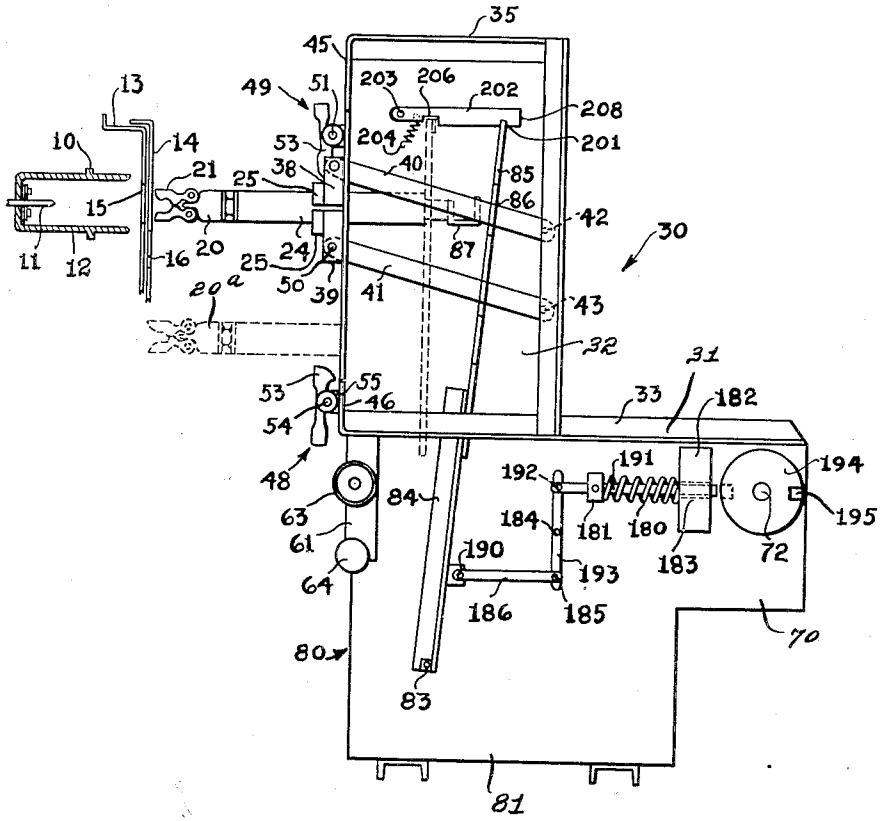
Dec. 25, 1951 J. D. WOOD 2,579,992

GROUND TESTING DEVICE

Original Filed Feb. 26, 1947



INVENTOR.
JOSEPH D. WOOD
BY
Ostrolenk & Faber
ATTORNEYS

Patented Dec. 25, 1951

2,579,992

UNITED STATES PATENT OFFICE

2,579,992

GROUND TESTING DEVICE

Joseph D. Wood, Strafford Village, Teddyffrin Township, Pa., assignor to I-T-E Circuit Breaker Company, Philadelphia, Pa., a corporation of Pennsylvania

Original application February 26, 1947, Serial No. 731,165, now Patent No. 2,504,775, dated April 18, 1950. Divided and this application July 16, 1949, Serial No. 105,224

4 Claims. (Cl. 175—298)

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This application is a division of my Patent No. 2,504,775, issued April 18, 1950, and relates to a grounding or earthing device which may be connected to power generating or power consuming apparatus in order to protect the same when the electrical circuits are intended to be deenergized and in order, especially, to protect men who are working on these apparatus.

In most modern switchboards, a stationary structure is provided into which electrical connections from power generating apparatus and to power consuming apparatus are led. The structure contains the bus and cable terminals which are attached to stationary elements of saparable contact members through which current is led into switching apparatus which is usually readily removable.

In many types of switchboards, circuit breakers or switches are mounted in trucks or on other means which permit easy insertion or withdrawal of the switch so that its complementary contacts may be engaged with or disengaged from the stationary circuit connections.

In such installations it is often necessary for men to work on certain of the incoming or outgoing lines. For the protection of these men, it is essential that these lines be de-energized and preferably be connected to the earth in order to prevent personal injury.

The principal object of the present invention is the provision of a grounding device which may be inserted in the switchboard after the removal of a circuit breaker from its compartment.

Another object of the present invention is to engage switch elements of the grounding device with a selected set of stationary contacts within the switchboard and to provide means for thereafter connecting these elements to the earth without any danger to the attendant.

One type of switchboard construction in connection with which the grounding device of the present invention may best be used is one in which all of the stationary contacts comprising the legs of one circuit (i. e., the line) are arranged in a straight line and all of the stationary contacts comprising the legs of the circuit (the load) to which the circuit breaker will connect the first circuit are also arranged in a straight line parallel to the first group of contacts.

The grounding device of the present invention is provided with a group of contacts which may be moved selectively so that when the device is entered into the switchboard, they may engage either the first group of contacts or the second group of contacts.

Another object of this invention, therefore, is the provision of means in a single grounding

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device which may be engaged and disengaged with a selected set of circuit connecting elements in a stationary switchboard.

A further object of the present invention is the provision in a grounding device of selectively movable connecting elements, the position of which in the grounding device may be altered to engage a selected set of stationary circuit connecting elements.

A further object of my invention is the provision in my novel grounding device of a barrier so arranged that the contact elements to which connections are to be made cannot be reached until the grounding device has been racked into the compartment.

A further object of my invention is the arrangement of the grounding device so that the completion of the racking-in operation will result in movement of the aforesaid barrier to a position wherein the contacts to be engaged and grounded are exposed.

Another and modified object of my invention is the arrangement of the grounding device so that the barrier can be moved into position to expose the contacts only after the racking-in operation is completed.

Another object of my invention is the arrangement of my novel grounding device in such a manner that the barrier is moved to a position rendering the contacts inaccessible before the racking-out of the grounding device can begin.

The foregoing and many other objects of my invention will become apparent in the following description and drawings in which the figure is a side view of my novel grounding device.

Referring now to the figure, the compartment into which my novel grounding device is to be racked and in which it is to operate is indicated generally by the back wall 10 thereof. The circuit breaker originally in the compartment and in engagement with the disconnect contacts 11 recessed in insulating housings 12 in the back wall has been removed and the grounding device has been racked-in in its stead.

The fronts of the individual housings 12 are closed by the isolation shutters 13, 14 which when the compartment is empty are so arranged that their respective openings 15 and 16 are not in registry with each other, the shutter portion 14 being then lowered.

In order to admit the connecting elements of either the circuit breaker or the grounding device, the shutter element 14 muts be raised to bring the openings 15 and 16 into registry with each other.

The grounding device is shown in the figure with its connection stud 20 having the contact

element 21 about to enter through the registered openings 15 and 16 into the recessed housing 12 but not yet engaged with the stationary disconnect contact 11 leading to a box behind the compartment.

The conductive stud 20 is provided with a sheath 24 of insulating material preferably phenolic insulation molded around the stud in order to isolate the group of studs 20 and their contacts 21 from each other.

The individual studs 20 are connected together by the insulating cross-bars 25, 25 which are clamped on opposite sides of the aligned studs to yoke them together to operate as a single unit mechanically, although of course they are isolated from each other electrically.

My novel grounding device 30 comprises a main supporting platform or tray 31 with side vertical supports 32, 32 secured to the upstanding flanges 33, 33 of the tray 31. A suitable cover plate 35 is provided across the tops of the side vertical plates 32. The cross-bars or yoke members 25 are provided with flanges 38, 39 on each side, which are respectively connected to the links 40 and 41 on each side.

The opposite ends of each of the links 40, 41 on each side are pivotally mounted on pivots 42, 43 respectively, the said pivots being secured in any suitable manner to the front ends of the vertical side panels 32, 32. The arrangement is such that the cross-bar or yoke 25 carrying the three or more contact studs 20 and their associated contacts 21 may be moved from the upper portion shown in the figure wherein they engage the line terminals in the compartment to the lower position indicated at 20a in the figure wherein they are in a position to engage the load terminals in the compartment.

The upper covering panel 35 is a tray-like member provided with a downwardly dependent flange 45 in the rear. Similarly the main platform or tray 31 is provided with an upwardly ascending flange 46 in the rear.

Latch members 48 and 49 respectively are secured to the lower member 46 and the upper member 45 at the rear where these latches may respectively engage the pins 50 and 51 which connect the links 40 and 41 to the transverse bar or yoke 25.

Only one latch need be used for either the up or down position although a pair of latches may be used on each side for the up and down position if desired. Each latch member is a simple latching bar 53 pivotally mounted on pin 54 carried by lug 55 secured either to the flange 46 or the flange 45. The latch member 53 of the lower latch 48 is spring biased in any suitable manner as by a coil spring around the pin 54 into clockwise rotation; while the corresponding latch member 53 of the latch element 49 at the upper end is similarly biased into counterclockwise rotation with respect to the figure.

The latch 48 will engage pin 50 when the contacts 21 are in the lowered position and hold them in that position; the latch 49 will engage the pin 51 when the contacts are in the upper position and will hold them in that position.

In order to prepare my novel grounding device for use in connection with either the line or the load contacts, it is necessary merely to release the particular latch 48 or 49 which holds the contacts by manually pressing the end of lever 53 opposite its hooked portion and then by grasping either the cross-bar 25 or one of the studs 20 to move the aligned studs 20 and the cross-bar 25 to the proper position where they will then be latched for an engagement with the desired set of contacts.

This of course must be done before the grounding device is moved into the compartment.

The platform 31 has secured thereto at the lower end the downwardly extending lateral cross-piece 60 having the side flanges 61 on each side, which side flanges carry the rollers 63 and 64 to ride on the track of the compartment. Adjacent the front end of the platform is a downwardly extending cross-bar 66 carrying rollers 67 on each side to ride on the rail of the compartment.

The front end of the platform 31 supports the front lower side panels 70, 70 on each side by which the rotatable racking shaft 72 is rotatably supported.

The main horizontal platform 31 of the grounding device 30 is also provided with the lower housing 80 including the side panels 81. Panels 81 carry between them at the lower end thereof the shaft 83 on which are pivotally secured the lower ends of the bars 84, 84. Bars 84, 84 carry between them the barrier 85. Barrier 85 is provided with openings 86, 86 through which the contact members 87 at the front end of the connecting studs 20 may pass.

In the test position of the grounding device, the barrier 85 is in the position where the front contact elements 87 of the studs are inaccessible. In the fully racked-in position of the grounding device 30, the barrier has been moved to a position where the front contacting elements 87 of the connecting studs 20 have passed through the openings 86 and are accessible for grounding purposes.

After the circuit breaker is racked in, the barrier 85 may thereafter be manually moved by a stick or otherwise to the position where contacts 87 are accessible.

The shaft 72 in this case is provided with a disk 194 having the peripheral notch 195 into which the end of link 191 may enter. Disk 194 is associated with the racking mechanism in the manner described in the parent application hereof. In the racked-out position of the circuit breaker, the notch 195 is in the outer position 180° away from the end of link 191. When the circuit breaker is fully racked in, the notch 195 is rotated 180° to the position where it is in the dotted-line position opposite the end of link 191. Link 191 is biased towards the left by the compression spring 190 which bears between the roller 181 keyed to the link 191 and the stationary plate 182 having an opening 183 through which the end of link 191 passes.

Link 191 is connected by pin 192 to lever 193 pivoted on the stationary pin 184. The opposite end of lever 193 is connected by pin 185 to link 186. Link 186 is pivotally connected to pin 190 on the vertical bars 84.

The upper end of the barrier 85 is provided with a central notch 201 which bears against the latch bar 202; the said latch bar 202 is pivotally mounted on stationary pin 203 and is spring biased downwardly by the tension spring 204.

When the grounding device is fully racked in and the notch 195 has moved to the dotted line position where the front end of link 191 may enter into the said notch, then the elements are engaged so that the barrier 85 may now be pushed by a prod or otherwise to the left into the dotted line position where the contact elements 87 are accessible. When the barrier 85 is pushed to-

wards the left, the link 186 is pulled to the left rotating the lever 193 in a clockwise direction around the pin 194 and pushing the link 191 against the compression of spring 190 so that the front end of the link enters into the notch 195.

At the same time the upper end or notch 201 in the barrier 85 moves into the latch detent 206 of the latching member 202 so that the barrier 85 is held in the position where the contact elements 87 are accessible against the pressure of the compression spring 180.

When it is desired to rack the grounding device out, it is necessary first to remove the front end of link 191 from the notch 195; otherwise the shaft 72 cannot be rotated to rack the grounding device out. In order to accomplish this, the front end 208 of the latch lever 202 is raised by a prod or stick to release the upper end 201 of the barrier from the detent 206 of the latch member 202. This permits the compression spring 180 to drive the link 191 to the left, thereby rotating the lever 193 counterclockwise and pulling the link 196 to the right. This results in pulling the vertical bars 84 to the right around their pivot 83 and pulls the barrier 85 out.

This then permits the grounding device to be racked out after the contact elements have been rendered inaccessible by movement of the barrier 85 to the solid line position of the figure. The barrier 85 is thus so arranged in the construction of the figure that it is always spring biased to the outward position. It cannot be moved and latched into the position of accessibility of the contacts 87 until the racking-in operation has been completed so that contact 21 has engaged the disconnect contact or terminal 11.

It may then be moved in by a prod or stick as above pointed out. Likewise the racking-out operation cannot even be commenced until the barrier is unlatched and returned to the position where contact elements 87 are inaccessible.

Thus, provision is made of a barrier so arranged that the contact elements of the grounding device are unavailable for grounding of the circuit until the grounding device is fully racked in. The barrier is moved into a position where the contacts are available for grounding either on completion of the racking-in operation and connection of the grounding device to the terminals or immediately following the completion of the racking in and the aforesaid connection. The barrier is then moved to a position where the contacts which are to be grounded are inaccessible for connection either during the initial portion of the racking-out operation before the elements 21 and 11 separate or the device may be so arranged that the barrier must be moved to the position where the contact elements will be inaccessible before the racking-out operation is even commenced.

In the foregoing I have described my invention solely in connection with specific illustrative embodiments thereof. Since many variations and modifications of my invention will now be obvious to those skilled in the art, I prefer to be bound not by the specific disclosures herein contained but only by the appended claims.

I claim:

1. In a ground testing device, groundable contact studs, a supporting mechanism therefor, a racking mechanism connected to said supporting mechanism for racking said studs into engagement with circuit terminals, a barrier for normally maintaining said studs inaccessible for grounding before said studs have been racked into contact engagement with said terminals, said barrier being movable to a position in which said studs are accessible, and a lock engaging said racking mechanism and connected to said barrier for preventing said racking mechanism from being operated while said barrier is in the position in which said studs are accessible.

2. In a ground testing device, groundable contact studs, a supporting mechanism therefor, a racking mechanism connected to said supporting mechanism for racking said studs into engagement with circuit terminals, a barrier having a first position for normally maintaining said studs inaccessible for grounding before said studs have been racked into contact engagement with said terminals and movable to a second position in which said studs are accessible, and a locking mechanism for preventing any movement of said barrier from its first to its second position in which said studs are accessible except after the racking mechanism has moved said studs to engagement with said terminals.

3. In a ground testing device, groundable contact studs, a supporting mechanism therefor, a racking mechanism connected to said supporting mechanism for racking said studs into engagement with circuit terminals, a barrier for normally maintaining said studs inaccessible for grounding before said studs have been racked into contact engagement with said terminals and movable to a position in which said studs are accessible, and a connection from said barrier to said racking mechanism for preventing operation of said racking mechanism while said barrier is in the position in which said studs are accessible.

4. In a ground testing device, groundable contact studs, a supporting mechanism therefor, a racking mechanism connected to said supporting mechanism for racking said studs into engagement with circuit terminals, a pivotally mounted barrier having a first position in which said studs are inaccessible for grounding and having a second position to which it is movable about said pivot in which said stud is accessible for grounding, a lock for locking said barrier in either of its positions, a member connected to said barrier and extending toward said racking mechanism, a notch in said racking mechanism, biasing means for biasing said member into said notch, said notch being positioned opposite said member only when said racking mechanism has racked said supporting mechanism into the position in which said studs engage said circuit terminals, said member when received in said notch permitting said barrier to be rocked about its pivot into the position in which said stud is accessible and said member when out of said notch forcing said barrier to be moved about its pivot into the position in which said stud is inaccessible.

JOSEPH D. WOOD.

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