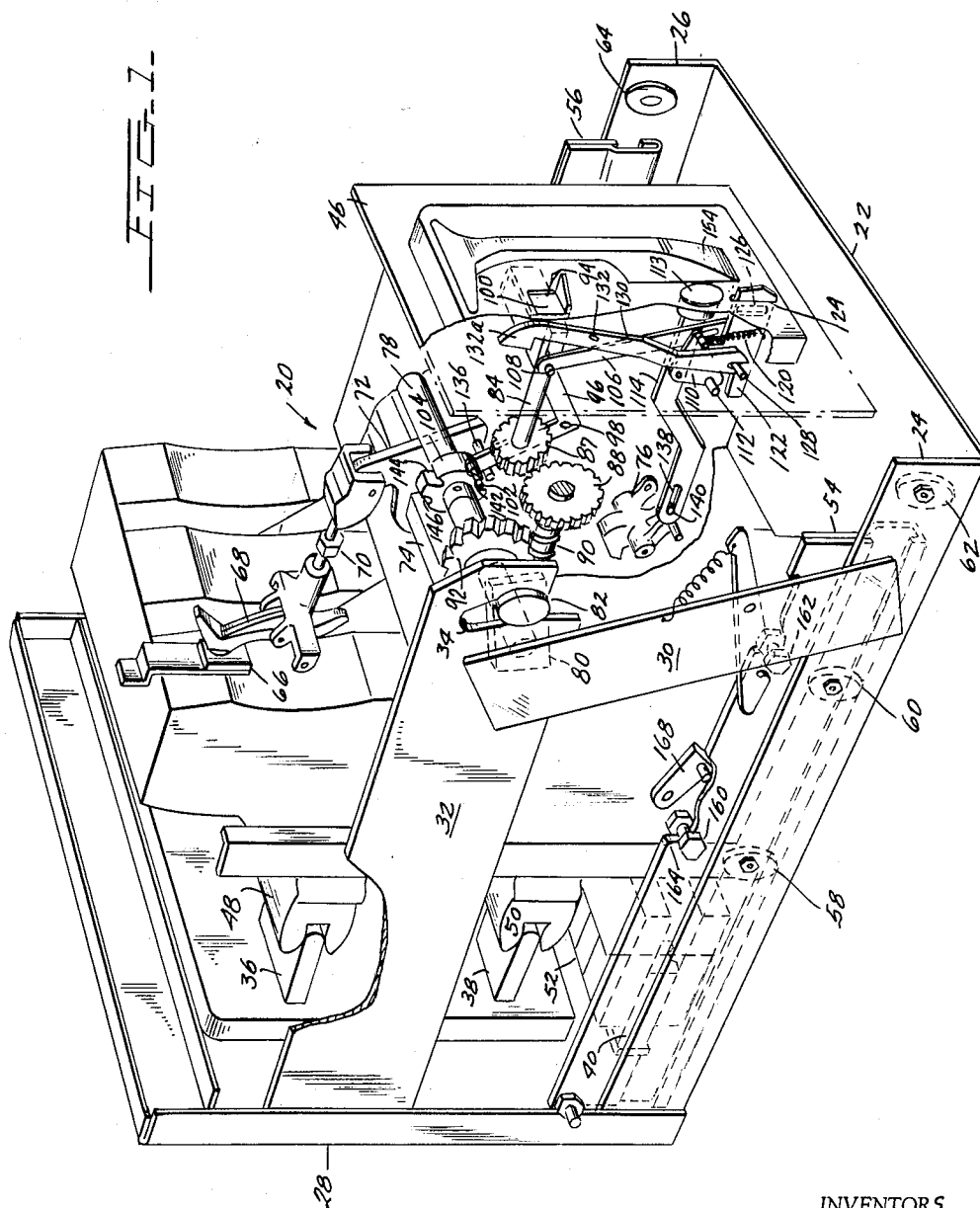
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FOUR POSITION DRAWOUT CIRCUIT BREAKER

Filed May 2, 1958

5 Sheets-Sheet 1



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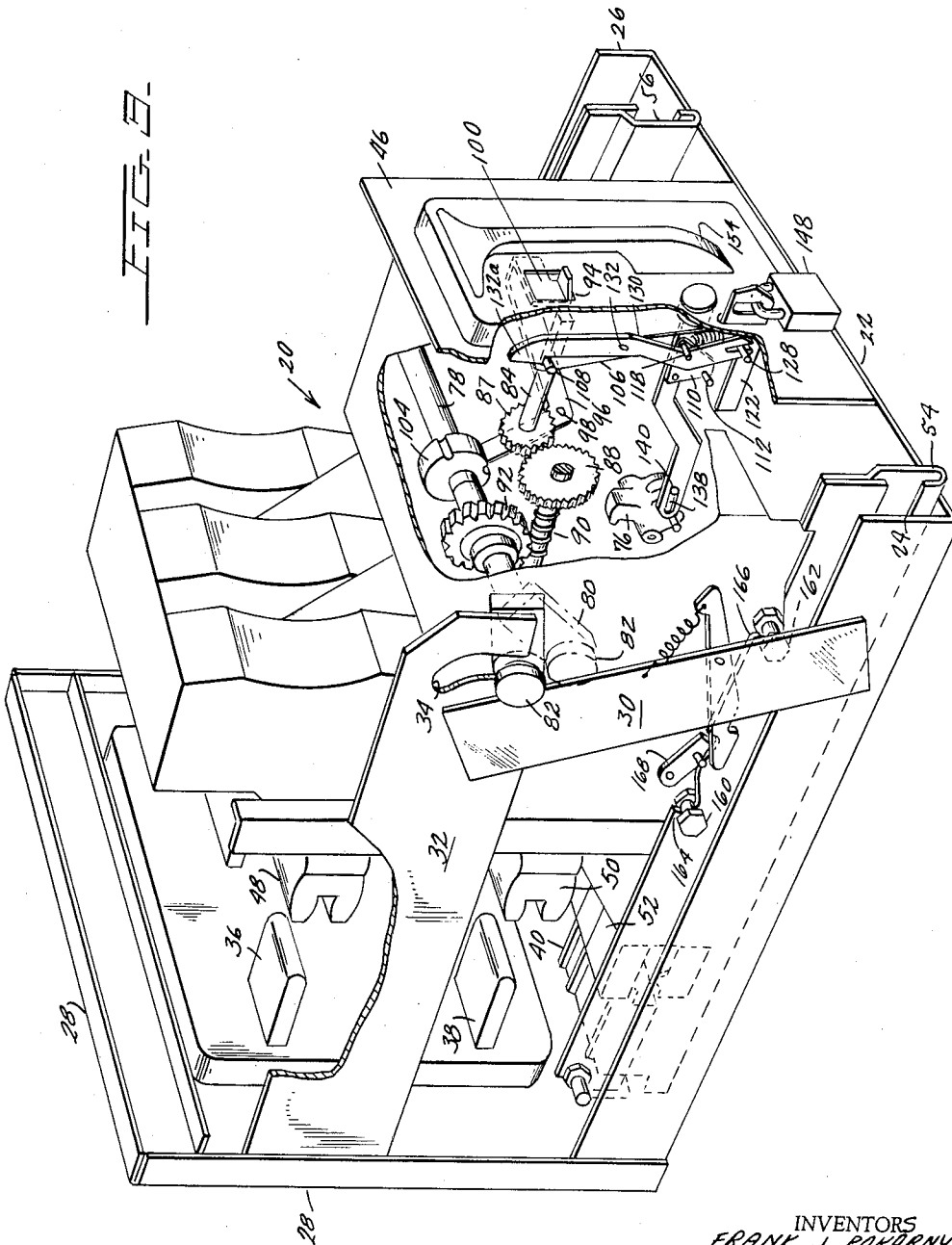
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FOUR POSITION DRAWOUT CIRCUIT BREAKER

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5 Sheets-Sheet 3



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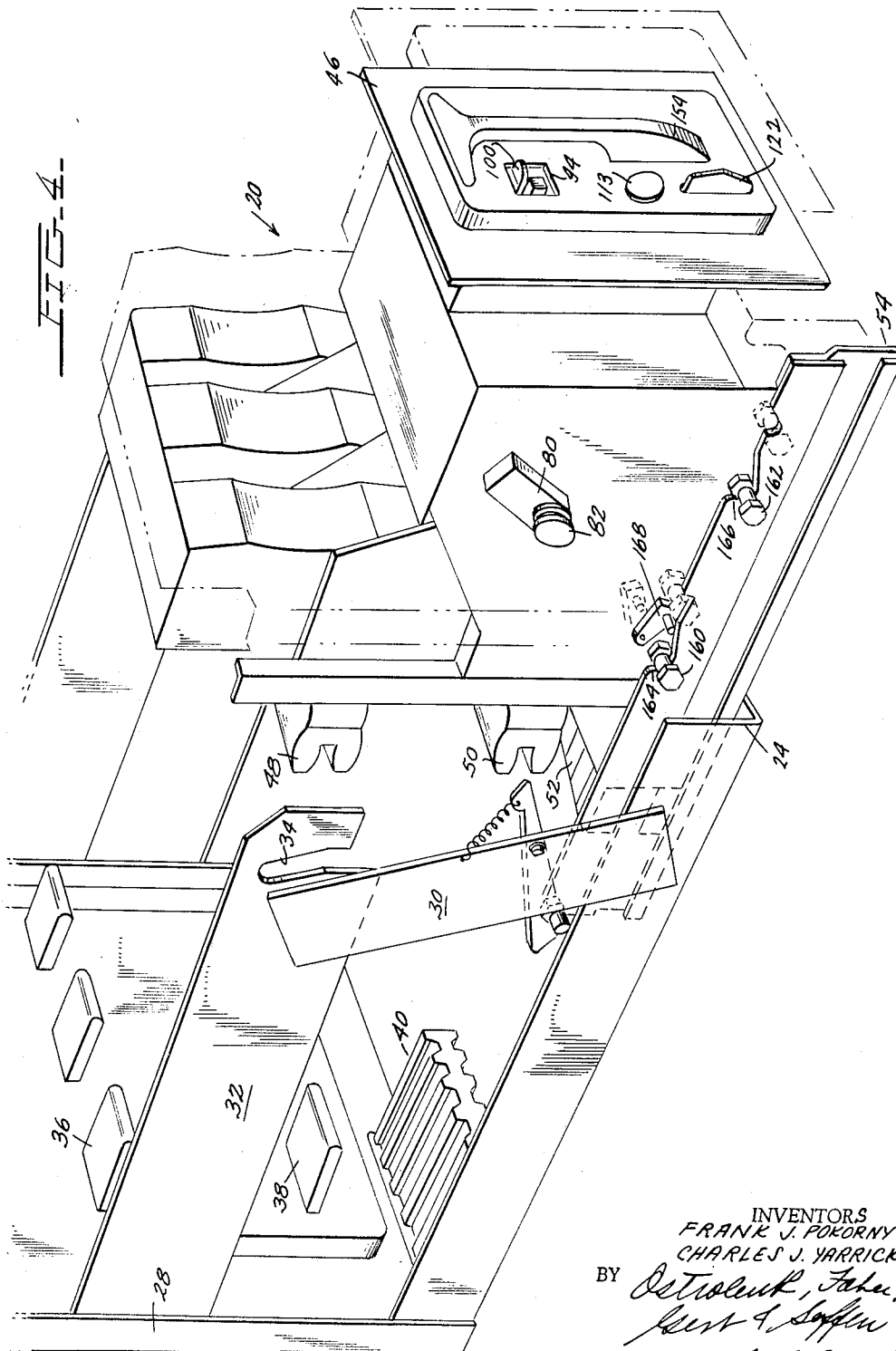
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FOUR POSITION DRAWOUT CIRCUIT BREAKER

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5 Sheets-Sheet 4



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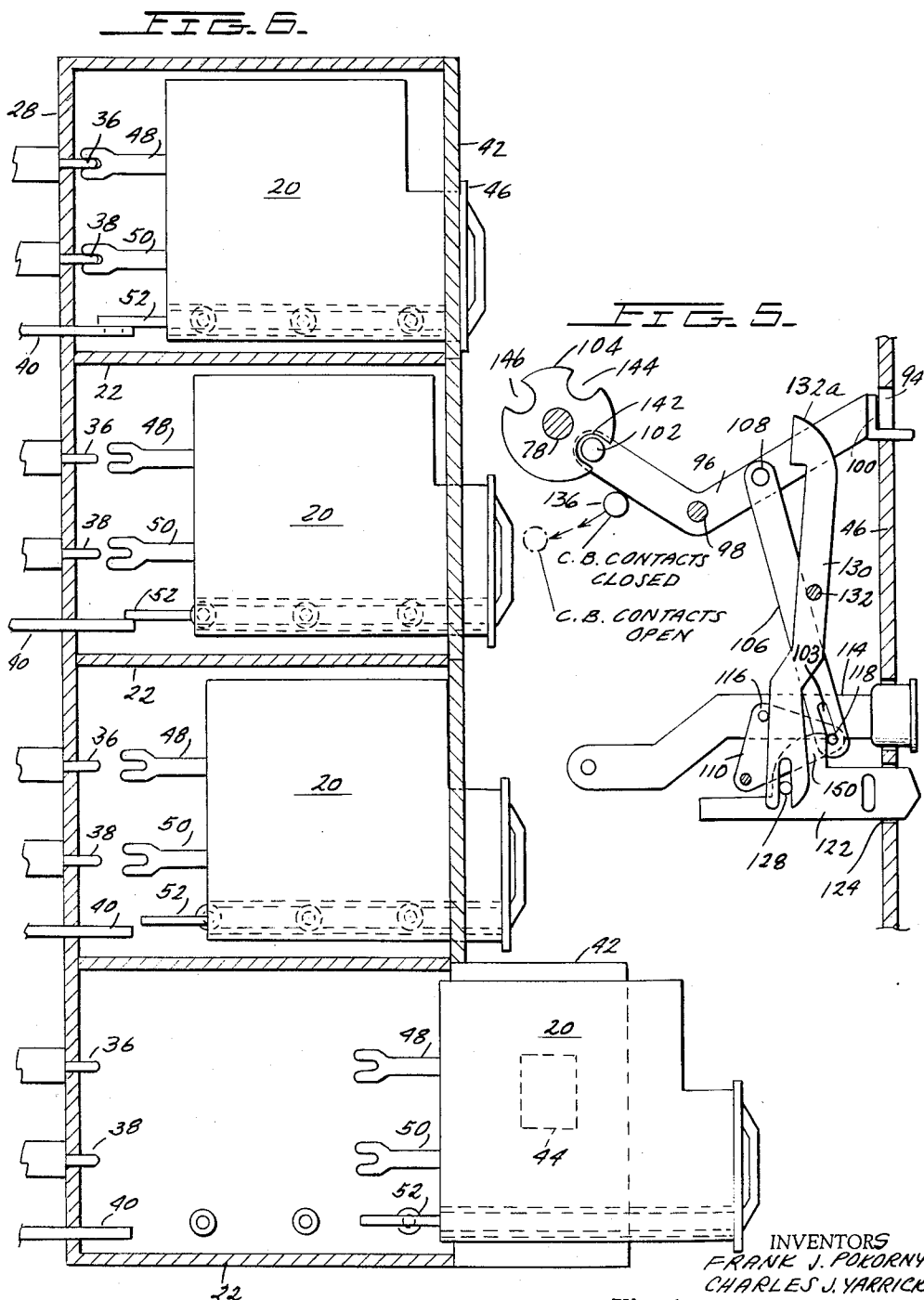
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FOUR POSITION DRAWOUT CIRCUIT BREAKER

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5 Sheets-Sheet 5



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## FOUR POSITION DRAWOUT CIRCUIT BREAKER

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Application May 2, 1958, Serial No. 732,618

23 Claims. (Cl. 200—50)

Our invention relates to a novel interlocking system for drawout breakers in which circuit breaker racking is defeated when the circuit breaker contacts are closed, the circuit breaker may not be closed when the circuit breaker is conditioned for racking, and a locking means which may be of the padlock type is associated with the interlock means for locking the circuit breaker contacts open and locking the racking mechanism at the same time.

Drawout type circuit breakers are well known in the art, and are generally comprised of a cubicle mounted circuit breaker which carries main and secondary contacts which cooperate with corresponding main and secondary contacts carried within the cubicle. The circuit breaker is then movable from an operating position in which both the main and secondary contacts are engaged to a test position in which the secondary contacts are maintained engaged while the main contacts are disengaged, and, finally, to a disconnected position where both the main and secondary contacts are disengaged.

In the preferred embodiment of our invention, we utilize the type of circuit breaker having an escutcheon which protrudes through a cooperating aperture in the cubicle door so that the circuit breaker may be racked between its operating, test and disconnected position without opening the cubicle door, as is disclosed in copending application Serial No. 606,597 filed August 28, 1956, entitled Two Position Escutcheon in the name of Charles J. Yarrick and assigned to the assignee of the instant invention.

In accordance with the instant invention, we provide a novel interlock system for controlling and coordinating the operation of the circuit breaker contacts and the racking mechanism.

A further feature of the instant invention is to extend the number of positions of the circuit breaker from the normal three positions which are operating, test and disconnected, and add a fourth position which is a withdrawn position where the circuit breaker is carried to a fully withdrawn position with the cubicle door open whereby a simple vertical lift will remove the circuit breaker from the cubicle.

Our novel interlock system is illustrated in conjunction with a preferred embodiment wherein a shutter means is provided in the front of the escutcheon plate which allows access or prevents access of a racking crank to the racking mechanism. Clearly, however, the shutter means could be replaced by any type of defeating system which will prevent the connection of a racking means to the racking mechanism.

This defeating means or shutter in the preferred embodiment is maintained closed by an interference pin which is carried by the circuit breaker mechanism and positioned in an interfering position when the circuit breaker contacts are closed. Therefore, in order to open the shutter to gain access to the racking mechanism, it is necessary first to operate the circuit breaker contacts and thereby remove the interfering pin. Therefore, rack-

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ing cannot be started when the circuit breaker contacts are closed.

Once the circuit breaker contacts are operated to their open position and the shutter is operated open, the shutter or defeating means is operatively connected to the circuit breaker trip latch so that the trip latch is maintained in a defeated position. Therefore, so long as the shutter is open, it will be impossible to close the circuit breaker contacts.

The shutter operation is further controlled by a second interfering system which cooperates with the racking mechanism whereby the shutter can be opened only when the circuit breaker is accurately positioned in either its test, connected or disconnected position. Therefore, since the shutter may not be closed, it will be impossible to operate the circuit breaker contacts when the main disconnect contacts and secondary disconnect contacts are improperly positioned.

The defeating means, such as the shutter, is then further operatively connected to a locking means which may be a padlock hasp which is movable to a locking position by exposing the hasp whereby the defeating means or shutter may be padlocked in a closed position only. The padlock hasp is further associated with the circuit breaker trip latch so that, upon its movement to a locking position, the trip latch will be operated. Accordingly, a single locking action will operate to lock the shutter closed and to lock the trip latch in a defeated position whereby both racking and circuit breaker operation are defeated.

Accordingly, the primary object of this invention is to provide a novel interlock system for drawout circuit breakers.

Another object of this invention is to provide a novel interlock system for drawout circuit breakers wherein access to the racking mechanism is prevented so long as the circuit breaker contacts are engaged.

Another object of this invention is to provide a novel interlock system for drawout circuit breakers wherein the connection of a racking means to the racking mechanism defeats the circuit breaker trip latch and prevents circuit breaker operation while the racking means is in position.

A further object of this invention is to associate a padlock means with both a means for preventing connection of a racking means to the racking mechanism and to the circuit breaker trip latch whereby a single padlocking operation will defeat the possibility of either circuit breaker operation or racking operation.

Another object of this invention is to provide a novel interlock system for drawout circuit breakers wherein the circuit breaker can be operated only when it is accurately positioned in either its connected, test or disconnected position.

Another important object of this invention is to provide a novel drawout circuit breaker system in which the circuit breaker is movable between an operating, test and disconnected position with the cubicle door closed.

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

Figure 1 shows a perspective view of our novel invention with the circuit breaker in its connected position.

Figure 2 shows the mechanism of Figure 1 in the test position.

Figure 3 shows the mechanism of Figure 1 in the disconnected position.

Figure 4 shows the mechanism of Figure 1 in the fully withdrawn position.

Figure 5 shows a side view of the interlock mechanism of Figures 1-4.

Figure 6 shows a side cross-sectional view of a cubicle containing a stack of four circuit breakers which are re-

spectively in the connected, test, disconnected and fully withdrawn position.

Referring now to Figures 1 through 4, the circuit breaker seen generally at 20 is contained within a metal enclosed cubicle having a floor member 22 which has flanges 24 and 26 extending along the sides thereof, and back member 28. The back member 28 and flanges 24 and 26 support side wall members, such as side wall members 30 and 32, for the case of the left side of the cubicle seen in Figures 1 through 4, and a similar pair of side members are provided to be associated with flange 26, though not shown in these drawings.

Side member 32 contains a cam slot 34 therein which, as will be seen hereinafter, is utilized in the racking operation. The rear wall 28 has a pair of main disconnect contacts 36 and 38 for each phase of the circuit breaker, disconnects 36 and 38 being for the first phase of the circuit breaker, as best seen in Figures 1 and 6. In a similar manner, a secondary disconnect contact 40 extends through the rear wall 28. As is seen in Figure 6, the cubicle section shown in Figures 1-4 may be repeated so as to form a stack of cubicles each of which has a door 42 (seen in the open position in the bottom cubicle of Figure 6) which has an aperture 44 therein which receives the escutcheon plate 46 of the circuit breaker 20 whereby the circuit breaker may be moved between its various positions without having to open the cubicle door.

The circuit breaker 20, as shown in the figures, carries thereon a pair of cooperating main disconnect contacts 48 and 50 for each respective phase to cooperate with a respective pair of main disconnect contacts fastened to the cubicle, such as contacts 36 and 38. In a similar manner, the circuit breaker 20 carries a movable secondary disconnect contact 52 which cooperates with the stationary secondary disconnect contact 40.

In order to allow movement of circuit breaker 20 within its corresponding cubicle, the circuit breaker is mounted on a first and second bottom rail 54 and 56 which has a slot therein for cooperating with wheels, such as wheels 58, 60 and 62 for rail 54 (see Figures 1 and 6) and a similar set of wheels including wheel 64 for rail 56. Each of the wheels 58 through 62 are pivotally carried by flange 24, while the similar set of wheels including 64 is carried by flange 26. Therefore, the circuit breaker which is supported from rails 54 and 56 will be slidably mounted with respect to the stationary flanges 24 and 26 of floor 22, since rails 54 and 56 can move in and out of the cubicle, so that the circuit breaker may be easily moved into and out of the cubicle.

The circuit breaker carries a pair of cooperating contacts therein for each phase which are connected in series with the disconnect contacts of each phase, such as disconnects 36-48 and 38-50. The circuit breaker contact mechanism is of any desired type and is typically shown in Figure 1 for the phase corresponding to disconnect contacts 36 and 38 as including a stationary contact 66 and a movable contact 68 wherein movable contact 68 is operable between an engaged and disengaged position with respect to stationary contact 66 by means of a contact arm 70 which is associated with extending member 72 of jack-shaft 74. Jack-shaft 74 also has a corresponding extending member 72 for each of the other phases of the circuit breaker, although not shown in Figure 1.

For purposes of simplicity, the operating mechanism for driving the jack-shaft 74 is not set forth in this application, and full details to the operating mechanism are contained in copending application, Serial No. 773,331, filed November 12, 1958, in the name of Robert V. Starr, and assigned to the assignee of the instant invention.

As may be seen from the above noted application, the position of movable contact 68 is controlled by the trip latch 76 of Figures 1 through 3 whereby movement of trip latch 76 in a clockwise direction will cause the opening of contacts 66 and 68. Furthermore, so long as trip

latch 76 is maintained rotated in a clockwise direction, the circuit breaker contacts may not be closed through their closing operating mechanism.

As stated above, the circuit breaker is to be racked between a connected, test and disconnected position shown in Figures 1, 2 and 3 respectively, as well as in the three upper cubicles respectively of Figure 6.

When the circuit breaker is in its connected position, the main disconnect contacts 36-48 and 38-50, and the secondary disconnects 40-52 are engaged, as seen in the upper cubicle of Figure 6, and Figure 1. When the mechanism is racked to the test position, as seen in the next to the highest cubicle of Figure 6 and in Figure 2, the secondary contacts are maintained engaged so that test power is available, but the main disconnect contacts are disengaged. In the disconnected position of Figure 3 and the next to the lowest cubicle of Figure 6, both the main disconnect contacts and the secondary disconnect contacts are disengaged.

The racking mechanism for achieving these various positions is seen in Figures 1, 2 and 3 as comprising a shaft 78 which is carried by circuit breaker 20 and is terminated by an extending arm 80 for the left side of the circuit breaker, and a similar extending arm on the right side of the circuit breaker (not shown in the figures), and the arms, such as arm 80, are then terminated in rollers, such as roller 82.

Roller 82 cooperates with the cam-shaped opening 34 in side piece 32 whereby rotation of shaft 78 will move roller 82 within cam slot 34 so that the circuit breaker will be moved accordingly within its cubicle.

The operating mechanism for rotating racking shaft 78 includes the shaft 84 which is terminated with a square head for cooperating with a racking means, such as crank 86 (Figure 2), and the opposite end of shaft 84 terminates in a gear 87. Gear 87 then operates through a geartrain including gears 88, wormgear 90 and gear 92 which is fastened to shaft 78.

Accordingly, when the racking means 86 is rotated in a clockwise direction, in Figure 2, the circuit breaker 20 will be moved inwardly and, similarly, when the racking means 86 is rotated counterclockwise, the circuit breaker 20 will be brought out of the cubicle.

The racking means 86 engages the square head of shaft 84 through an aperture 94 in the escutcheon plate 46 carried by the circuit breaker. Thus, the racking operation may be initiated even though the cubicle doors 42 are closed, since the escutcheon plate surface is always accessible.

In accordance with our invention, and as seen in Figures 1-3 and 5, we provide a defeating means for defeating the connection of the racking means to the racking mechanism which comprises the shutter member 96 which is pivotally mounted at a stationary pivot 98. Shutter means 96 carries a shutter surface 100 which is movable to block aperture 94 and thus defeat the connection of crank 86 and shaft 84 so as to prevent a racking operation. The opposite end of shutter means 96 carries a pin 102 which cooperates with a notched disk 104 carried by racking shaft 78, as will be described more fully hereinafter.

Shutter member 96 further carries a connecting link 106 which is pivotally mounted thereto and has a protruding pin 108 extending therefrom. The lower end of member 106 is pivotally connected to a crank 110 through a slotted connection and crank 110 is movable about a fixed pivot 112 and is pivotally connected to trip button link 114 at pivot 116. The pin 118, which pivotally connects crank 110 and member 106, extends sufficiently far to carry a biasing spring 120 which has its lower end fixed to a slidably movable padlock hasp 122 which extends through an aperture 124 in escutcheon plate 46 to expose a padlock aperture 126.

Padlock hasp 122 then carries an extending pin 128 which cooperates with a member 130 which is pivotally

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supported at pivot point 132 and has a curved upper end which cooperates with extending pin 108 of connecting member 106.

It is now possible to describe the operation of our novel interlock system.

Assuming, first, that the circuit breaker is in the position of Figure 1 and that it is desired to rack the circuit breaker to a new position, it will be observed that it is necessary to first open shutter 100 in order to connect racking means 86 to shaft 84. However, since the contact 68 and the extending member 72 which operates contact 68 are in their closed position, an interfering pin 136 (Figure 5) carried by extending member 72 prevents the lifting of shutter 100 by pivotally rotating the shutter member 96 in a counterclockwise direction about pivot 98.

Therefore, racking from the operating position is prevented so long as the contacts are in their engaged position and the circuit breaker must be operated either manually or automatically in order to remove the interference pin 136 from its interfering position with respect to shutter member 96.

Once the circuit breaker contacts are moved to their open position, shutter 100 may be lifted upwardly, and crank 86 may be inserted through aperture 94 to be connected to the square end of shaft 84. With the crank 86 so inserted, the shutter member 96 will be held in its open position because of the crank. When the shutter is raised from the position of Figure 1 to the position of Figure 2, the connecting link 106 will also be raised against the force of biasing spring 120 to rotate crank 110 in a counterclockwise direction about its pivot 112. This will cause the trip link 114 to be moved inwardly toward the position of Figure 2 until the lost motion slot 138 containing pin 140 of trip latch 76 is sufficiently moved so that the trip latch 76 is moved to a defeated position.

Since the crank 86 is inserted through the window 94, it will be clear that so long as the racking means is connected to the racking mechanism, the trip latch 76 will be maintained defeated, and, therefore, it will be impossible to close the circuit breaker while the racking means is so positioned.

Accordingly, when preparing to rack from the connected position of Figure 1 to the test position of Figure 2, it will be impossible for the operator to rack while the circuit breaker contacts are closed, or to close the contacts during the racking operation.

The circuit breaker is racked from the position of Figure 1 to the position of Figure 2 by a counterclockwise rotation of racking means 86 whereby the roller 82 will rotate in a counterclockwise direction within cam slot 34 until it achieves the position shown in Figure 2. Once in the test position of Figure 2, the racking means 86 may be removed and the shutter 100 closed so that the circuit breaker contacts may be closed and test procedure started.

If, however, the operator does not crank fully to the test position, or if he passes the test position and attempts to close the contacts in an intermediate position, the attempt will be defeated because of pre-positioned slots 142 and 144 and 146 in disk 104 (Figure 5) carried by racking shaft 78. Slots 142, 144 and 146 in racking disk 104 carried by racking shaft 78 (see Figure 5) are pre-positioned to correspond to the racking position for the connected, test and disconnected positions respectively. So long as the circuit breaker is correctly positioned in one of these racking positions, the respective slot 142, 144 or 146 will be correctly aligned with respect to interference pin 102 carried on the left-hand end of shutter member 96. Thus, in Figure 2, if the circuit breaker is not accurately positioned in its test position, after the racking means 86 is withdrawn, it will still be impossible to close shutter 100 because interference member 102 will not nest within its appropriate slot.

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Accordingly, a definite interlock is provided in our novel interlock system which guarantees that the circuit breaker cannot be closed unless properly positioned. When, however, the circuit breaker is properly positioned, the shutter 100 may be closed to allow trip latch 76 to be properly positioned for subsequently allowing the circuit breaker contacts to be latched closed.

In order to move the circuit breaker from the test position of Figure 2 to the disconnected position of Figure 3, it is clear that the same procedure will be followed as that set forth in racking from the operating position of Figure 1 to the test position of Figure 2 with the interlock features available wherein the shutter 100 may not be opened if the contacts are closed; and after the contacts are open and the racking means is connected to the racking mechanism the contacts may not be closed; and, finally, the shutter may not be closed if the circuit breaker is not correctly positioned in its disconnected position because of the mis-match between interference member 102 and slot 146 in disk 104.

As heretofore described, the novel interlocking system of our invention is further associated with a padlock means wherein a single padlocking operation will serve to prevent both a racking operation and a circuit breaker contact closing operation. The padlocking operation is seen in Figure 3 wherein the circuit breaker contacts may not be closed, and the racking mechanism may not proceed so long as padlock hasp 122 is withdrawn and padlocked in position by padlock 148.

More specifically, the padlock hasp 122 may be withdrawn only when shutter 100 is closed, since when the shutter is in its open position any attempts to withdraw padlock 122 will be defeated by the engagement of pin 108 of shutter member 96 and the extending portion 132a of member 130. That is to say, when member 122 is withdrawn, it will cause member 130 to be rotated in a counterclockwise direction about pivot 132 because of the slot engagement between pin 128 and the notch in the lower end of member 130. Therefore, the padlock hasp can be withdrawn only when the shutter is closed since this brings pin 108 below extending surface 132a as seen in Figure 3, so that the shaft 130 may be rotated counterclockwise. Therefore, when padlock hasp 122 is withdrawn, the shutter 100 must be closed so that it will be impossible for a racking operation to proceed.

Inherently, in this operation it is seen that it will be impossible to padlock the circuit breaker when it is in an intermediate position, since shutter 100 may not be depressed unless interference pin 102 cooperates with slots 142, 144 or 146.

From the above, it is seen that the first requirement for pulling the padlock hasp to padlock the racking mechanism is that the shutter be closed. A second requirement for pulling the padlock hasp to allow padlocking is that the trip link 114 be depressed and remains depressed so as to maintain trip latch 76 defeated.

As is best seen in Figure 5, when the shutter 100 is closed, the protruding pin 118 which connects link 106 and crank 110 is positioned in front of an upward extension 150 of hasp 122. Thus, unless the pin 118 is removed from the position of Figures 1 or 5 or the position it will assume when the shutter is closed, the hasp may not be removed. Therefore, it is necessary to depress the trip button and trip link 114 so that crank 110 will be rotated counterclockwise about its pivot 112, and the pin 128 will be rotated upwardly within a slot 103 (Figure 5) of link 106, thus permitting the withdrawal of hasp 122, and at the same time defeats the trip latch of the circuit breaker.

Accordingly, the padlocking of hasp 122 by padlock 148 in Figure 3 will first defeat racking because of the closed shutter, and, secondly, will cause a defeat of the circuit breaker contact operation through the defeated trip latch 76.

Another feature of our invention is that the circuit

breaker may be moved to a fourth and withdrawn position which is the position shown in Figure 4 and in the lower cubicle of Figure 6. In this position, it is seen that the roller 82 of Figure 3 has been rotated to the dot-dash position shown in Figure 3 so that the circuit breaker may now be withdrawn by grasping handle 154 and pulling the circuit breaker outwardly on tracks 54 and 56. The circuit breaker itself is connected to tracks 54 and 56 by bolt means, such as bolt means 160 and 162 which are normally carried in depressions in their rails, such as depressions 164 and 166 of rail 54.

In a similar manner, the rail 56 will have depressions to support corresponding bolts fastened in the circuit breaker on the other side of the circuit breaker which are similar to bolts 160 and 162. The circuit breaker is normally latched to its tracks by the latch means 168 which maintains the bolt 160 in the position shown in Figure 4. When, however, it is desired to remove the circuit breaker from its track, it is now merely necessary to lift the latch 168 and slide the circuit breaker with respect to the track so that bolts 160 and 162 move to the dotted position whereby a simple vertical lift will readily remove the circuit breaker from its enclosing structure.

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

**We claim:**

1. An interlock system for a drawout circuit breaker; said drawout circuit breaker being mounted within a cubicle and having a racking mechanism associated therewith; said racking mechanism being connectable to a manually operable racking means for racking said circuit breaker between an operating and test position; said interlock system including a defeater means carried by said circuit breaker; said defeater means being movable to a defeating position for preventing connection between said racking mechanism and said racking means and to an open position for allowing connection between said racking mechanism and said racking means.

2. An interlock system for a drawout circuit breaker; said drawout circuit breaker being mounted within a cubicle and having a racking mechanism associated therewith; said racking mechanism being connectable to a manually operable racking means for racking said circuit breaker between an operating and test position; said interlock system including a defeater means carried by said circuit breaker; said defeater means being movable to a defeating position for preventing connection between said racking mechanism and said racking means and to an open position for allowing connection between said racking mechanism and said racking means; the contacts of said circuit breaker being operatively connected to an interference means; said interference means being positioned to operatively engage said defeater means to prevent movement of said defeater means to said open position when the contacts of said circuit breaker are engaged; said interference means being removed from said defeater means when said circuit breaker contacts are opened; said defeater means being movable to said open position to allow connection of said racking mechanism and said racking means only when said circuit breaker contacts are open.

3. A drawout circuit breaker; said drawout circuit breaker including a first contact movable between an engaged and disengaged position with respect to a second contact; said drawout circuit breaker being mounted within a cubicle and having an extended escutcheon plate means movable through an aperture in the door of said cubicle; said extended escutcheon plate means normally completing the enclosure of said cubicle; said drawout circuit breaker having a racking mechanism associated therewith and connectable to a racking means for racking

said circuit breaker between a connected, test and disconnected position; said racking means being operable externally of said cubicle door and extending through an aperture in said extended escutcheon plate means to connect to said racking mechanism; said racking means racking said drawout circuit breaker between said operating, test and disconnect positions with said cubicle door closed.

4. In a drawout circuit breaker; said drawout circuit breaker including a first contact movable between an engaged and disengaged position with respect to a second contact; said drawout circuit breaker being mounted within a cubicle and having an extended escutcheon plate means movable through an aperture in the door of said cubicle; said drawout circuit breaker having a racking mechanism associated therewith and connectable to a racking means for racking said circuit breaker between a connected, test and disconnected position; said racking means being operable externally of said cubicle door and extending through an aperture in said extended escutcheon plate means to connect to said racking mechanism; said racking means racking said drawout circuit breaker between said operating, test and disconnect positions with said cubicle door closed; an interlock system; said interlock system including a shutter means movable between a closed position and open position with respect to said aperture in said escutcheon plate means; said shutter means preventing connection of said racking means to said racking mechanism when in said closed position.

5. In a drawout circuit breaker; said drawout circuit breaker including a first contact movable between an engaged and disengaged position with respect to a second contact; said drawout circuit breaker being mounted within a cubicle and having an extended escutcheon plate means movable through an aperture in the door of said cubicle; said drawout circuit breaker having a racking mechanism associated therewith and connectable to a racking means for racking said circuit breaker between a connected, test and disconnected position; said racking means being operable externally of said cubicle door and extending through an aperture in said extended escutcheon plate means to connect to said racking mechanism; said racking means racking said drawout circuit breaker between said operating, test and disconnect positions with said cubicle door closed; an interlock system; said interlock system including a shutter means movable between a closed position and open position with respect to said aperture in said escutcheon plate means; said shutter means preventing connection of said racking means to said racking mechanism when in said closed position; said first contact of said circuit breaker being operatively connected to an interference means; said interference means being positioned to operatively engage said shutter means when said shutter means are closed and said circuit breaker first contact is in its said engaged position to prevent movement of said shutter means to its said open position; said interference means being moved to a non-interfering position with respect to said shutter means when said circuit breaker first contact is moved to its said disengaged position; the connection of said racking means to said racking mechanism being defeated by said shutter means as long as said first contact of said circuit breaker is in said engaged position.

6. In a drawout circuit breaker; said circuit breaker comprising a first contact movable between an engaged and disengaged position with respect to a second contact; said circuit breaker having a trip latch associated therewith for controlling the engagement of said first and second contacts whereby operation of said trip latch to an unlatched position defeats the engagement of said first and second contacts; said circuit breaker being mounted within a cubicle and having a racking mechanism associated therewith; said racking mechanism being connectable to a manually operable racking means for racking said circuit breaker between an operating and test posi-

tion; an interlock system for preventing the engagement of said first and second contacts of said circuit breaker when said racking means is connected to said racking mechanism; said interlock system including a defeating means movable from a non-defeating position to a defeating position for preventing engagement of said racking mechanism by said racking means; said defeating means being operatively connectable to said trip latch; said defeating means operating said trip latch to said unlatched position when said defeating means is moved to said non-defeating position to allow connection between said racking means and said racking mechanism; said defeating means being operatively disconnected from said trip latch when said defeating means is moved to said defeating position.

7. In a drawout circuit breaker; said circuit breaker comprising a first contact movable between an engaged and disengaged position with respect to a second contact; said circuit breaker having a trip latch associated therewith for controlling the engagement of said first and second contacts whereby operation of said trip latch to an unlatched position defeats the engagement of said first and second contacts; said circuit breaker being mounted within a cubicle and having a racking mechanism associated therewith; said racking mechanism being connectable to a manually operable racking means for racking said circuit breaker between an operating and test position; an interlock system; said interlock system including a defeating means movable from a non-defeating position to a defeating position for preventing engagement of said racking mechanism by said racking means; said defeating means being operatively connectable to said trip latch; said defeating means operating said trip latch to said unlatched position when said defeating means is moved to said non-defeating position to allow connection between said racking means and said racking mechanism; said defeating means being operatively disconnected from said trip latch when said defeating means is moved to said defeating position; said first contact of said circuit breaker being operatively connected to an interference means; said interference means being positioned to operatively engage said defeater means to prevent movement of said defeater means to said non-defeating position when said first contact of said circuit breaker is in said engaged position; said interference means being removed from said defeater means when said first contact of said circuit breaker is moved to said open position; said defeater means being movable to said non-defeating position to allow connection of said racking mechanism and said racking means only when said first contact of said circuit breaker is in said disengaged position; the engagement of said first and second circuit breaker contacts being thereafter prevented so long as said racking means is connected to said racking mechanism and said defeater means is in said non-defeating position.

8. In a drawout circuit breaker; said drawout circuit breaker including a first contact movable between an engaged and disengaged position with respect to a second contact; said circuit breaker having a trip latch associated therewith for controlling the engagement of said first and second contacts whereby operation of said trip latch to an unlatched position defeats the engagement of said first and second contacts; said drawout circuit breaker being mounted within a cubicle and having an extended escutcheon plate means movable through an aperture in the door of said cubicle; said drawout circuit breaker having a racking mechanism associated therewith and connectable to a racking means for racking said circuit breaker between a connected test and disconnected position; said racking means being operable externally of said cubicle door and extending through an aperture in said extended escutcheon plate means to connect to said racking mechanism; said racking means racking said drawout circuit breaker between said operating, test and disconnected positions with said cubicle door closed; an interlock

system; said interlock system including a shutter means movable between a closed position and open position with respect to said aperture in said escutcheon plate means; said shutter means preventing connection of said racking means to said racking mechanism when in said closed position; said shutter means being operatively connectable to said trip latch; said shutter means operating said trip latch to said unlatched position when said shutter means is moved to said open position to allow connection between said racking means and said racking mechanism; said shutter means being operatively disconnected from said trip latch when said defeating means is moved to said defeating position; movement of said first circuit breaker contact to said engaged position being defeated when said shutter means is open.

9. In a drawout circuit breaker; said drawout circuit breaker including a first contact movable between an engaged and disengaged position with respect to a second contact; said circuit breaker having a trip latch associated therewith for controlling the engagement of said first and second contacts whereby operation of said trip latch to an unlatched position defeats the engagement of said first and second contacts; said drawout circuit breaker being mounted within a cubicle and having an extended escutcheon plate means movable through an aperture in the door of said cubicle; said drawout circuit breaker having a racking mechanism associated therewith and connectable to a racking means for racking said circuit breaker between a connected, test and disconnected position; said racking means being operable externally of said cubicle door and extending through an aperture in said extended escutcheon plate means to connect to said racking mechanism; said racking means racking said drawout circuit breaker between said operating, test and disconnect positions with said cubicle door closed; an interlock system; said interlock system including a shutter means movable between a closed position and open position with respect to said aperture in said escutcheon plate means; said shutter means preventing connection of said racking means to said racking mechanism when in said closed position; said first contact of said circuit breaker being operatively connected to an interference means; said interference means being positioned to operatively engage said shutter means when said shutter means are closed and said circuit breaker first contact is in its said engaged position to prevent movement of said shutter means to its said open position; said interference means being moved to a non-interfering position with respect to said shutter means when said circuit breaker first contact is moved to its said disengaged position; the connection of said racking means to said racking mechanism being defeated by said shutter means as long as said first contact of said circuit breaker is in said engaged position; said shutter means being operatively connectable to said trip latch; said shutter means operating said trip latch to said unlatched position when said shutter means is moved to said open position to allow connection between said racking means and said racking mechanism; said shutter means being operatively disconnected from said trip latch when said defeating means is moved to said defeating position; movement of said first circuit breaker contact to said engaged position being defeated when said shutter means is open.

10. An interlock system for a drawout circuit breaker; said drawout circuit breaker being mounted within a cubicle and having a racking mechanism associated therewith; said racking mechanism being connectable to a manually operable racking means for racking said circuit breaker between an operating and test position; said interlock system including a defeater means carried by said circuit breaker; said defeater means being movable to a defeating position for preventing connection between said racking mechanism and said racking means and to an open position for allowing connection between said racking mechanism and said racking means; an inter-

ference means being operatively connected to said racking mechanism and position thereby in a position related to the position of said circuit breaker within said cubicle; said interference means being positioned to engage said defeater means to prevent operation thereof to said open position when said racking mechanism positions said circuit breaker in a position intermediate to said test and operating position; said interference means allowing operation of said defeater means to said open position when said circuit breaker is positioned in either of its test or connected positions.

11. An interlock system for a drawout circuit breaker; said drawout circuit breaker being mounted within a cubicle and having a racking mechanism associated therewith; said racking mechanism being connectable to a manually operable racking means for racking said circuit breaker between an operating and test position; said interlock system including a defeater means carried by said circuit breaker; said defeater means being movable to a defeating position for preventing connection between said racking mechanism and said racking means and to an open position for allowing connection between said racking mechanism and said racking means; an interference means being operatively connected to said racking mechanism and position thereby in a position related to the position of said circuit breaker within said cubicle; said interference means being positioned to engage said defeater means to prevent operation thereof to said open position when said racking mechanism positions said circuit breaker in a position intermediate to said test and operating position; said interference means allowing operation of said defeater means to said open position when said circuit breaker is positioned in either of its test or connected positions; said interference means including a notched disk rotated responsive to movement of said circuit breaker; the notches in said disk being aligned with projection means carried by said defeater means only when said circuit breaker is in said test or connected position to allow said projection means to enter one of said notches and allow movement of said defeater means.

12. In a drawout circuit breaker; said drawout circuit breaker including a first contact movable between an engaged and disengaged position with respect to a second contact; said drawout circuit breaker being mounted within a cubicle and having an extended escutcheon plate means movable through an aperture in the door of said cubicle; said drawout circuit breaker having a racking mechanism associated therewith and connectable to a racking means for racking said circuit breaker between a connected, test and disconnected position; said racking means being operable externally of said cubicle door and extending through an aperture in said extended escutcheon plate means to connect to said racking mechanism; said racking means racking said drawout circuit breaker between said operating, test and disconnect positions with said cubicle door closed; an interlock system; said interlock system including a shutter means movable between a closed position and open position with respect to said aperture in said escutcheon plate means; said shutter means preventing connection of said racking means to said racking mechanism when in said closed position; said interlock system further including an interference means to prevent opening of said shutter when said circuit breaker is not in one of its connected, test, or disconnected position; said interference means being operatively connected to said racking mechanism and positioned thereby in a position related to the position of said circuit breaker within said cubicle; said interference means being positioned to engage said shutter means to prevent operation thereof to said open position when said racking mechanism positions said circuit breaker in a position intermediate any of said connected, test, or disconnected positions; said interference means allowing operation of said shutter means to said open position

when said circuit breaker is positioned in any of its connected, test or disconnected positions.

13. An interlock system for a drawout circuit breaker; said drawout circuit breaker being mounted within a cubicle and having a racking mechanism associated therewith; said racking mechanism being connectable to a manually operable racking means for racking said circuit breaker between an operating and test position; said interlock system including a defeater means carried by said circuit breaker; said defeater means being movable to a defeating position for preventing connection between said racking mechanism and said racking means and to an open position for allowing connection between said racking mechanism and said racking means; said defeater means being adapted to be locked in its defeating position when moved to said closed position to thereby prevent the connection of said racking means to said racking mechanism.

14. In a drawout circuit breaker; said drawout circuit breaker including a first contact movable between an engaged and disengaged position with respect to a second contact; said drawout circuit breaker being mounted within a cubicle and having an extended escutcheon plate means movable through an aperture in the door of said cubicle; said drawout circuit breaker having a racking mechanism associated therewith and connectable to a racking means for racking said circuit breaker between a connected, test and disconnected position; said racking means being operable externally of said cubicle door and extending through an aperture in said extended escutcheon plate means to connect to said racking mechanism; said racking means racking said drawout circuit breaker between said operating, test and disconnect positions with said cubicle door closed; an interlock system; said interlock system including a shutter means movable between a closed position and open position with respect to said aperture in said escutcheon plate means; said shutter means preventing connection of said racking means to said racking mechanism when in said closed position; said shutter means being adapted to be locked in said closed position by padlock means to defeat connection of said racking means and said racking mechanism.

15. In a drawout circuit breaker; said circuit breaker comprising a first contact movable between an engaged and disengaged position with respect to a second contact; said circuit breaker having a trip latch associated therewith for controlling the engagement of said first and second contacts whereby operation of said trip latch to an unlatched position defeats the engagement of said first and second contacts; said circuit breaker being mounted within a cubicle and having a racking mechanism associated therewith; said racking mechanism being connectable to a manually operable racking means for racking said circuit breaker between an operating and test position; an interlock system for preventing the engagement of said first and second contacts of said circuit breaker when said racking means is connected to said racking mechanism; said interlock system including a defeating means movable from a non-defeating position to a defeating position for preventing engagement of said racking mechanism by said racking means; said defeating means being operatively connectable to said trip latch; said defeating means operating said trip latch to said unlatched position when said defeating means is moved to said non-defeating position to allow connection between said racking means and said racking mechanism; said defeating means being operatively disconnected from said trip latch when said defeating means is moved to said defeating position; and a locking mechanism; said locking mechanism being operatively connected to said trip latch and movable to operate and maintain said trip latch to its said unlatched position; said locking mechanism being further operatively connected to said defeater means to be defeated when said defeater means

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is in its said undefeated position; said locking mechanism being operable to prevent both operation of said circuit breaker contacts and connection of said racking means to said racking mechanism.

16. In a drawout circuit breaker; said drawout circuit breaker including a first contact movable between an engaged and disengaged position with respect to a second contact; said circuit breaker having a trip latch associated therewith for controlling the engagement of said first and second contacts whereby operation of said trip latch to an unlatched position defeats the engagement of said first and second contacts; said drawout circuit breaker being mounted within a cubicle and having an extended escutcheon plate movable through an aperture in the door of said cubicle; said drawout circuit breaker having a racking mechanism associated therewith and connectable to a racking means for racking said circuit breaker between a connected test and disconnected position; said racking means being operable externally of said cubicle door and extending through an aperture in said extended escutcheon plate means to connect to said racking mechanism; said racking means racking said drawout circuit breaker between said operating, test and disconnect positions with said cubicle door closed; an interlock system; said interlock system including a shutter means movable between a closed position and open position with respect to said aperture in said escutcheon plate means; said shutter means preventing connection of said racking means to said racking mechanism when in said closed position; said shutter means being operatively connectable to said trip latch; said shutter means operating said trip latch to said unlatched position when said shutter means is moved to said open position to allow connection between said racking means and said racking mechanism; said shutter means being operatively disconnected from said trip latch when said defeating means is moved to said defeating position; movement of said first circuit breaker contact to said engaged position being defeated when said shutter means is open; said interlock system further including a padlocking mechanism being operatively connected to said trip latch and movable to operate and maintain said trip latch to its said unlatched position; said padlocking mechanism being further operatively connected to said shutter means to be defeated when said shutter means is in its said open position; said padlocking mechanism being operable to prevent both operation of said circuit breaker contacts and connection of said racking means to said racking mechanism.

17. An interlock system for a drawout circuit breaker; said interlock system including a shutter link operatively connected to the trip latch of said circuit breaker; said shutter link being movable from a position preventing access to the racking mechanism of said circuit breaker to a position allowing access to the racking mechanism of said circuit breaker; movement of said shutter link to said position allowing access to said circuit breaker defeating said trip latch through said operative connection.

18. An interlock system for a drawout circuit breaker; said interlock system including a shutter link operatively connected to the trip latch of said circuit breaker; said shutter link being movable from a position preventing access to the racking mechanism of said circuit breaker to a position allowing access to the racking mechanism of said circuit breaker; movement of said shutter link to said position allowing access to said circuit breaker defeating said trip latch through said operative connection; the contacts of said circuit breaker having an interference means associated therewith; said interference means being positioned to prevent movement of said shutter link to said position allowing access to said racking mechanism when said contacts of said circuit breaker are closed.

19. An interlock system for a drawout circuit breaker; said interlock system including a shutter link operatively connected to the trip latch of said circuit breaker; said

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shutter link being movable from a position preventing access to the racking mechanism of said circuit breaker to a position allowing access to the racking mechanism of said circuit breaker; movement of said shutter link to said position allowing access to said circuit breaker defeating said trip latch through said operative connection; the contacts of said circuit breaker having an interference means associated therewith; said interference means being positioned to prevent movement of said shutter link to said position allowing access to said racking mechanism when said contacts of said circuit breaker are closed; said racking mechanism having an interference means associated therewith to prevent movement of said shutter link to said position allowing access to said racking mechanism until said racking mechanism is in a predetermined position.

20. An interlock system for a drawout circuit breaker; said interlock system including a shutter link operatively connected to the trip latch of said circuit breaker; said shutter link being movable from a position preventing access to the racking mechanism of said circuit breaker to a position allowing access to the racking mechanism of said circuit breaker; movement of said shutter link to said position allowing access to said circuit breaker defeating said trip latch through said operative connection; said shutter link being operatively connected to a padlock hasp; said padlock hasp being operatively connected to said trip latch independently of said shutter link; said padlock hasp being movable to a padlocking position; said shutter link defeating movement of said padlock hasp to said padlocking position when said shutter link is positioned to allow access to said racking mechanism; movement of said padlock hasp to said padlocking position operating said trip latch; said padlock hasp being in said padlocking position only when said trip latch is operated and said shutter link is positioned to prevent access to said racking mechanism.

21. An interlock system for a drawout circuit breaker; said interlock system including a shutter link operatively connected to the trip latch of said circuit breaker; said shutter link being movable from a position preventing access to the racking mechanism of said circuit breaker to a position allowing access to the racking mechanism of said circuit breaker; movement of said shutter link to said position allowing access to said circuit breaker defeating said trip latch through said operative connection; the contacts of said circuit breaker having an interference means associated therewith; said interference means being positioned to prevent movement of said shutter link to said position allowing access to said racking mechanism when said contacts of said circuit breaker are closed; said racking mechanism having an interference means associated therewith to prevent movement of said shutter link to said position allowing access to said racking mechanism until said racking mechanism is in a predetermined position; said shutter link being operatively connected to a padlock hasp; said padlock hasp being operatively connected to said trip latch independently of said shutter link; said padlock hasp being movable to a padlocking position; said shutter link defeating movement of said padlock hasp to said padlocking position when said shutter link is positioned to allow access to said racking mechanism; movement of said padlock hasp to said padlocking position operating said trip latch; said padlock hasp being in said padlocking position only when said trip latch is operated and said shutter link is positioned to prevent access to said racking mechanism.

22. A drawout circuit breaker; said drawout circuit breaker including a first contact movable between an engaged and disengaged position with respect to a second contact; said drawout circuit breaker being mounted within a cubicle and having an extended escutcheon plate means movable through an aperture in the door of said cubicle; said extended escutcheon plate means normally

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completing the enclosure of said cubicle; said drawout circuit breaker having a racking mechanism associated therewith and connectable to a racking means for racking said circuit breaker between a connected, test and disconnected position; said racking means being operable externally of said cubicle door and extending through an aperture in said extended escutcheon plate means to connect to said racking mechanism; said racking means racking said drawout circuit breaker between said operating, test and disconnect positions with said cubicle door closed; said circuit breaker being movable to a fully extended position when said cubicle door is open; said circuit breaker being easily removable from said cubicle when in said fully extended position.

23. A drawout circuit breaker; said drawout circuit breaker including a first contact movable between an engaged and disengaged position with respect to a second contact; said drawout circuit breaker being mounted within a cubicle and having an extended escutcheon plate means movable through an aperture in the door of said cubicle; said extended escutcheon plate means normally completing the enclosure of said cubicle; said drawout circuit breaker having a racking mechanism associated therewith and connectable to a racking means for

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racking said circuit breaker between a connected, test and disconnected position; said racking means being operable externally of said cubicle door and extending through an aperture in said extended escutcheon plate means to connect to said racking mechanism; said racking means racking said drawout circuit breaker between said operating, test and disconnect positions with said cubicle door closed; said circuit breaker being supported by movable rail means within said circuit breaker, said rail means being supported by said cubicle; said movable rail means being adapted to allow movement of said circuit breaker to a fully extended position with respect to said cubicle, said circuit breaker being removable from said rails and hence said cubicle by a relatively small vertical lift when said circuit breaker is in said fully extended position.

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