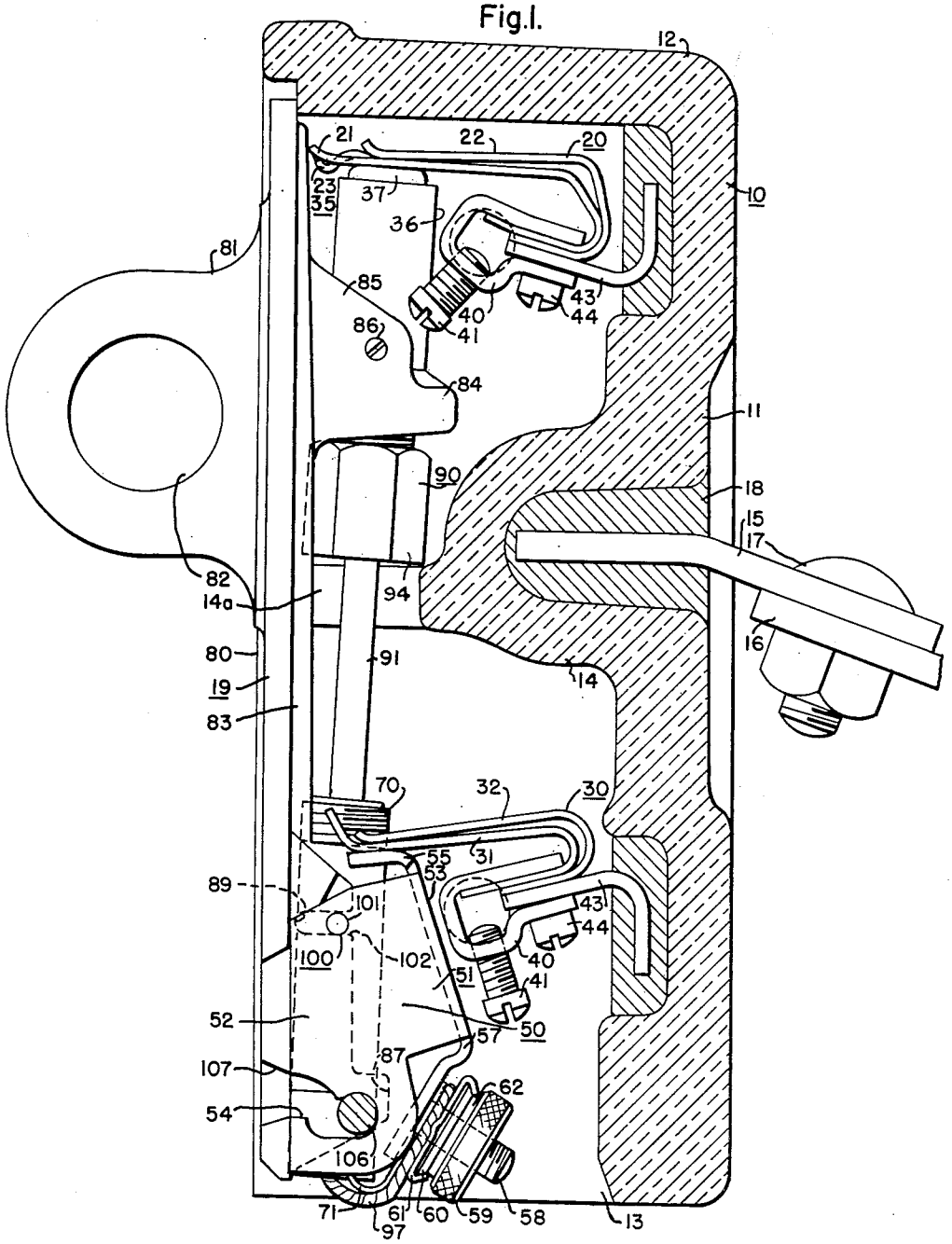
June 22, 1954 H. H. FAHNOE 2,681,963

ENCLOSED SWITCH

Filed Aug. 19, 1950 3 Sheets-Sheet 1

Fig.1.



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ENCLOSED SWITCH

2,681,963

Filed Aug. 19, 1950

3 Sheets-Sheet 2

Fig.2.

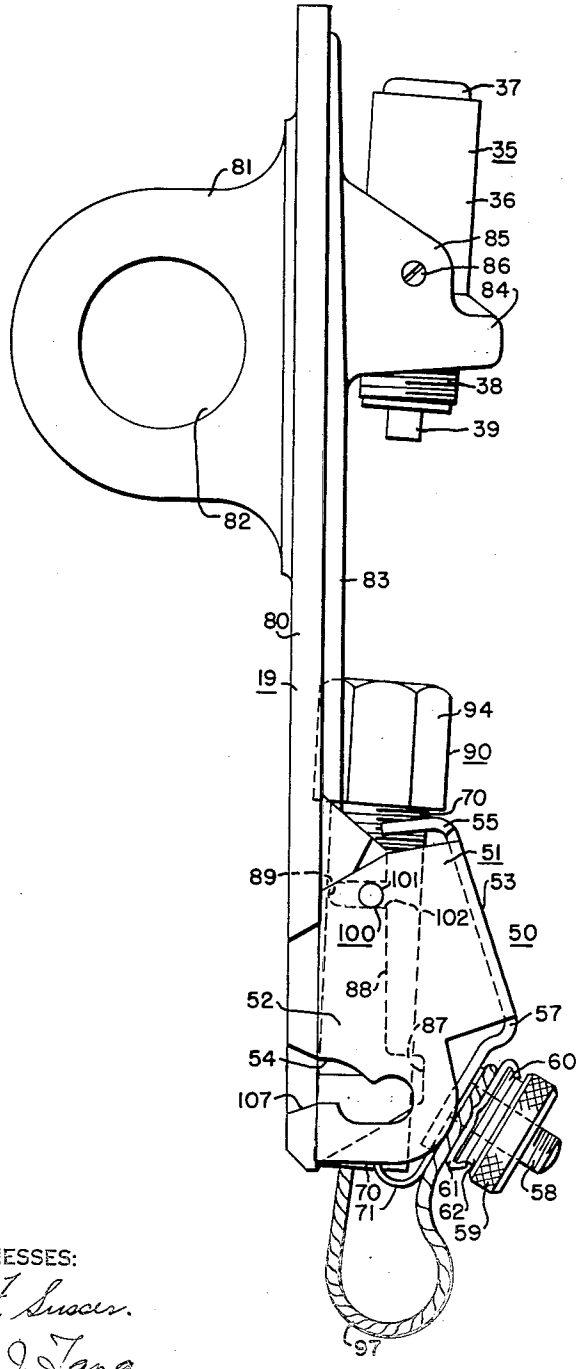
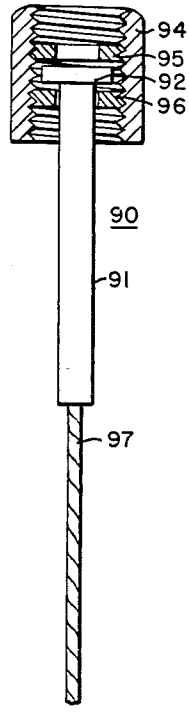


Fig.3.



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June 22, 1954 H. H. FAHNOE 2,681,963

ENCLOSED SWITCH

Filed Aug. 19, 1950 3 Sheets-Sheet 3

Fig.4.

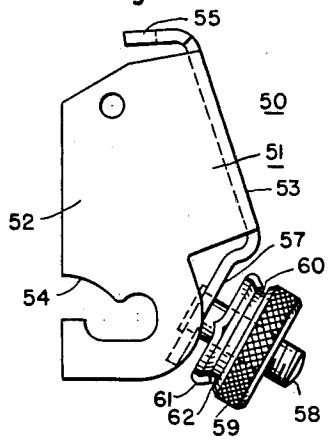


Fig.5.

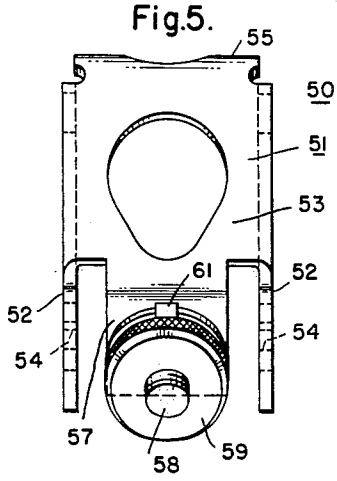


Fig.6.

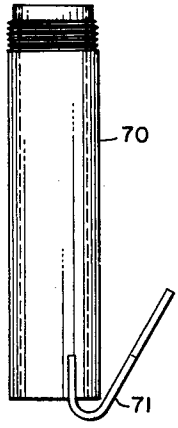


Fig.8.

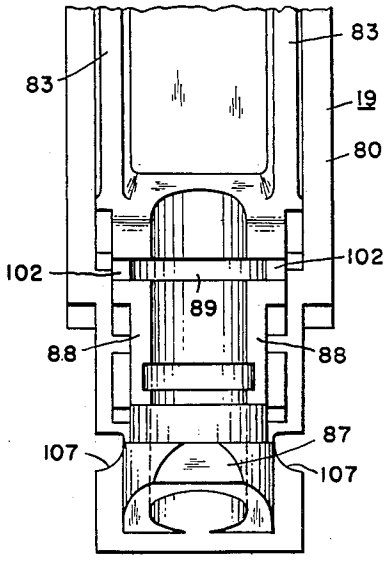


Fig.9.

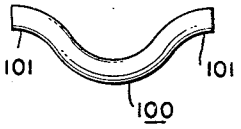


Fig.10.

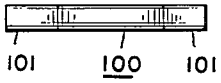
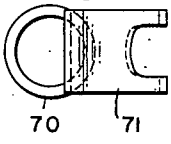


Fig.7.



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Patented June 22, 1954

2,681,963

UNITED STATES PATENT OFFICE

2,681,963

ENCLOSED SWITCH

Harold H. Fahnoe, Wilkinsburg, Pa., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Application August 19, 1950, Serial No. 180,430

6 Claims. (Cl. 200—114)

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This invention relates to electric switches, and more particularly to enclosed heavy duty switches for power line control.

An object of this invention is the provision of a simple, practical and reliable electrical switch which is easy to produce and is highly satisfactory in use.

Another object of this invention is that of providing an enclosed electric switch which serves to house and protect switch components thereof while maintaining either open-circuit or closed-circuit position as desired, and which may be operated to open the circuit and expose these components for setting to desired relation for enclosure.

A further object of this invention is the provision of an electric switch of the character noted in which the housed components are disconnected from the electrical supply when they are exposed.

Another object of the present invention is the provision of an electric switch having a housing including a door, which switch is capable of maintaining an open circuit or a closed circuit both with the housing door closed and of giving indication visible from outside the housing when an open circuit prevails.

A still further object of this invention is the provision of an electric switch of the character noted in which the door is operable for opening the switch circuit and for exposing components of the switch which may be set relative to each other so as to give either an open circuit or a closed circuit as desired when the switch door is closed.

Another object of the present invention is that of providing a door and switch terminal assembly suited for use in an electric switch of the character noted.

These and other objects of this invention will become more apparent upon consideration of the following detailed description of a preferred embodiment thereof, when taken in connection with the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view through an enclosed switch embodying this invention, with the door and terminal assembly of the switch occupying circuit-closing position;

Figure 2 is a side elevation of the door and terminal assembly shown in Figure 1, with the terminals disconnected and accordingly representing open-circuit position of the switch;

Figure 3 is a fragmentary view, partially in longitudinal section, depicting certain details of

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movable connector means in the door and terminal assembly represented in Figures 1 and 2;

Figure 4 is a side elevational view of the lower terminal member of the device;

Figure 5 is a front elevational view of the lower terminal member;

Figure 6 is a side elevational view of the locking tube;

Figure 7 is an end view of the locking tube;

Figure 8 is a fragmentary side elevational view of the lower inner surface of the door panel; and

Figures 9 and 10 are detail views of the rod-like locking member utilized in my improved switch.

Referring now more particularly to the embodiment of this invention illustrated in the drawings, the switch is preferably provided with an insulating housing 10 which may be of any desired insulating material, as for example, die-pressed porcelain. The housing 10 preferably has an open bottom and comprises a rear wall 11, a top wall 12, and opposite side walls 13. The rear wall 11 is provided with an inwardly extending protuberance 14 forming with the integral flange 14a a transverse baffle intermediate the ends of insulating casing 10. The protuberance 14, as shown, is provided with a cavity opening to the outer side of rear wall 11 adapted to receive one end of a mounting bracket 15 for supporting the casing, for example, from a cross-arm hanger 16, adapted to be secured to the bracket 15 by a bolt 17. Supporting bracket 15 is preferably secured in the cavity of protuberance 14 by cementing material 18, which may be any satisfactory type of cementing material, or may be a metal cast in the cavity around bracket arm 15.

Inside casing 10 there are provided upper and lower contact assemblies 20 and 30, respectively, secured in cavities in the inner surface of rear wall 11 of the casing. The upper contact assembly 20 includes a forwardly projecting contact strip 21 of any desired conducting material, such for example, as copper or the like, with a resilient backing strip 22 overlying conducting strip 21. The outer end of conducting strip 21 is preferably bifurcated, and the outer end of resilient backing strip 22 is preferably formed with three spaced tine portions, the outer ones of which overlie the furcations of contact strip 21, and the middle one of which is formed with a downwardly projecting end portion 23 adapted to project downwardly between the furcations of contact strip 21, to form a latch means for

engagement with the upper end of an upper terminal member 35. Similarly, the lower contact assembly 30 includes a contact strip 31 and resilient backing strip 32 overlying contact strip 31. The outer ends of strips 31 and 32 are preferably provided with an arcuate contact portion for receiving a tube 70 within casing 10.

The contact assemblies 20 and 30 are mounted in position in casing 10 by substantially U-shaped clamp members 40 having an enlarged bight portion for the reception of a line conductor, with a screw 41 threaded through an aperture in one wall of the bight portion to clamp the conductor therein. The contact and backing strips of each of the contact assemblies are received between the outer ends of the corresponding one of the U-shaped clamps 40, as is one leg of the corresponding angled supporting bracket 43. Securing means, such for example, as screws 44, are adapted to extend through one leg of each U-shaped clamp 40 and through apertures in the contact and backing strips, to be threadedly engaged in the other leg of each clamp 40. Each angled supporting bracket 43 is provided with a slot in the outer edge thereof for receiving an intermediate portion of the corresponding screws 44 so that the entire contact assemblies may be slipped off or on brackets 43 when screws 44 are loosened, and may be secured to the brackets merely by tightening screws 44 when the assemblies are in position. The other legs of angled brackets 43 are secured in depressions formed in the inner surface of rear casing wall 11, preferably in the same manner that supporting bracket 15 is secured in the cavity of protuberance 14.

A front side opening in casing 10 is adapted to be closed by a door 19 of insulating material, such for example, as porcelain, a synthetic resin, or the like. The door 19 of casing 10 comprises a door panel 80 having at the outer surface thereof an integral projection 81, extending outwardly and apertured, as at 82, for the reception of a hook stick operating member, or the like, for manipulation of the door to open and closed positions with respect to the main body of casing 10. Door panel 80 is suited at the inner side thereof for supporting a terminal assembly. This terminal assembly includes the upper and lower terminals 35 and 50, spaced from each other and individually corresponding to the upper and lower line contact assemblies 20 and 30 hereinbefore described, and further comprises movable connector means 90 for connecting and disconnecting the spaced terminals 35 and 50.

The door 19 is operative for bringing the spaced terminals 35 and 50 to position for engaging the corresponding line contact assemblies 20 and 30, and in the latter position the door closes the front of casing 10. Also, when desired, the door 19 may be brought to an open position relative to the front of the casing 10, thereby bringing the terminals 35 and 50 to open-circuit relation with respect to the line contact assemblies 20 and 30. Of further importance, the door is highly useful for closing the front of casing 10 without effecting closure of the circuit across the line contact assemblies 20 and 30. This use is made possible by virtue of the movable connector means 90 between the switch terminals 35 and 50, which connector means may be moved to disconnecting position relative to the terminals before the door 19 is closed. Thereafter, the door is operative to close the casing 10 to avoid exposure of the various switch components inside, including electrically conductive parts, and for protecting the housed parts against the effects of weather where outdoor use of the switch is had. Also, under these conditions, the movable connector means 90 remains inside the casing 10, protected against loss, and available at any time for use in again connecting the door-supported terminals 35 and 50 and thus rendering the switch operative for closing the circuit across the line contact assemblies 20 and 30.

As shown, the upper terminal 35 includes a substantially cylindrical terminal member 36, for example made of an electrically conductive material such as copper, a copper alloy, or the like. The top end surface of this terminal member 36 conveniently is formed by an integral projecting contact 37 for passing under and engaging in electrically conductive relation the upper line contact assembly 20. At the opposite end, the upper terminal member 36 has a reduced shank portion 38 threaded or otherwise suited for engaging the movable connector means 90. A contact 39 (see Figure 2), as in the form of an axially extending integral tip of the shank portion 38 of the upper terminal member 36, is provided for connection with the movable connector means 90.

The inner surface of the door panel 80 in the present embodiment is provided, intermediate the ends thereof, with spaced longitudinally extending integral ribs 83, adjacent the upper ends of which is an integral projection 84, apertured for the reception of the shank portion 38 of the upper terminal member 36. For assembly with the door 19, the shank 38 is inserted downwardly through the aperture in projection 84, until abutment of a shoulder on the terminal member 36, formed at the zone of reduction of diameter of the terminal member 36 to produce the shank 38, is achieved against the adjacent upper surface of projection 84. The shank 38 of upper terminal member 36 preferably is sufficiently long to produce a considerable run of threads beneath the projection 84 and to expose the tip contact 39. Integral upstanding brackets 85 are provided above projection 84 joining it to door panel 80, and they are joined by a curved wall portion to conform to the curvature of the upper terminal member 36. Also, one of the brackets 85 preferably is provided with a threaded aperture for receiving a set screw 86 to prevent removal of the terminal member 36 from projection 84, and set screw 86 conveniently is received in a side aperture in the upper terminal member 36.

In the embodiment illustrated, the connector means 90 includes a laterally inflexible conductor rod 91 (see Figure 3) having an end contact head 92, for abutment against, and separation from, tip contact 39 on the upper terminal member 36. This conductor rod 91 may be tubular and closed off at one end by the integral enlarged head affording the contact 92, and for example is made of copper, copper alloy, or the like. Surrounding the head 92 of conductor 91, and rotatable on the same, is a terminal engaging and disengaging element, such as an internally threaded nut 94 in which the threads correspond to those on the upper terminal member 36, for moving the contact 92 to and from pressure connection with the upper terminal member contact 39. Stop rings 95 and 96, which may have threaded outside edges engaging the threads interiorly within nut 94, are disposed in the bore of the nut 94 and occupy fixed positions on opposite sides of the conductor head 92, as by being cleated or clinched to the bore wall, thus to prevent longitudinal separation of the nut 94 and

conductor 91, and yet allow clearance for relative rotation of the same. In this, the stop ring 95 has an opening large enough to freely receive contact tip 39 of the upper terminal member 36 and admit free passage of this tip 39 to abutment against contact head 92 when nut 94 is tightened onto the threaded shank 38. The stop ring 96 likewise has an opening large enough to fully receive stem 91 of movable connector means 90, the stem passing substantially axially outwardly from the corresponding end of the nut 94, and affording an outer end which receives a flexible conducting lead or tail 97 of the connector means 90. The conducting tail 97 illustratively is a looped cable of twisted-together strands made of copper, copper alloy, or other satisfactory conducting material. In preferred practice the conducting tail 97 is doubled lengthwise to form an outside loop leaving its free inner ends passing side by side through the inside of tubular rod 91 to the head 92, and attached to the latter as by welding or integration at the time the head 92 is formed. The outer looped portion of the conducting tail 97 is conveniently connected with lower terminal 50 in a manner which will be more readily understood hereinafter.

As shown, door panel 80 is also provided at the inside surface with an integral apertured projection 87 (Fig. 3) adjacent the lower end thereof. Extending upwardly from projection 87 and integral therewith and with the door panel 80 are spaced brackets 88, joined by a curved connecting wall portion adapted to conform to the curvature of tube 70 upon the latter extending through the aperture in the projection 87 just mentioned, for locking the lower terminal 50 in place on the door 19. The lower terminal 50 of the door and terminal assembly includes a lower terminal member 51 removably associated with the door. This feature of removability in the present instance is achieved by the provision of a transverse slot or groove 89 in the inner surface of the door panel 80 intermediate the spaced brackets 88 for the reception of a curved rod-like locking member 100 (Fig. 9) having oppositely outwardly extending end portions 101 to form pintles adapted to extend outwardly through notches 102 formed in the brackets 88. The rod-like locking member 100 is itself maintained in position in groove 89 by the locking or overlying tube 70, and may readily be assembled in position merely by withdrawing the tube 70 from the aperture in projection 87, placing the rod-like member 100 in groove 89 and then inserting the tube back through the aperture in projection 87 so as to overlie the rod-like member 100.

The pintle portions 101 of member 100 are adapted to support lower terminal member 51 of the switch door assembly. As shown in the drawing, terminal member 51 comprises spaced side walls 52 apertured adjacent the upper ends thereof for the reception of pintle portions 101, respectively, and further includes an integral connecting wall 53 also located adjacent the upper ends of the side walls 52 for rigidly connecting the sides 52 of the terminal member 51. The lower portions of side walls 52 of the lower terminal member 50 are provided with slots 54 opening respectively to the forward edges thereof, and each slot being re-entrant at the inner end for receiving pivot pins 106 supported on the side walls 13 of the insulating casing 10.

By the provision of slots 54 in the terminal member 51, it will be seen that the terminal member 51 may be readily attached and detached with respect to the supporting pivots 106 by movement of the terminal member 51 to cause entrance or exit of supporting pins 106 into the slots 54. It will be noted that slots 54 in the terminal member 51 line up with notches 107 provided in opposite side edges of the door panel 80 to permit this terminal member 51, when assembled with the door 19, to be engaged or disengaged with pivot pins 106. Notches 107 in door panel 80 preferably are flared outwardly to facilitate easy entrance of pivot pins 106 into these notches 107 and slots 54 in the terminal member 51.

The upper end of the connecting wall 53 of the lower terminal member 51 comprises an integral extension 55 turned about 90° inward in advance of the upper ends of the terminal side walls 52 to form a contact terminal portion for engagement with contact strip 31 of the lower contact assembly 30 when the switch is in operative position. Preferably, the contact terminal portion 55 has an arcuate cut-out edge at the outer end thereof, similar to that at the outer end of contact strip 31 and resilient backing strip 32, to accommodate the tube 70.

The other end of lower terminal member 51, and more particularly the connecting wall 53 thereof, is extended beyond the corresponding ends of side walls 52 and bent angularly, for example, approximately at an angle of 45° to form a terminal portion 57 apertured adjacent the outer end thereof for the reception of a headed stud 58 for connection to the tail lead 97 of the movable connector means 90. A portion of the shank of headed stud 58, which is in the aperture of terminal portion 57 preferably is other than circular, as is also the aperture, for preventing relative rotative movement of the adjacent portions of the terminal portion 57 and stud 58. The stud 58 also includes an outer threaded portion for cooperation with a cup-shaped nut 59 having a base portion 60. Preferably stud 58 is made from square rod stock which is turned to produce threads on its outer portion and to produce the other than circular portion thereof corresponding to the other than circular aperture in the terminal portion 57. A washer member 61 is interposed between terminal portion 57 and nut 59 and is preferably secured to the nut 59 by integral tab portions of the washer being bent into a peripheral groove 62 in the outer surface of the nut in a loose manner to prevent relative separating movement of the washer and nut while permitting relative movement thereof. Washer 61 is provided with an aperture also non-circular in form, similar to the form of the inner portion of stud 58, so that upon rotation of the nut 59, washer 61 is moved longitudinally of the stud 58 with nut 59 but is prevented from rotating on the stud 58.

For assembling the lower terminal member 51 including the supported stud 58, nut 59 and washer 61 upon the door 19, it is but a simple matter to introduce the pintles 101 of rod-like locking member 100 into the apertures in side walls 52 of the lower terminal member 51. Thereafter, the lower terminal member 51 is seated to the position indicated in Figures 1 and 2 with the rod-like locking member 100 disposed in groove 89 in the panel 80. Locking tube 70 then is inserted upward from the bottom of door 19, as viewed in Figures 1 and 2, through the aperture in projection 87 of the door panel 80 and further upward over the rod-like locking

member 100. The lower end of tube 70 conveniently has an angular extension 71 bent upward, as on about a 45° angle, to overlie the inturned terminal portion 57, which supports the stud 58, nut 59 and washer 60.

This angular extension 71 preferably is in the form of a flat tab of sheet metal seating at one end in a chord-like slot (Fig. 6) cut into the lower end of tube 70 and welded, soldered or otherwise secured to the tube 70. Beyond the lower end of the tube 70, the tab 71 is bent upward so as to occupy a plane substantially parallel to the plane of terminal portion 57. The upper end of the tab 71 is bifurcated or notched to accommodate the stud 58, so that the extension 71 may be clamped between the outer surface of terminal portion 57 and the inner surface of washer 61.

Thus, by advancing the locking tube 70 upward over the rod-like locking member 100 the tube 70 becomes effective for retaining the rod-like element 100 against escape. Of further consequence, the lower terminal member 51 may be rotated on the pintles 101 of this rod-like element 100 to align the angular tab 71 for insertion between terminal portion 57 and washer 61 for the bifurcated end of the tab 71 to receive the stud 58. With further upward movement of the locking tube 70 the bifurcated end of the tab 71 receives the stud 58 and forces the terminal portion 57 inward toward the door panel 80 by rotation of the terminal member 51 on the pintles 101 of the bar-like locking member 100.

Tightening of the nut 59 and washer 61 down onto the underlying bifurcated end of angular tab 71 serves to clamp the tab 71 and accordingly the tube 70 in position indicated in Figures 1 and 2. Also, after being clamped in this position, in the manner just described, the locking tube 70 prevents rotation of the terminal member 51 on pintles 101 by virtue of extending through the aperture in projection 87 of the door panel 80 and because of being held against longitudinal withdrawal by the clamping action of nut 59 and terminal portion 57. The tube 70 restrains unitary escape of terminal member 51 and the rod-like element 100, by virtue of overlying the rod-like element 100 and being held in place by extending through the aperture in projection 87 of door panel 80.

It will be noted that the rod-like locking member 100 constitutes a locking extension or part extending from terminal member 51 and abutting against the sides of the groove 89 in panel 80 of door 19 to prevent relative endwise movement between door 19 and terminal member 51. Slidable locking means 70, guided by the aperture in projection 87, releasably engages the locking extension 100.

For adding the movable conductor means 90 to the switch door assembly, the flexible lead or tail 97 of this conductor means is introduced into the upper end of the bore of tube 70 and is pushed down the bore and out the lower end of the same. The lower portion of the lead or tail 97 thereafter is pulled and introduced to a point of connection with the lower terminal member 51, as by loosening the nut 59 sufficiently for inserting the tail 97 between washer 61 and tab 71 of the tube 70, and thereafter tightening the nut 59 so as to obtain firm connection of the tail 97 in this position. Where the lower end of tail 97 is in the form of a loop, this looped portion is conveniently pushed downwardly through the bore of tube 70 and pulled out a sufficient distance to pass over the upper portion of nut 59 and washer 61, and down on the stud 58 between the washer 61 and tab 71. Thereafter, the nut 59 is tightened toward the underlying portion of the lead or tail 97 to clamp the same against tab 71 and terminal portion 57.

Tail or lead 97 of the movable connector means 90 is long enough, once connected to the lower terminal portion 57 by nut 59, washer 61 and stud 58, to enable pull exerted on the stem 91, or upper terminal engaging and disengaging element 94, to bring the latter to the upper terminal member 36, the threads, for example, in the element 94 then being turned onto the corresponding threads on shank 38 of the upper terminal member 36 thus to bring the contacts 92 and 39 to firm abutment. Electrical connection accordingly is established between upper terminal member 36 and the lower terminal member 51. When connection between the upper and lower terminal members 36, 51 prevails, it is preferred that substantially all slack be out of the flexible lead or tail 97, thus for example rendering the front of switch door 19 or other portions of the switch casing 10 effective for concealing the lower portion of the lead or tail 97. This is achieved simply by making the length of the movable connector means 90 sufficient to assure that the flexible lead or tail 97 will be drawn upwardly through tube 70, removing slack, when the upper terminal engaging and disengaging portion 94 is brought to engagement with the upper terminal member 36. The substantial concealment of the lead or tail 97 in the manner indicated is useful for denoting that the upper and lower terminal members 36 and 51 of the switch are electrically connected by the movable connector means 90.

In the connected relation of the several elements just mentioned, the lower end of stem 91 of the movable conector means 90 conveniently remains inside the upper end of tube 70 for guidance by the latter when it is desired to disconnect the movable connector means 90 from the upper terminal member 36. Disconnection in the present instance is readily achieved by reverse rotation of the upper terminal engaging and disengaging portion 94 thus, for example, backing off the threads thereof from the corresponding threads of the shank 38 and separating contacts 39 and 92. Once this disconnection has been achieved, the movable connector means 90 may be moved back from the upper terminal member 36, this movement, for example, being guided by stem 91 moving farther and farther into tube 70. The advancement of stem 91 into the tube 70 introduces slack to the flexible lead or tail 97, and this slack conveniently passes through the open bottom of casing 10 and becomes visible from the exterior to indicate disconnection of the upper and lower terminals 35 and 50 of the switch and the fact that the switch is in open-circuit position. The movable connector means 90 preferably is positively supported to the switch door 19 a safe distance away from the upper terminal 35 of the switch, as by engaging the threads of the upper terminal engaging and disengaging portion 94 with corresponding threads provided on the upper end of tube 70. The positive securement of the movable connector means 90 to the switch door 19, as in the manner indicated, prevents accidental displacement of the connector element 94 back to circuit-closing position with respect to upper terminal member 36.

Thus it will be seen that the door 19 and the terminal and switching assembly supported by

the same are readily attached to the pins 106 on the casing side walls 13, by moving the door and notches 107 therein, and the lower terminal member 51 and slots 54 therein, to receive the pins 106 when the door is in an open position. The pins 106 finally seat in the re-entrant ends of the slots 54 in lower terminal member 51 and thus prevent escape of the door 19 and form a pivot for the door and the switching assembly mounted thereon. Upward rotation of the door 19 to the position indicated in Figure 1 brings contact 37 of the upper terminal member 36 to engage beneath the line contact 21, the latter being urged to electrical conductive relation with the contact 37 by the associated backing strip 22. Also, contact portion 55 of the lower terminal member 51 moves under line contact 31, which is urged to firm electrical connection with the contact 55 by the associated backing strip 32. With connector means 90 interconnecting the upper and lower terminal members 36 and 51, as indicated in Figure 1, an electrical path may be traced from lower line contact 31, lower terminal member 51 of the switch door 19, flexible lead or tail portion 97 of movable connector means 90 and on through the connecting means 99 to upper terminal member 36 of the switch door 19 and upper line terminal 20. In this position of the movable connector means 90, it will be seen that substantially all of the slack is gone from the flexible lead or tail 97 to indicate closed-circuit condition of the switch. Of course, with the switch door 19 closed and the movable connector means 90 occupying the open circuit position, indicated in Figure 2, the electrical path just traced is open at the movable connecting means 99, and line contact assemblies 29 and 39 of the switch thus are disconnected. In the latter position, it will be seen that a considerable amount of slack exists in the flexible lead or tail 97 to give a visible external indication that the line terminals 20 and 30 are disconnected within the switch. In either of the positions represented in Figures 1 and 2, the inner parts of the switch are protected by the casing 10 and the closed door thereof.

With the switch in closed position represented in Figure 1, opening of the switch door 19 by rotation of the same on pins 106 serves to withdraw upper terminal member 36 from connection with upper switch contact 21, and thus the path between line contact assemblies 29 and 39 is opened. When door 19 is open, this door and the switch components supported thereon may be bodily lifted from the pins 106, if desired, to detach the same from the rest of the casing 10 and the switch components supported by the latter. Adjustments of the movable connector means 90 to or from circuit-closing position relative to upper and lower terminal members 36 and 51, accordingly, are conveniently made without danger of shock before once again placing the door back on pins 106. Instead, if desired, adjustment of the movable connector means 90 may be had merely by opening the door 19 for access to the movable connector means without removal of the door from pins 106. In the open position of door 19, contacts 31 and 55 are separated, and so are the contacts 21 and 37 and, therefore, the terminals 35 and 50 and the movable connector means 90 may be handled without sustaining electrical shock.

Many of the parts of the switch disclosed, such as housing 10, its contacts 20 and 30, as well as parts of the door and terminal 50, are identical with the like parts of the fuse disclosed in H. L. Rawlins Patent 2,359,153. One reason for this is that a door carrying a fuse, as in the Rawlins patent, will be interchangeable with the switch door 19 illustrated herein.

Having described a preferred embodiment of the invention in accordance with the patent statutes, it is desired that the invention be interpreted as broadly as possible, and that it be not limited to the particular embodiment disclosed inasmuch as it will be obvious, particularly to persons skilled in the art, that many modifications and changes may be made in the particular embodiment without departing from the broad spirit and scope of the invention. Accordingly, it is desired that the invention be interpreted as broadly as possible and that it be limited only by what is expressly set forth in the following claims and by the prior art.

I claim as my invention:

1. In a door and switch terminal assembly for an enclosed disconnecting switch, a casing door member, a switch terminal member, means for keying said members against relative endwise movement and including a key extension from one of said members abutting the other of said members to arrest said relative endwise movement, and slidable key-securing means guided on one of said members for movement to and from position of releasable connection with the other of said members and of releasably engaging said key extension, respectively to interlock said members against relative transverse separation and to free the same for said separation.

2. In a door and switch terminal assembly for an enclosed disconnecting switch, a casing door member, a switch terminal member, means for interlocking said members against relative endwise movement and including a key extension from one of said members and abutting the other of said members to arrest said relative endwise movement, a slidable key-securing tube guided on said door member for movement to and from position of releasable connection with said terminal member and of releasably engaging said key extension, respectively to interlock said members against relative transverse separation and to free the same for said separation, a flexible disconnecting lead extending through said tube from said terminal member and having a contact at the opposite end thereof, a second terminal member mounted on said door member and adjacent said contact end of the lead, and means for connecting and disconnecting said contact on the lead and said second terminal respectively for connecting and disconnecting said terminals.

3. In a door and switch terminal assembly for an enclosed disconnecting switch, a casing door member, a switch terminal member, means for interlocking said members against relative endwise movement and including a key extension from one of said members and abutting the other of said members to arrest said relative endwise movement, a slidable key-securing tube guided on said door member for movement to and from position of releasable connection with said terminal member and of releasably engaging said key extension, respectively to interlock said members against relative transverse separation and to free the same for said separation, a flexible disconnecting lead extending through said tube from said terminal member and having a contact at the opposite end thereof, a second terminal member mounted on said door member and adjacent said contact end of the lead, and means ro-

tatably connected with the contact end of said disconnecting lead for engaging said second terminal and said tube respectively for connecting and disconnecting said terminals.

4. In a door and switch terminal assembly for an enclosed disconnecting switch, a casing door member, a switch terminal member, means for keying said members against relative endwise movement and including a part retained by said terminal member and seated in a groove in said door member to arrest said relative endwise movement, and slidable key-securing means guided on one of said members for movement to and from position of releasable connection with the other of said members and of releasably engaging said part, respectively to key said members against relative transverse separation and to free the same for said separation.

5. In a door and switch terminal assembly for an enclosed disconnecting switch, a casing door member, a first switch terminal member, means for interlocking said members against relative endwise movement and including a key extension from one of said members and abutting the other of said members to arrest said relative endwise movement, a slidable key-securing tube guided on one of said members for movement to and from position of releasable connection with the other of said members and of releasably engaging said key extension, and a flexible disconnecting lead extending through said tube from connection with said first switch terminal member and having a contact at the opposite end thereof, a second switch terminal member mounted on said door member spaced away from said first switch terminal member and away from the far end of said tube from the latter terminal member, and means for connecting and disconnecting the contact end of said flexible disconnecting lead with said second switch terminal member and with the far end of said tube from the first terminal member to close and open connection across said terminals, said flexible lead being of such length and movable through said tube as to have slack between said first switch terminal member and said tube upon said terminals being disconnected and to substantially dissipate the slack upon said terminals being connected.

6. A switch including a casing having an opening therein, a door for closing said opening, spaced line contacts disposed inside said casing and secured thereto, spaced terminals secured to said door and movable therewith, the spaced terminals cooperating with the spaced line contacts to engage and disengage respectively upon closing and opening the door, a laterally inflexible conducting rod slidably supported on said door for movement to and away from bridging relation with respect to said terminals, a flexible connection for electrically connecting one end of the rod at all times with one of the spaced terminals on the door, and means detachably connecting the other end of the rod to the other spaced terminal on the door.

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