Dec. 9, 1952 S. I. LINDELL 2,621,271

SWITCH CONSTRUCTION

Filed Jan. 20, 1948 4 Sheets-Sheet 1

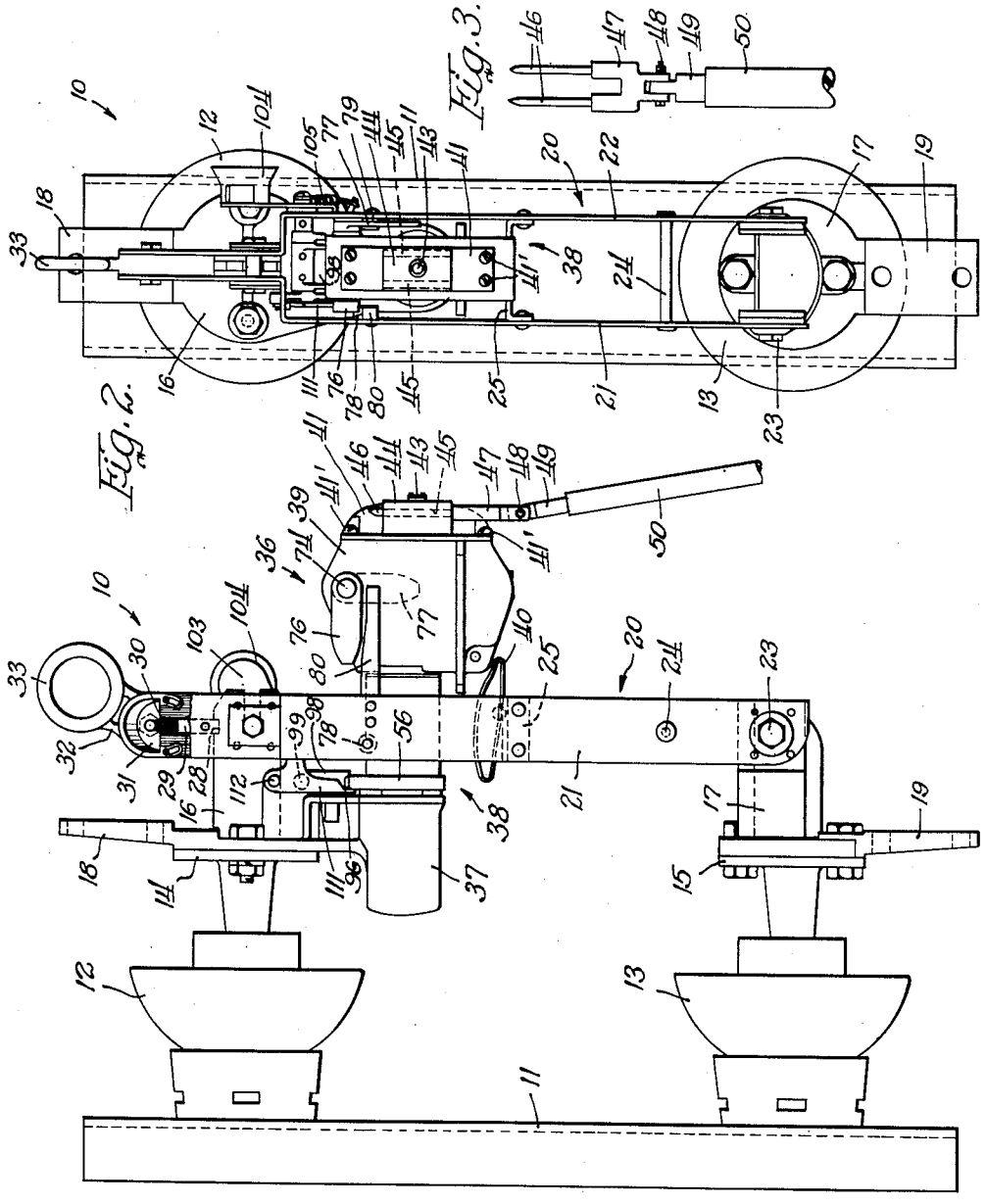


Fig. 1.

Inventor:
Sigurd I. Lindell.
By Brown, Jackson, Boettcher & Dienner
Atty's.

Dec. 9, 1952 S. I. LINDELL 2,621,271

SWITCH CONSTRUCTION

Filed Jan. 20, 1948 4 Sheets-Sheet 2

Fig. 4.

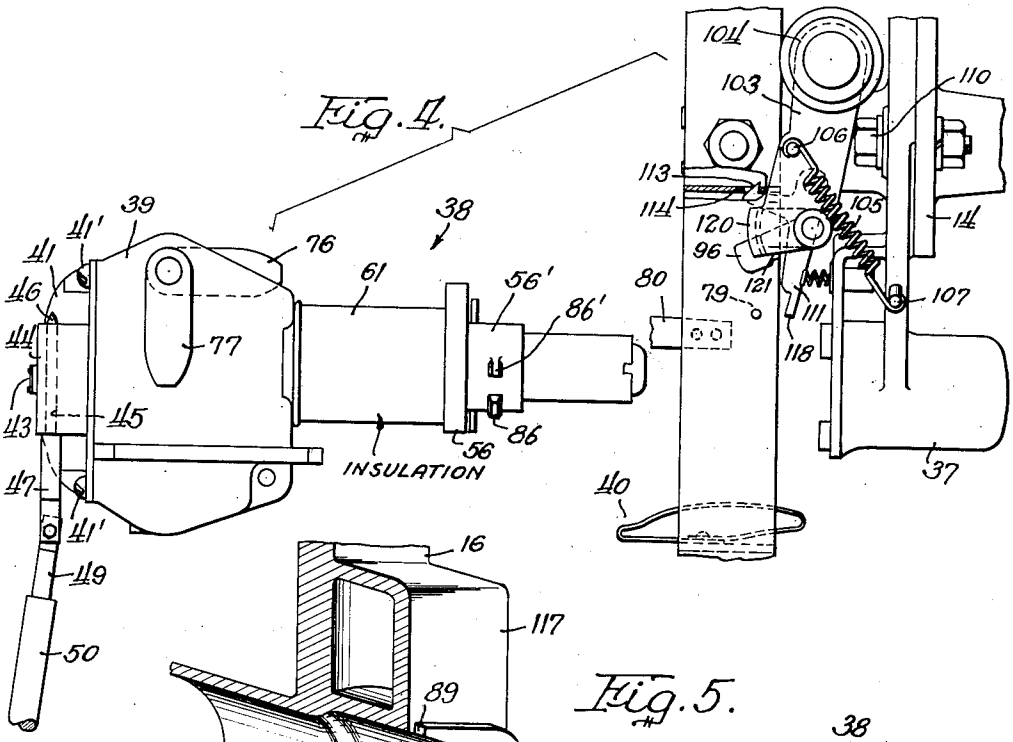



Fig. 5.

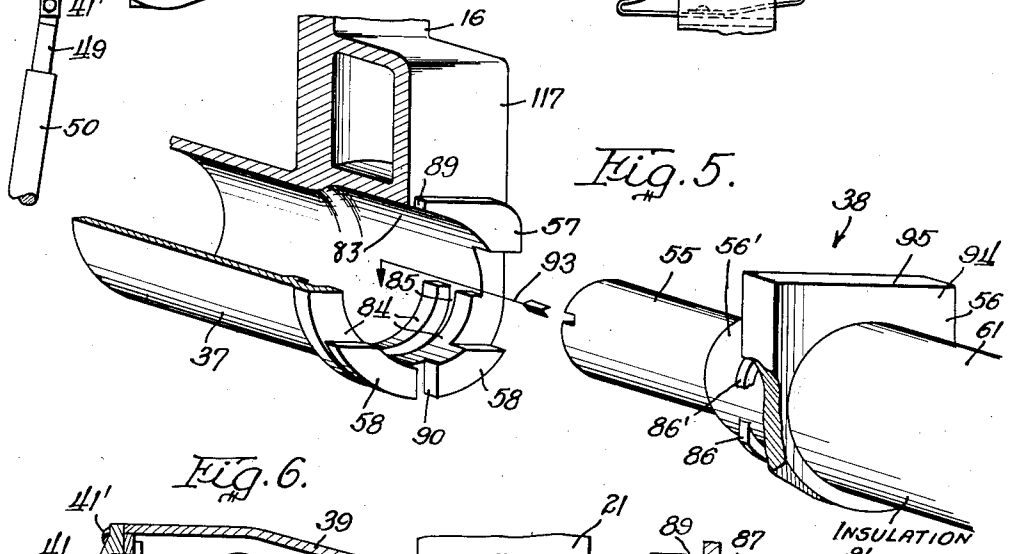
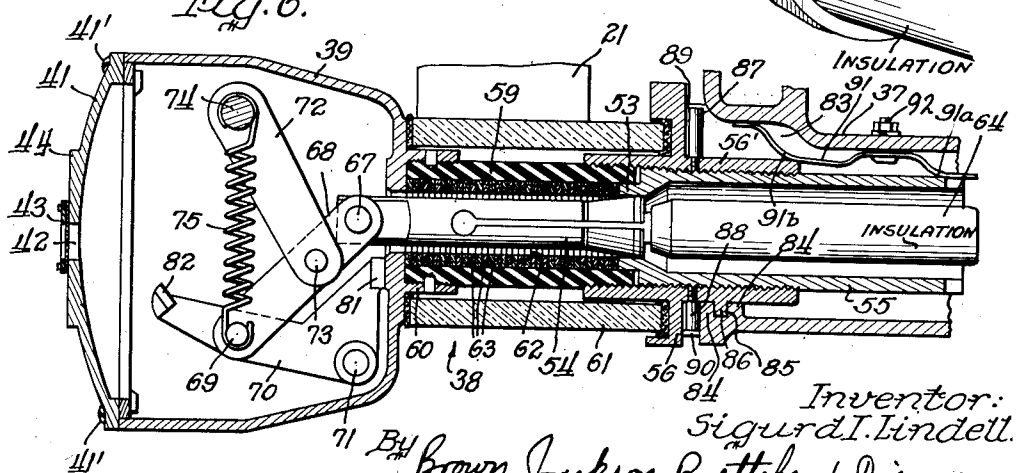



Fig. 6.




Inventor:
Sigurd I. Lindell.
By Brown, Jackson, Boettcher & Dienner
Attys.

Dec. 9, 1952 S. I. LINDELL 2,621,271

SWITCH CONSTRUCTION

Filed Jan. 20, 1948 4 Sheets-Sheet 3

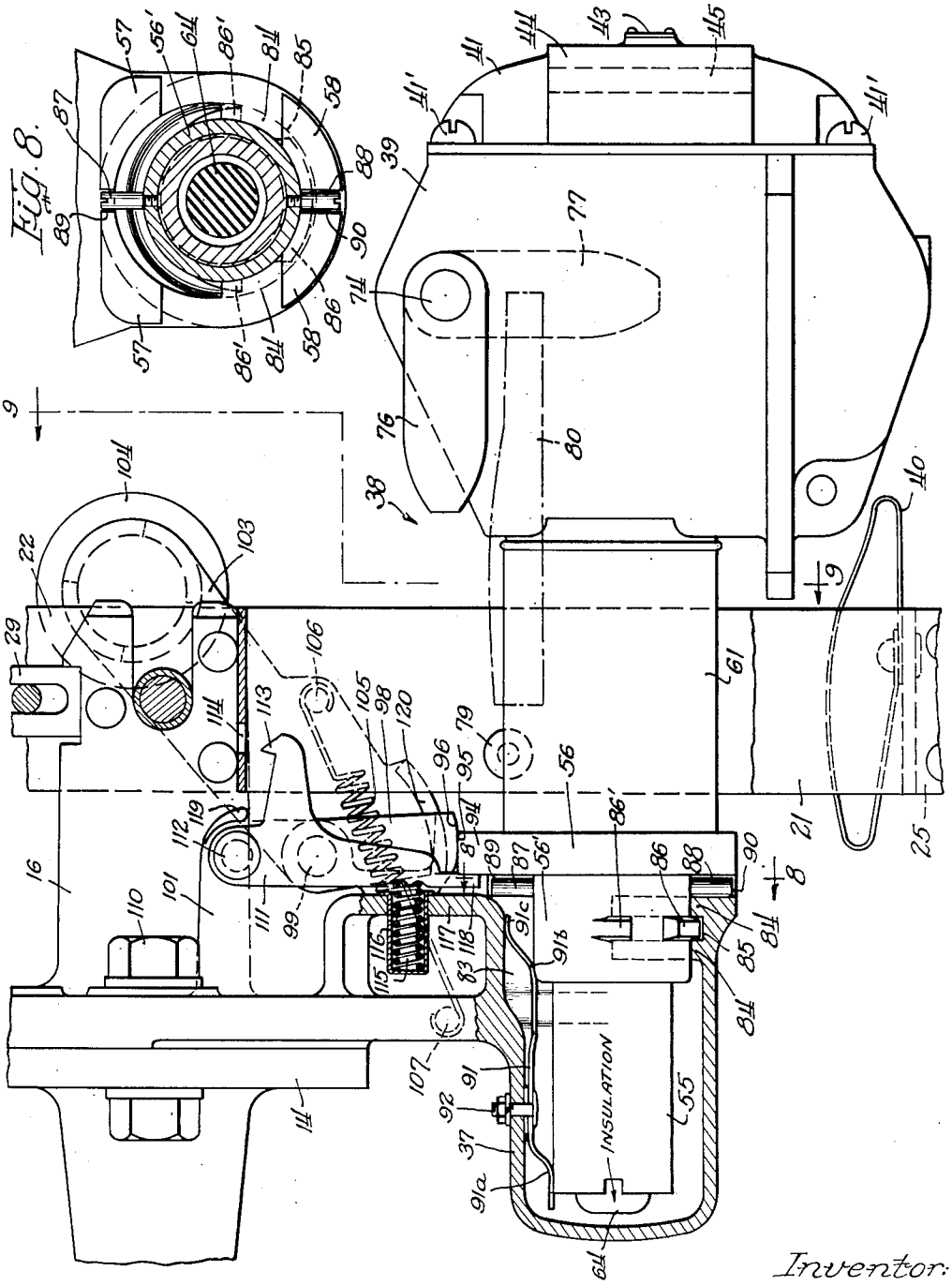



Fig. 8.

Fig. 7.

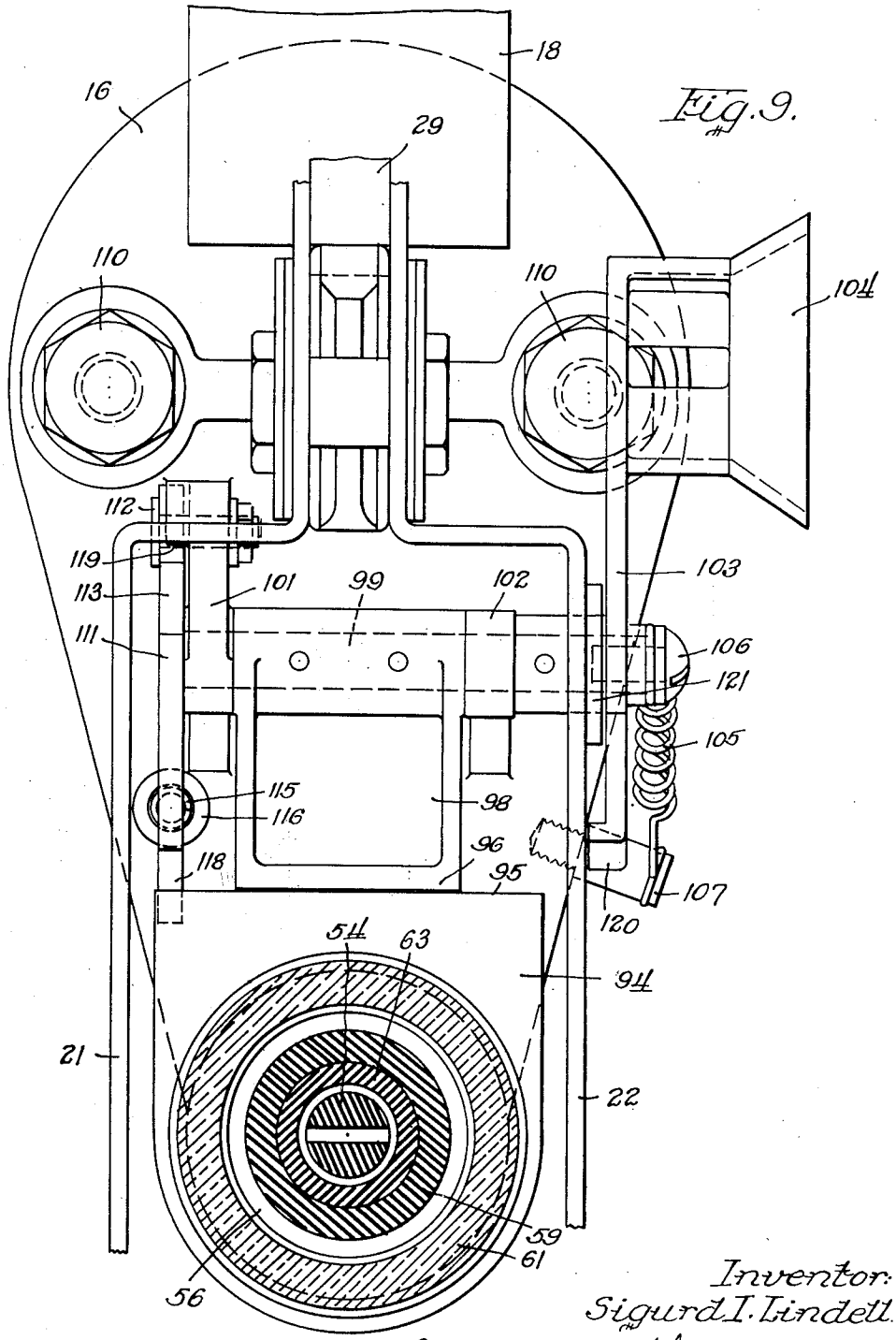
Inventor:
Sigurd I. Lindell.
By Brown, Jackson, Boettcher & Dienner
Attys.

Dec. 9, 1952 S. I. LINDELL 2,621,271

SWITCH CONSTRUCTION

Filed Jan. 20, 1948 4 Sheets-Sheet 4

Fig. 9.




Inventor:
Sigurd I. Lindell.

By Brown, Jackson, Boettcher & Dinner
Attys.

Patented Dec. 9, 1952

2,621,271

# UNITED STATES PATENT OFFICE

2,621,271

## SWITCH CONSTRUCTION

Sigurd I. Lindell, Chicago, Ill., assignor to S & C Electric Company, Chicago, Ill., a corporation of Delaware

Application January 20, 1948, Serial No. 3,221

6 Claims. (Cl. 200—146)

1

My invention relates, generally, to switch constructions and it has particular relation to disconnecting switches for electric power distribution circuits operating at and above 2300 volts. More particularly it has to do with improvements in the switch construction disclosed in Patent No. 2,351,826, issued June 20, 1944, to Lindell et al., which is assigned to the assignee of this application.

In the switch construction in this patent there is provided a pair of stationary switch contacts which are arranged to be interconnected by a switch blade. This constitutes a common form of disconnecting switch which has been used widely in the industry. It is often desirable to employ a switch of this type for interrupting the flow of load current or to interrupt the flow of line charging current or for other purposes. Since these switches are employed in circuits which are operated at relatively high voltages, a substantial amount of power is required to be interrupted by the switch. The arc which is incident to such circuit interruption is likely to injure the switch blade and the stationary switch contact from which it separates unless steps are taken to prevent the formation of an arc between these parts. In accordance with the patent a load break device is mounted on the switch contact which is engaged and disengaged by the switch blade. The load break device constitutes an integral part of the switch and is arranged in cooperation with the switch blade to carry the full load current when the switch blade is moved out of engagement with the stationary switch contact. Thereafter, on continued movement of the switch blade to the open position, the load break device is capable of interrupting the flow of load current therethrough and extinguishing the arc incident thereto. No arc is drawn between the switch blade and the stationary contact and, as a result, their functioning is unimpaired.

It has been found that it is desirable to inspect, service or replace the load break device after it has been in use for some time, particularly where it has been called upon to interrupt the flow of load current at frequent intervals. In the construction shown in the patent, it is necessary ordinarily to deenergize the switch and open the switch blade in order to do the required work on the load break device. This is undesirable since it requires that the circuit in which the switch is connected be deenergized with the consequent loss of service of this particular circuit until the switch is replaced.

Accordingly, among the objects of my invention are: To construct the load break device and its mounting in the switch so that the former can be removed bodily from the latter for inspection, servicing, replacement or the like while the switch blade is closed and the switch is energized at rated line voltage; to employ a plug and socket arrangement to enable the quick detachment and replacement of the load break device; to employ remotely operable clamp mechanism for mechanically and electrically holding the load break device in operative position or releasing it from the same; to interlock the clamp mechanism and the switch blade in such manner as to prevent opening of the latter if the former is in the non-clamping position; to interlock the switch blade and one of the stationary switch contacts from which it separates to open the circuit so as to prevent such separation in the absence of the load break device; and to provide means on the load break device for receiving a switch stick or other hot line tool so as to facilitate the removal of the load break device or replacement of the same while the switch is energized.

2

Other objects of my invention will, in part, be obvious and in part appear hereinafter.

My invention is disclosed in the embodiment thereof shown in the accompanying drawings and it comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of my invention reference may be had to the following detailed description, taken together with the accompanyiny drawings, in which:

Figure 1 is a view, in side elevation, of a disconnecting switch constructed in accordance with my invention and having a load break device which can be removed for servicing, inspection, replacement or the like while the switch is closed or, if open, with the switch contact on which the load break device is mounted continuously energized;

Figure 2 is a view, in front elevation, of the switch construction shown in Figure 1;

Figure 3 is a view, in front elevation, of the upper portion of a manipulating tool which can be employed for removing the load break device shown in Figures 1 and 2 and replacing it while the switch or parts thereof are energized;

Figure 4 is a view, at an enlarged scale, showing how the plug portion of the load break de-

vice can be removed bodily from its cooperating socket which forms a part of one of the switch contacts;

Figure 5 is a view, partly in perspective and partly in section, illustrating how the plug portion of the load break device can be inserted in the cooperating socket portion of the device;

Figure 6 is a longitudinal sectional view showing the details of construction of the load break device;

Figure 7 is a view, at an enlarged scale, partly in side elevation and partly in section, showing the plug portion of the load break device mounted in operative position on its cooperating socket;

Figure 8 is a detail sectional view taken along the line 8—8 of Figure 7; and

Figure 9 is a detail sectional view taken generally along the line 9—9 of Figure 7.

Referring now particularly to Figures 1 and 2 of the drawings, it will be observed that the reference character 10 designates, generally, a disconnecting switch constructed in accordance with my invention. It includes a suitable mounting such as a channel iron base 11 which may carry pin-type insulators 12 and 13. They, in turn, carry support members 14 and 15 which, at their outer ends, serve to mount switch contacts 16 and 17 that have line terminal pads 18 and 19 integral therewith to facilitate connection to the line conductors as will be understood readily.

The stationary switch contacts 16 and 17 may be interconnected by a switch blade which is indicated, generally, at 20. The switch blade 20 includes a pair of blade members 21 and 22 which may be mounted at one end by a hinge bolt 23 to permit swinging of the switch blade 20 relative to the switch contact 17 so as to engage and disengage the upper switch contact 16. The switch blade members 21 and 22 may be spaced apart intermediate their ends by a pin 24 and a bracket 25.

It will be noted that the switch contact 16 has a slot 26 in its upper edge for receiving a bolt 29 that serves to lock the switch blade 20 in the closed position. The bolt 29 is biased to the locking position by a coil compression spring 30. The bolt 29 has a head 31 which cooperates with a latch lever 32 that is rockably mounted on the upper end of the switch blade 20. A pull ring 33 is formed integrally with the latch lever 32 and is arranged, in accordance with conventional practice, to be engaged by a prong of a hook stick for operating the switch blade 20 from and to the switch closed position. When the latch lever 32 is rocked from the position shown in Figure 1 through a slight extent, the head 31 is lifted and therewith the bolt 29 to withdraw the same from the slot 28 and permit the switch blade 20 to be moved out of the switch closed position or into the same as the case may be provided that the switch blade 20 is free of certain interlocking means to be described.

For the reasons set forth hereinbefore, it is undesirable to move the switch blade 20 to the open position while load current is flowing through the switch 10. If an attempt is made to open the load current when the switch is connected in a circuit energized at a relatively high voltage, the resulting arc may damage the switch blade 20 and the switch contact 16 from which it separates and also the arc may be of such a nature as to jump to an adjoining piece of electrical apparatus and cause a fault on the system. In order to avoid the formation of such an arc in the air and to prevent any arc being formed between



the switch blade 20 and the stationary switch contact 16, a load break device, indicated generally at 36, may be provided. The load break device 36 disclosed herein is of the same general type and character as disclosed in Patent No. 2,351,826, referred to hereinbefore. However, as will appear presently, the construction of the load break device 36 is such that the operating mechanism thereof can be removed bodily from connection to the stationary switch contact 16 even though it or the switch blade 20 is energized at line voltage.

In accordance with my present invention, a socket 37 or cap member is formed integrally with the upper stationary switch contact 16 and it is arranged in a manner to be described presently for receiving a plug that is indicated, generally, at 38 which constitutes the mechanism of the load break device 36. It will be understood that the plug 38 not only includes the particular portion which is arranged to engage and disengage the socket 37 but also it includes the separable contacts, arc extinguishing means and operating mechanism employed for controlling the movement of the separable contacts of the load break device 36.

The plug 38 also includes a metallic housing 39 which is arranged to be engaged by a bow contact 40 that is carried by the bracket 25. The bow contact 40 is employed to place the load break device 36 in parallel circuit relation with the switch blade 20 and the upper stationary switch contact 16. This circuit is maintained after the switch blade 20 moves out of engagement with the switch contact 16, at which time the entire load current is carried by the load break device 36. Subsequently the load break device 36 operates, as will be described hereinafter, to interrupt the flow of this current. Further movement of the switch blade 20 toward the open position causes the bow contact 40 to move out of engagement with the housing 39.

It will be observed that the housing 39 has a cover 41 which may be secured in position by screws 41'. As shown in Figure 6 the cover 41 has a central opening 42 that may be covered by a screen 43. A boss 44 is located centrally on the cover 41 and, as shown in Figure 2, it has apertures 45 extending longitudinally thereof for receiving tines 46 of a fork 47 that may be held in proper position by a clamp bolt 48 on a fitting 49 carried by the upper end of an insulated handle 50 It will be understood that the operator can manipulate the handle 50 which, with the fork 47, constitutes a tool for moving the plug 38 of the load break device 36 into or out of operative position with respect to the socket 37.

The internal details of construction of the load break device 36 are shown more clearly in Figure 6 of the drawings. It will be observed that it includes a stationary contact 53 and a movable contact 54. The stationary contact 53 is cylindrical in form and has an extension 55 which projects into the socket or cap 37 which, it will be recalled, is formed integrally with the upper stationary switch contact 16. The extension 55 is provided to direct the high temperature products of the arc drawn between the contacts 53 and 54 in an indirect path through the socket 37 and out to the atmosphere along which path they may be cooled to below a temperature which may be dangerous. The stationary contact 53 is threaded into an annular fitting 56 which, as shown more clearly in Figure 5, is arranged to abut bosses 57 and 58 that are formed integrally

with the socket 37 and makes electrical contact therewith to complete the circuit to the upper stationary switch contact 16.

A tube 59 of insulating material is threaded into one end of the annular fitting 56 and also into a sleeve 60 that is formed integrally with the housing 39. Surrounding the insulating tube 59 is a weatherproof sleeve 61 of suitable insulating material such as porcelain. The movable contact 54 is arranged to move in a cylindrical opening 62 that is formed in a stack of washers 63 of a material, such as fiber, which is capable of evolving an arc extinguishing medium A trailer or plug 64 of insulating material, also capable of evolving an arc extinguishing medium, is secured to the movable contact 54 and moves conjointly therewith into the cylindrical opening 62 in the washers 63 so that the arc is confined between the outer surface of the plug 64 and the inner surface of the cylindrical opening 62, the arc being drawn between the adjacent portions of the contacts 53 and 54 as will be understood readily

The mechanism for operating the movable contact 54 and the plug 64 is positioned within the housing 39. A pin 67 extends through the movable contact 54 and rockably mounts a link 68 thereon which, in turn, is rockably mounted by a pin 69 on a link 70. The link 70 is pivoted at 71 on the housing 39. A link 72 is connected by a pin 73 to the link 68. The link 72 also is mounted on a rock shaft 74 and is fast thereon so that, when the shaft 74 is rocked, the link 72 is moved correspondingly to effect a corresponding movement of the movable contact 54. A coil tension spring 75 extends between the shaft 74 and the pin 69 and serves to bias the movable contact 54 to either the closed or the open position as the case may be; the spring 75 functioning as a part of an over center mechanism that is made up by the links 68, 70 and 72 interconnected in the manners described.

It will be observed that the rock shaft 74 extends through the housing 39 and that its ends project beyond the same for receiving operating levers 76 and 77 which are shown more clearly in Figures 1 and 2 of the drawings.

The operating levers 76 and 77 are arranged to be moved by detents 78 and 79, respectively, which are carried by the blade members 21 and 22, respectively, and project inwardly from the same. It will be understood that, when the switch blade 20 is moved from the switch closed position to the open position, the detent 79 engages the operating lever 77 and rocks the shaft 74 so as to move the contact 54 out of engagement with the stationary contact 53, Figure 6, to interrupt the current flowing in the circuit therebetween. Such movement of the shaft 74 swings the operating lever 76 to its alternate position where it can be engaged by the detent 78 when the switch blade 20 is closed. The continued movement of the switch blade 20 toward the closed position causes the detent 78 to engage the operating lever 76 and rock the shaft 74 in a direction to move the contact 54 forwardly in the cylindrical opening 62 and into engagement with the stationary contact 53.

A lock member 80 is secured to the blade member 21 and, as shown in Figure 1, extends underneath the operating lever 76 when the switch blade 20 is in the closed position. The function of the lock member 80 is to prevent accidental operation of the load break device 36 to the open position such as might occur if the shaft 74 were rocked by means other than the switch blade 20. This prevents opening of the switch blade 20 without shifting the load current to the load break device 36 for interruption by it. The lock member 80 is of sufficient length so as to prevent the insertion of the plug 38 into the socket 37 in the event that an attempt should be made to apply the plug 38 with the load break device 36 in the open rather than in the closed position when the switch blade is closed. That is, if the load break device 36 is in the open position and an attempt is made to insert the plug 38 in the socket 37, the outer end of the lock member 80 will engage the operating lever 76 and prevent proper engagement between the plug 38 and socket 37. When the switch blade 20 is closed, it is possible to insert the plug 38 in the socket 37 only when the load break device 36 is in the closed position as shown in Figure 6.

It is desirable to limit the movement of the contact 54 in either the closed or the open positions. For this purpose a pad 81 is formed integrally on the link 70 and it is arranged, as shown in Figure 6, to engage the inner surface of the housing 39 for limiting the movement of the contact 54 in the closed position. A shoulder 82 is provided on the link 70 for engagement by one edge of the link 68 to limit the movement of the contact 54 toward the open position.

Referring particularly to Figures 6 and 7 of the drawings, it will be observed that the socket 37 is recessed at 83 to provide for receiving the portion 56' of the annular fitting 56 which extends into the socket 37 while the plug 38 is being inserted. The lower inner surface of the socket 37 has arcuate ribs 84 which are shown best in Figure 5. The ribs 84 provide an arcuate slot 85 therebetween. Integrally formed with the portion 56' of the annular fitting 56 that extends into the socket 37 are rib sections 86 and 86' which are arranged to interfit with the arcuate slot 85 located between the ribs 84. The rib sections 86 and 86' are separated and shaped so as to reduce the depth of the recessed portion 83 or the extent of movement of the plug 38 which must be made radially in locating the same in the socket 37 or removing it therefrom.

In Figures 6 and 8 of the drawings, it will be noted that pins 87 and 88 extend radially from the portion 56' of the annular fitting 56 into slots 89 and 90 between the bosses 57 and 58. This construction is provided to prevent the plug 38 from turning axially with respect to the socket 37.

As shown in Figures 6 and 7 of the drawings a leaf spring 91 is held in place within the socket 37 by a bolt 92. One end 91*a* of the spring 91 bears against the adjacent end of the extension 55 to hold the plug 38 in position after the fork 47 of the tool has been withdrawn and before it is clamped in position. An intermediate portion 91*b* of the spring 91 bears against the portion 56' of the fitting 56 to hold the rib sections 86 and 86' in the slot 85 when the tool is withdrawn. The end 91*c* of the spring 91 bears against the surface of the recessed portion 83 of the socket 37, as shown, to reenforce the action of the spring 91 just described.

As shown in Figure 5, the plug 38 is inserted in the socket 37 as indicated by the arrow 33. Initially the plug 38 is moved so that its longitudinal axis is spaced slightly above the longitudinal axis of the socket 37. When the annular fitting 56 has been moved inwardly sufficiently far so that the rib sections 86 and 86' register with

the arcuate slot 85 between the ribs 84, the inner face of the annular fitting 56 engages the bosses 57 and 58 and the spring 91 is engaged, as described, the plug 38 is moved downwardly, as indicated by the forward end of the arrow 93 to place the plug 38 in operative position. The axial alignment is provided by the pins 87 and 88 entering the slots 89 and 90. The tool, shown in Figures 1 and 3, which is used to manipulate the plug 38 now is removed.

Referring particularly to Figures 7 and 9 of the drawings, it will be noted that the annular fitting 56 has a projecting portion 94 which is provided with a flat top 95 that is arranged to be engaged by a cam 96 at the outer end of an arm 98 which is fast on a shaft 99. The shaft 99 is rockably mounted in bearing bosses 101 and 102 and it has an operating arm 103 fast on one end which is provided with a bell mouth 104 in which the prong of a switch stick can be inserted for rocking the arm 103 and thereby the shaft 99 from the position shown in Figures 7 and 9 of the drawings to the position shown in Figure 4. An over center spring 105 serves to hold the operating arm 103 in either of its extreme positions. The spring 105 is strained between a screw 106 on the operating arm 103 and a pin 107 which extends from the bottom plate of the stationary switch contact 16. The movement of the arm 102 in the unclamping direction may be limited by engagement with the head of one of the bolts 110 which serves to clamp the stationary switch contact 16 to its associated support member 14.

It is desirable to prevent opening of the switch blade 20 in the event that the load break device 36 is not in operative position. The reason for this, of course, is to prevent injury to the switch blade 20 and upper stationary switch contact 16 or flashover to adjacent electrical apparatus as described. For this purpose a latch 111, Figures 4, 7 and 9, may be employed. The latch 111 may be rockably mounted on a bolt 112 which extends through the bearing boss 101. It has a nose portion 113 that is arranged to engage an opening 114 in the blade member 21 for locking the switch blade 20 against movement to the open position. The latch 111 may be biased to the latching position by a coil compression spring 115 that may be located in a socket 116 which projects through a flange 117 of the stationary switch contact 16. The spring 115 reacts against the under side of a tail extension 118 which, as shown in Figure 7, projects into the path of the portion 94 of the annular fitting 56. As long as the plug 38 of the load break device 36 is in operative position, the projecting portion 94 holds the tail extension 118 in the position shown in Figure 7 with the spring 115 compressed and the nose portion 113 out of engagement with the opening 114 in the blade member 21. Now, when the plug 38 of the load break device 36 is moved out of the socket 37, the tail extension 118 no longer is restrained and the spring 115 rocks the latch 111 to position the nose portion 113 in the opening 114. This securely locks the switch blade 20 in the closed position and prevents accidental opening thereof in the absence of the plug 38 of the load break device 36.

In the event that the switch blade 20 is opened and thereafter the plug 38 of the load break device 36 is removed, it is desirable to limit the movement of the latch 111. For this purpose a stop 119, Figure 7, is formed integrally with the bearing boss 101 so that the movement of the latch 111 as urged by the spring 115 is limited when it is engaged.

In order to prevent opening of the switch blade 20 when the plug 38 is in position but the arm 103 is in the unclamped position, as shown in Figure 4, the arm 103 has a hook portion 120, Figure 9, which cooperates with a detent 121 on blade member 22. When the arm 103 is in the position shown in Figure 4, the hook portion 120 cooperates with the detent 121 to prevent opening of the switch blade 20.

It will be apparent now that the present invention permits bodily removal of the plug 38 of the load break device 36 from the switch construction without requiring that the switch blade 20 be moved to the open position or that the disconnecting switch 10 or any part thereof be deenergized. The advantages of this are obvious.

When the operator desires to remove the plug 38 of the load break device 36 for inspection, servicing, replacement or the like, he first inserts the prong of a switch stick in the bell mouth 104 of the operating arm 103 and moves the latter to the position shown in Figure 4 of the drawings, thereby releasing the mechanism which clamps the plug 38 of the load break device 36 in operative position by moving the cam 96 out of engagement with the flat top 95. This locks the switch blade 20 in the closed position as described. Thereafter he inserts the tines 46 of the fork 47 of the tool into the apertures 45 in the boss 44 on the cover 41 and lifts the plug 38 upwardly against the biasing force of the leaf spring 91 so that the inwardly projecting portion 56' of the annular fitting 56 moves into the recessed portion 85 of the socket 37 and the rib sections 86 and 86' are moved out of the arcuate slot 85 and above the ribs 84. Thereafter the plug 38 of the load break device 36 is moved or withdrawn along its longitudinal axis out of the socket 37 and removed to a place where the desired inspection, servicing, etc. it to be accomplished. This, of course, disconnects the plug 38 of the load break device 36 from the energized part of the disconnecting switch 10 and thus facilitates the work to be done on the plug 38 which incorporates the principal portion of the mechanism of the load break device 36.

As soon as the plug 38 is withdrawn from the socket 37 in the manner described, the coil compression spring 115 actuates the latch 111 to lock the switch blade 20 against opening movement in addition to the lock provided by the arm 103 in the unclamped position.

The plug 38 of the load break device 36 is replaced in the socket 37 in a reverse manner. After it has been located in the socket 37, the portion 94 engages the tail extension 118 of the latch 111 and moves the nose portion 113 out of the opening 114. The tool is removed and the plug 38 is held in place by the spring 91 and the rib sections 86 and 86'. The operator then swings the operating arm 103 from the position shown in Figure 4 to the position shown in Figures 7 and 9, thereby causing the cam 96 to engage the flat top 95 to clamp securely the plug 38 in the socket 37.

If the switch blade 20 is opened first, the plug 38 of the load break device 36 can be removed in the same manner just described. Ordinarily, however, the plug 38 of the load break device 36 will be removed when the switch blade 20 is closed although this may not always be the case.

Since certain changes can be made in the foregoing construction and different embodiments of

the invention can be made without departing from the spirit and scope thereof, it is intended that all matter shown in the accompanying drawings and described hereinbefore shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In a switch for electric power distribution circuits, in combination, a pair of switch contacts, a switch blade for bridging said contacts to carry load current, a load break device including a pair of separable auxiliary contacts and arc extinguishing means therefor mounted as a unit on one of said switch contacts independently of the other switch contact and adapted to be connected in series with said switch blade and said one switch contact for carrying the load current on separation of said switch blade from said one switch contact and interrupting the flow of the same and extinguishing the arc incident thereto, said one contact normally being energized, plug and socket means detachably mounting said load break device on said one switch contact so that the former is insertable into operative position from the front of said switch blade and can be withdrawn therefrom in the same general direction as the opening movement of said switch blade; and clamp means comprising an electrically conducting clamping member reacting between said plug and socket means for holding said plug and thereby said load break device in operative position in said socket and electrically interconnecting the same, and live line tool receiving means constituting an integral extension of said clamping member and engageable by a live line tool from a position generally in front of said switch blade for operating said clamping member and mechanically and electrically connecting said load break device on and to and releasing it from said one switch contact to provide for bodily removal thereof for inspection, servicing, replacement or the like without requiring that said one switch contact be deenergized.

2. In a switch for electric power distribution circuits, in combination, a normally energizable switch contact arranged to be engaged and disengaged by a switch blade for carrying load current in the engaged position, a socket carried by and electrically connected to said switch contact; a load break device including a pair of separable auxiliary contacts, arc extinguishing means therefor and a plug connected to one of said auxiliary contacts for engagement with and connection to said socket to permit bodily removal and replacement of said load break device while said switch contact is energized; contact means connected to the other auxiliary contact and arranged to be engaged by said switch blade to connect said load break device in series with said switch blade to transfer the load current to said load break device on disengagement of said switch blade from said switch contact whereupon the load current is interrupted and the arc incident thereto is extinguished by said load break device; and clamp means comprising an electrically conducting clamping member reacting between said socket and plug, and live line tool receiving means operatively connected to said clamping member for mechanically and electrically connecting said plug in and to and releasing it from said socket to provide for bodily removal of said load break device for inspection, servicing, replacement or the like without requiring that said one switch contact be deenergized.

3. In a switch for electric power distribution circuits, in combination, a pair of switch contacts, a switch blade for bridging said contacts to carry load current, a load break device including a pair of separable auxiliary contacts and arc extinguishing means therefor mounted as a unit on one of said switch contacts independently of the other switch contact and adapted to be connected in series with said switch blade and said one switch contact for carrying the load current on separation of said switch blade from said one switch contact and interrupting the flow of the same and extinguishing the arc incident thereto, said one contact normally being energizable regardless of the position of said switch blade; clamp means comprising an electrically conducting clamping member reacting between said one switch contact and a part of one of said auxiliary contacts, and live line tool receiving means operatively connected to said clamping member for mechanically and electrically connecting said load break device on and to and releasing it from said one switch contact to provide for bodily removal thereof for inspection, servicing, replacement or the like without requiring that said one switch contact be deenergized; and means comprising spring detent means on said one switch contact, and cooperating shoulder means on said load break device for holding the same in position on said switch contact independently of said clamp means to permit remote operation thereof without likelihood that said load break device will fall out of position while said clamp means is unclamped.

4. In a switch for electric power distribution circuits, in combination, a normally energizable switch contact arranged to be engaged and disengaged by a switch blade for carrying load current in the engaged position, a socket carried by and electrically connected to said switch contact; a load break device including a pair of separable auxiliary contacts, arc extinguishing means therefor and a plug connected to one of said auxiliary contacts for engagement with and connection to said socket to permit bodily removal and replacement of said load break device while said switch contact is energized; contact means connected to the other auxiliary contact and arranged to be engaged by said switch blade to connect said load break device in series with said switch blade to transfer the load current to said load break device on disengagement of said switch blade from said switch contact whereupon the load current is interrupted and the arc incident thereto is extinguished by said load break device; clamp means comprising an electrically conducting clamping member reacting between said socket and plug, and live line tool receiving means operatively connected to said clamping member for mechanically and electrically connecting said plug in and to and releasing it from said socket to provide for bodily removal of said load break device for inspection, servicing, replacement or the like without requiring that said one switch contact be deenergized; and means comprising spring detent means on said socket, and cooperating shoulder means on said plug for holding said plug in position in said socket independently of said clamp means to permit remote operation thereof without likelihood that said load break device will fall out of position in said socket while said clamp means is unclamped.

5. In a switch for electric power distribution circuits, in combination, a pair of switch contacts, a pair of spaced mechanically interconnected switch blades hinged at one end for swinging as a unit into and out of engagement with said contacts to close and open a load current carrying circuit therethrough, a load break device including a pair of separable auxiliary contacts and arc extinguishing means therefor non-rotatably and removably mounted as a unit on one of said switch contacts independently of the other switch contact and adapted to be connected in series with said switch blades and said one switch contact for carrying the load current on separation of said switch blades from said one switch contact and interrupting the flow of the same and extinguishing the arc incident thereto, said load break device being insertable between said switch blades from the front thereof and capable of being withdrawn in the same general direction of opening movement as said switch blades, cooperating levers and cams on said switch blades and said load interrupter device for operating the latter on movement of the former, said one switch contact normally being energizable regardless of the position of said switch blades; clamp means comprising an electrically conducting clamping member reacting between said one switch contact and a part of one of said auxiliary contacts, and live line tool receiving means operatively connected to said clamping member and operable from the front of said switch blades for mechanically and electrically connecting said load break device on and to and releasing it from said one switch contact to provide for bodily removal thereof for inspection, servicing, replacement or the like while said switch blades are closed and without requiring that the same be opened or said one switch contact deenergized; attachment means on said load break device to which a switch stick can be rigidly attached for positively guiding the former into and out of operative position between said switch blades on said one switch contact; and means comprising spring detent means on said one switch contact, and cooperating shoulder means on said load break device for holding the same in position on said switch contact independently of said clamp means whereby said clamp means can be remotely operated without likelihood that said load break device will fall out of position while said clamp means is unclamped.

6. In a switch for electric power distribution circuits, in combination, a pair of switch contacts, a pair of spaced mechanically interconnected switch blades hinged at one end for swinging as a unit into and out of engagement with said contacts to close and open a load current carrying circuit therethrough, a socket carried by and electrically connected to one of said switch contacts; a load break device including a pair of separable auxiliary contacts, arc extinguishing means therefor, a plug connected to one of said auxiliary contacts for non-rotatable and removable engagement with and connection to said socket to permit bodily removal and replacement of said load break device as a unit, and interengaging detent and detent receiving means on said plug and socket whereby they are relatively non-rotatable when they are in operative engagement; contact means connected to the other auxiliary contact and arranged to be engaged by said switch blades to connect said load break device in series therewith to transfer the load current to said load break device on disengagement of said switch blades from said one switch contact whereupon the load current is interrupted and the arc incident thereto is extinguished by said load break device, said load break device being insertable between said switch blades from the front thereof into said socket and capable of being withdrawn therefrom in the same general direction of opening movement as said switch blades, cooperating levers and cams on said switch blades, and said load interrupter device for operating the latter on movement of the former, said one switch contact normally being energizable regardless of the position of said switch blade; clamp means comprising an electrically conducting clamping member reacting between said socket and plug, and live line tool receiving means operatively connected to said clamping member and operable from the front of said switch blades for mechanically and electrically connecting said plug in and to and releasing it from said socket to provide for bodily removal of said load break device for inspection, servicing, replacement or the like while said switch blades are closed and without requiring that the same be opened or said one switch contact deenergized; attachment means on said load break device to which a switch stick can be rigidly attached for positively guiding the former into and out of operative position between said switch blades and into and out of said socket; and means comprising spring detent means on said socket, and cooperating shoulder means on said plug for holding said plug in position in said socket independently of said clamp means whereby said clamp means can be remotely operated without likelihood that said load break device will fall out of said socket while said clamp means is unclamped.

SIGURD I. LINDELL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,335,045 | Conrad | Mar. 30, 1920 |
| 2,207,837 | Sundt | July 16, 1940 |
| 2,351,826 | Lindell et al. | June 20, 1944 |