

Feb. 12, 1929.

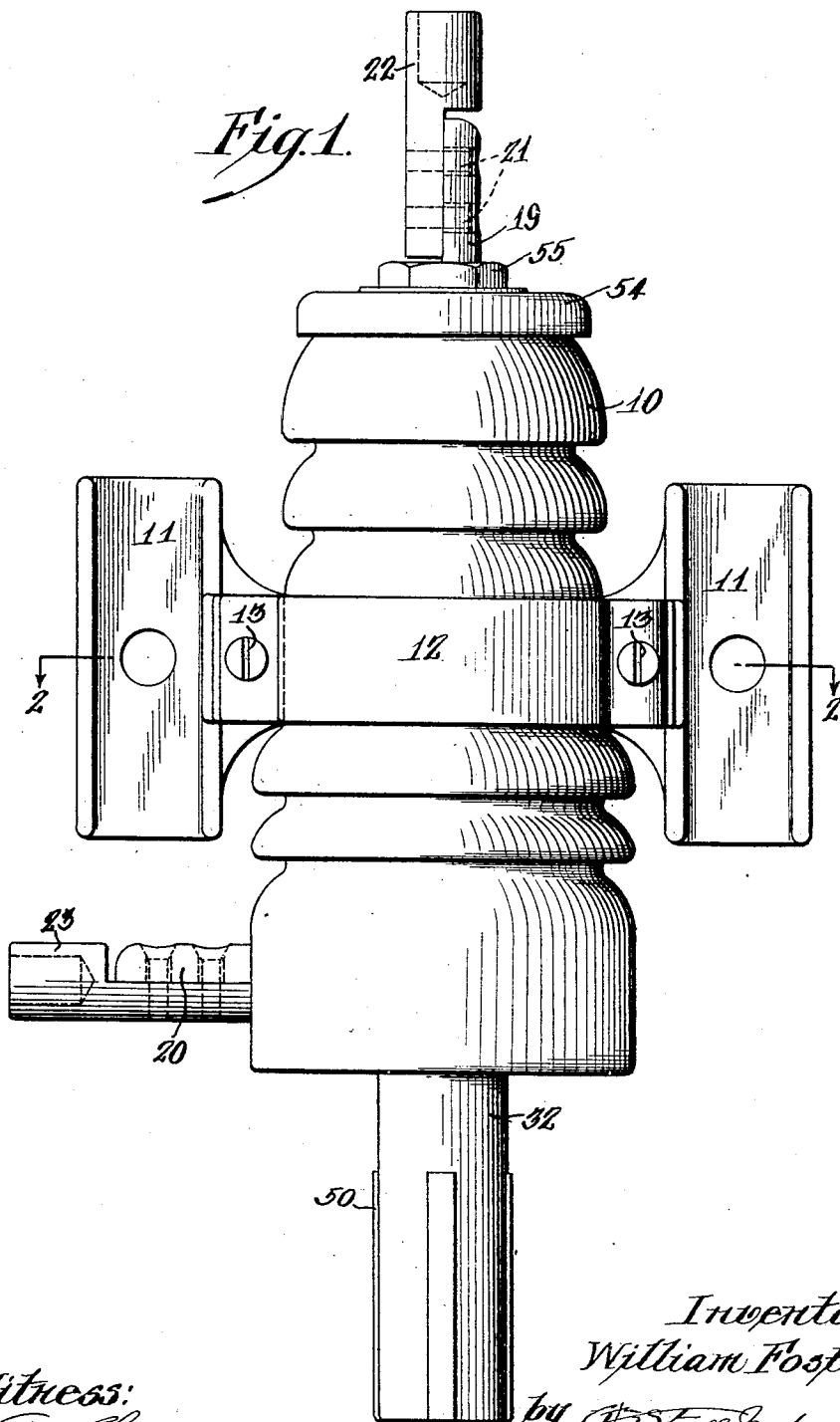
1,701,877

W. FOSTER

DISCONNECTING DEVICE

Filed Nov. 5, 1925

4 Sheets-Sheet 1



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DISCONNECTING DEVICE

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4 Sheets-Sheet 2

Fig. 2.

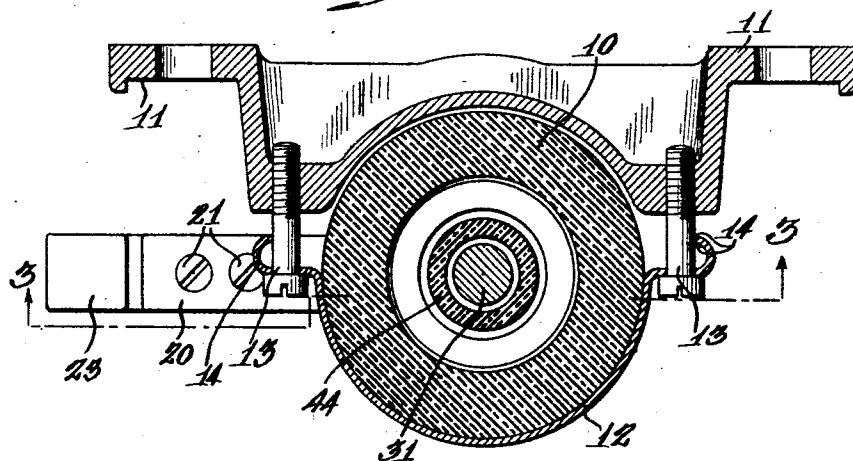
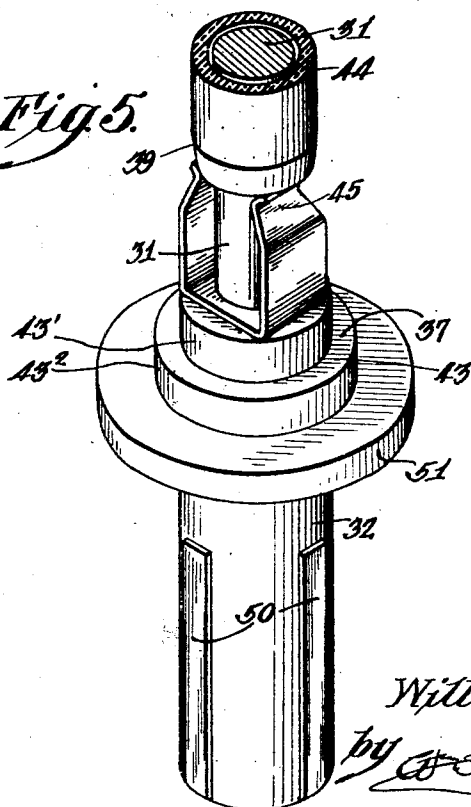


Fig. 5.



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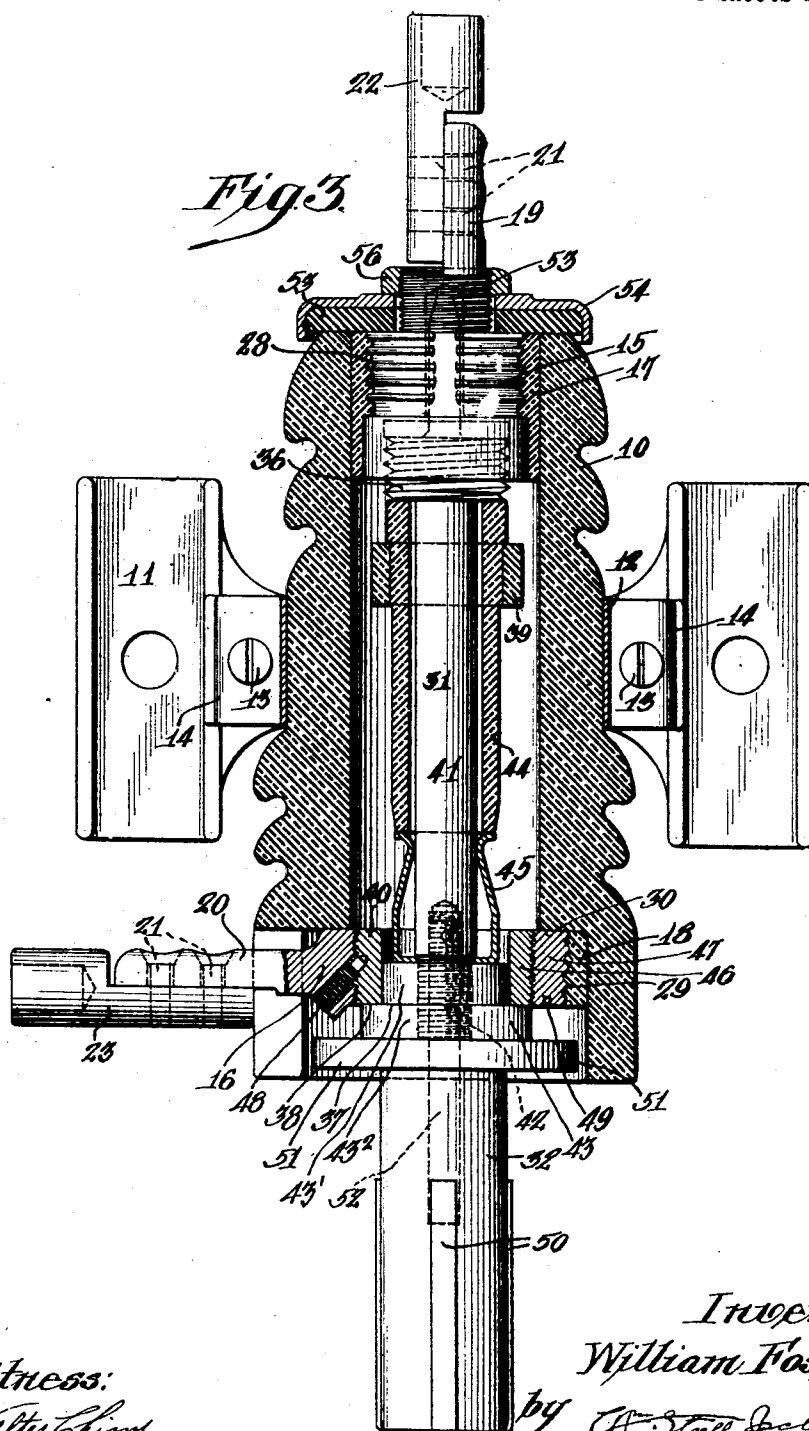
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4 Sheets-Sheet 3



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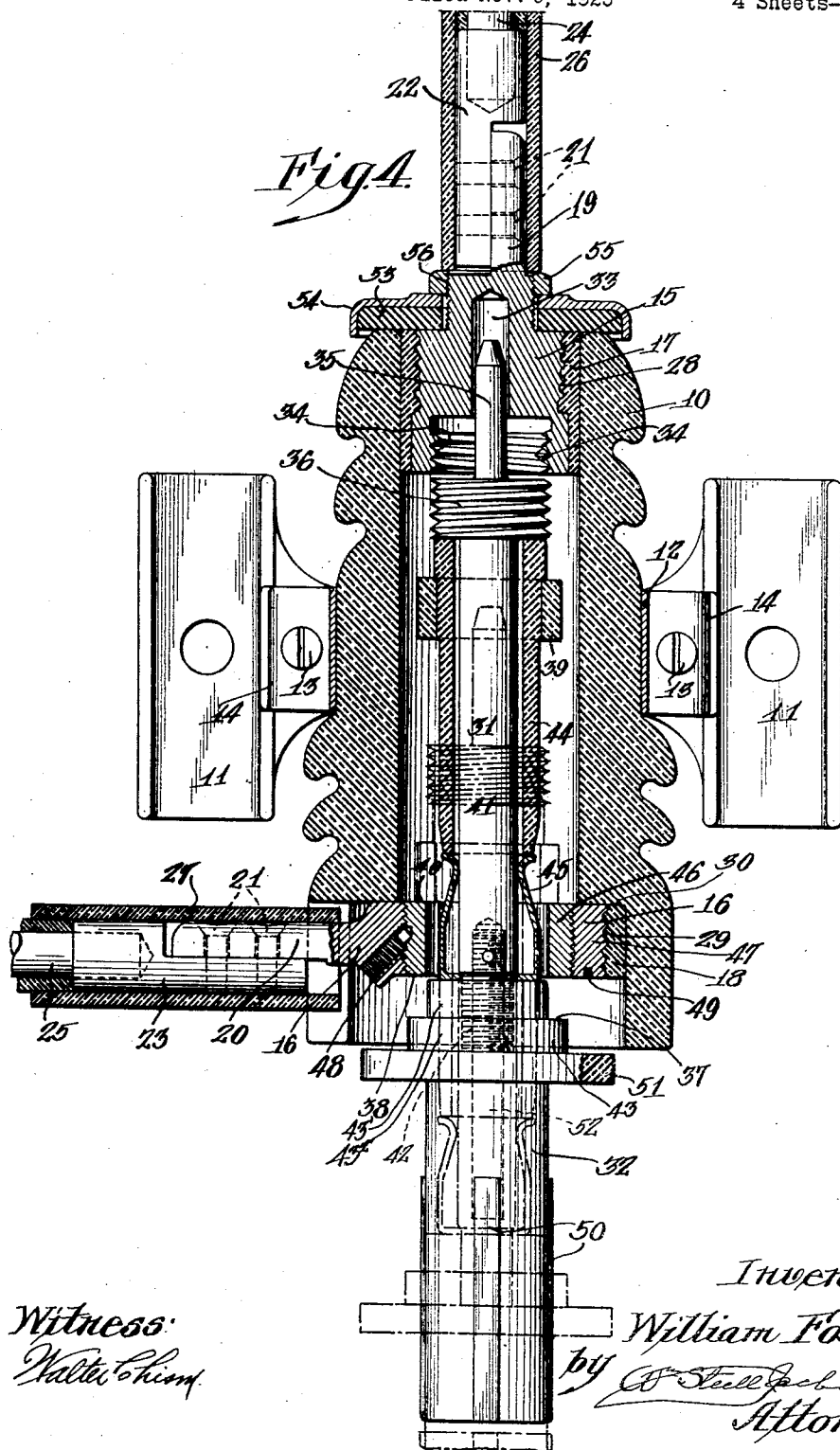
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DISCONNECTING DEVICE

Filed Nov. 5, 1925

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

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DISCONNECTING DEVICE.

Application filed November 5, 1925. Serial No. 66,957.

My invention relates to disconnecting switches for use in line circuits.

A purpose of my invention is to provide a disconnecting device having the switch element inside of a tubular insulator.

A further purpose is to protect separated terminals by an insulator encasing them and to connect them to close the circuit by a plug wholly insulated in all exposed parts and protected against accidental contact exterior to the insulator.

A further purpose is to provide spaced circuit terminals enclosed within an insulator and to unite them by a plug guided to initial position and threaded into final contact.

A further purpose is to utilize one of two spaced contact terminals enclosed within an insulator as a stop to prevent removal of the plug whose operating parts are also enclosed within the insulator and which is protected against accidental exterior contact.

A further purpose is to provide a plug for engagement with two spaced and insulator enclosed circuit terminals with a thread terminal adapted to draw the plug to final position and with an insulating sleeve between it and the other terminal.

A further purpose is to provide a plug for connecting two spaced and insulator-enclosed circuit terminals with insulation between its contact points and with a guiding and arcing device between the insulation and one of its contacts.

A further purpose is to divide one of two circuit terminals spaced and protected by insulation and axially in line into two parts of which one is removable and adjustable for the purpose of determining the setting of the connecting plug and by removal of the plug under normal conditions to permit its withdrawal when the part is removed.

A further purpose is to fasten switch terminals in opposite ends of a tubular insulator and to provide a plug or bolt connection having a threaded portion adapted to screw into one of the terminals and a shoulder adapted to engage the other terminal and stop against it when screwed home.

A further purpose is to provide a double break in the same side of a circuit and to wholly enclose both breaks.

A further purpose is to safeguard a plug or bolt disconnecting device to more fully protect the user.

Further purposes will appear in the specification and in the claims.

I have elected to show my invention in one form only and have selected a form that is easy to manufacture, efficient in operation and which well illustrates the principles involved.

Figure 1 is a side elevation of structure embodying my invention.

Figure 2 is a section of Figure 1 on the line 2—2.

Figure 3 is a section of Figure 2 taken upon line 3—3.

Figure 4 is a longitudinal section, corresponding to Figure 3 but with the switch member disconnected.

Figure 5 is a fragmentary perspective view of the lower portion of the switch member.

In the drawings similar numerals indicate like parts.

Describing in illustration and not in limitation and referring to the drawings:—

The disconnecting switch operates inside a tubular insulator 10.

The insulator is shown as fastened to a supporting bracket 11 by a perforated band 12 and screws 13. The ends of the band are preferably stiffened by reversely bending them into the screw shanks at 14, Figure 2; the arrangement being such that the screw shanks support the band ends from bending inward when the screws are tightened.

The inside terminals of the switch comprise upper and lower conductor elements, 15 and 16, sealed into opposite ends of the insulator 10 by means of molded insulation 17 and 18, and presenting outwardly extending flattened shanks 19 (vertical) and 20 (horizontal) to make connection by means of screws 21 with the correspondingly flattened outside terminals 22 and 23.

The ends of the line conductors, 24 and 25, (Figure 4) are sweated into the bored ends of the outside terminals, and the removable screw connections at 21 between the outside and inside terminals adapt the outside terminals to be easily interchanged in position, either line end connecting to either end of the switch while the other line end connects into the other end of the switch.

Insulation sleeves 26 and 27 are shown at the ends of the line conductors, extending over and suitably insulating the terminal connections. These sleeves are preferably adapted to be moved away along the con-

ductors to give access to the screw connections at 21.

The inside terminals 15 and 16 are desirably corrugated at 28 and 29 to afford more firm connection with the molded insulation (cement) and the lower terminal 16, in the form of a horizontal ring and shank 20 is sealed to place against a downwardly directed shoulder 30 near the bottom of the insulator.

Switch connection is made and broken between the inside terminals by means of a vertical plug connector 31 within the tubular insulator, and provided with an insulation handle 32 beneath the lower end of the insulator. Connection is made between the inside terminals by moving the plug up and then screwing it into one of the terminals until it makes stop engagement with the other.

Preferably the threaded connection is with the upper terminal and the stop engagement with the lower, and I have so illustrated it in the figures, where the upper terminal is bored at 33, (Figure 4) counterbored and internally threaded at 34, to receive respectively the guide pin 35 and threaded head 36 on the upper end of the plug connector 31. The plug is screwed up until it makes stop engagement with the lower inside terminal member 16, an upwardly directed face 37 of the bolt member engaging a downwardly directed face 38 of the terminal member.

When the bolt connector is unscrewed to open the switch, it is loosely supported upon the lower inside terminal 16, a downwardly directed collar 39 (preferably of insulating material) engaging an upper face 40 of the terminal member.

In the structure shown, the plug comprises an upper portion with guide-pin 35 and threaded head 36 and body portion 41 which is threaded at 42 into a flanged base 43, fitting the internal bore of the lower terminal member. An insulating sleeve 44, suitably of bakelite, and presenting a downwardly directed collar 39, surrounds the body of the plug and is held in place against the bottom of the threaded head 36 by a guiding and arcing thimble 45 between the body and base.

When moved upwardly for switch connection the plug is guided at the top by the pin 35 and at the bottom by the thimble 45 so that the mating threads of the head and upper terminal come together in perfect registry.

The lower inside terminal member is shown internally bushed, the bushing 46, threading into the ring 47, being normally held to place by a screw 48 and provided with holes 49 for spanner engagement. The bushing 46 may be taken out by loosening the screw 48 and using a spanner, and the whole plug will then slide out, as for inspection or repairs.

The operating handle is desirably pro-

vided with ridges 50 for more easy gripping and extends downwardly from an insulation flange 51 which normally loosely fills and closes the enlarged opening in the bottom of the insulator. The flanged handle is fastened to the plug in any suitable way, as by molding it about a shank 52 screwed into the bottom of the plug.

The top of the insulator is given finish and the switch interior is protected from the weather by a rubber washer 53, cap 54 and nut 55 upon a threaded portion 56 of the terminal member 15.

The gist of the invention lies in enclosing the two spaced hollow terminal members 15 and 16—46 axially in line, surrounding them by a protective insulator and connecting them by a plug which is so insulated as to prevent accidental contact with any live plug part.

The guide pin facilitates introduction of the plug. The thread upon the plug cooperating with terminal member 15 makes it possible to tighten the plug into position and the removable threaded bushing 46 supports the plug against accidental removal, provides for adjustment of the position at which contact engagement between it and the face 37 upon the plug shall take place and by its removal provides for complete withdrawal of the plug. The arcing guide 45 also has considerable value. Though these are highly beneficial they are ancillary to the main invention above.

In assemblage:—The members 15 and 16 are inserted within the insulator 10 and are readily fastened by the insulation 17, 18 which is molded to place. The collar 39 is mounted upon the sleeve 44, which is slipped over the rear of the front end of the plug, after which the guiding and sparking thimble 45 is put into position where it is held by screwing the contact 43 upon the rear end of the plug.

The handle 32 carrying the shank 52 is then screwed to position completing the assemblage of the plug member.

The bushing 46 is adjusted to any proper position and is held there by the set screw shown. No close adjustment is required because the screw 36 need not come home within the threads 34, a great deal of difference in final position being permissible at this end.

In operation after connection of the circuit has been made to the terminals:—

In disconnected position, dotted in Figure 4, the collar 39 will rest upon the surface 40 of the bushing 46 with the result that the upper end of the plug will be wholly disconnected from the upper contact and will be spaced at the sides, even from the insulator, by the insulating collar 39.

The interior of the plug will meantime be insulated from the bushing 46 by the sleeve 44 with the result that the plug will be wholly

insulated from both of the disconnected contacts, preventing the possibility of shock or leakage by engagement with the lower plug contact 43 or the guiding and arcing member 45, the only metallic parts of the plug which are exposed beneath the insulator.

As the plug is passed up into the insulator to make contact between the circuit terminals the metallic parts of the plug continue to be protected from engagement with the lower contact member until the upper end of the guiding and arcing member 45 first comes in contact with the bushing 46, at which time the lower plug contact 43 is too much protected by insulation 51 for reasonable chance of accidental contact with it.

As the plug is advanced further into the insulator the cooperating guide members upon the plug and upon the upper contact of the circuit engage and guide the plug thread 36 into engagement with the thread 34 while the guiding member 45 is maintaining the lower end of the plug in line so that the contact portion 43' is passed up into the opening in the bushing 46.

When the plug is screwed home within the thread 34 the upper surface 37 of lower contact part 43² is brought firmly into contact with the lower surface 38 of the bushing, completing an effective and reliable connection between the circuit contacts.

When the parts are disconnected by withdrawal of the plug any arc that is formed is intended to be taken up by the member 45, after which the parts move up or down to the dotted position of the plug at which this description started.

The switch is weather proof and fool proof. When the switch is opened any arcing can take place inside the insulator only, where it can do no harm, and at a thimble member 45 readily and inexpensively replaced. Bare conductors are at all times everywhere out of sight and out of reach of the operator, whether the switch be open or closed and during opening and closing, making the switch extremely safe.

In view of my invention and disclosure, variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, and I therefore claim all such in so far as they fall within the reasonable spirit and scope of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A tubular insulator, a pair of hollow circuit terminals whose hollow portions are located axially in line in front and rear of the insulator and are protected by it, in combination with a plug having a guide and thread in its forward end in the direction of the movement cooperating with one of the terminals and an inwardly facing contact

surface spaced therefrom, located near its rear end and adapted to engage the second of the terminals.

2. A tubular insulator, a pair of hollow circuit terminals whose hollow portions are located axially in line in opposite ends of the insulator, in combination with a plug having contacts near opposite ends both in one position out of contact with the terminals, connected by an intervening conductor and one threaded for engagement with one of the circuit terminals, an insulating sleeve surrounding the conductor between the two contacts and a collar of the sleeve adapted to engage with one of the circuit terminals to prevent normal withdrawal of the plug.

3. A tubular insulator, a pair of hollow circuit terminals whose hollow portions are located axially in line in opposite ends of the insulator, in combination with a plug having contacts near opposite ends connected by an intervening conductor and one threaded for engagement with one of the circuit contacts, an insulating sleeve surrounding the conductor, a guiding and arcing metallic fitting surrounding the conductor between the sleeve and second plug contact and a handle for applying the plug to close the circuit contacts.

4. A tubular insulator, a pair of hollow circuit terminals whose hollow portions are located axially in line in opposite ends of the insulator, one having a removable annular inner portion, in combination with a plug having contacts near opposite ends both in one position out of contact with the terminals, connected by an intervening conductor and one threaded for engagement with one of the circuit terminals, an insulating sleeve about the conductor between the plug contacts and a collar upon the insulating sleeve adapted to engage the removable portion of the second circuit terminal to prevent withdrawal of the plug without the removal of this portion.

5. A tubular insulator, a conducting terminal fastened in the upper end thereof and presenting a downwardly threaded portion, a conducting terminal fastened in the lower end of the insulator, bored co-axially therewith and presenting a downwardly directed face, a plug connector having an upper portion threading into the upper terminal and a lower portion presenting an upwardly directed face in disconnected position disengaged from the lower terminal but in engaged position engaging the face of the lower terminal, and an insulation handle fastened to the bottom of the plug for screwing and unscrewing the plug.

6. A tubular insulator, a conducting terminal fastened into the upper end thereof and within the insulator presenting a downwardly directed portion having a bore and internal threaded counterbore, a conducting terminal fastened to extend laterally into the lower end of the insulator, bored coaxial

therewith and presenting a downwardly directed face, a plug connector having a dowel and threaded upper portion fitting the bore and threaded counterbore respectively and a lower portion within the bore of the lower terminal and presenting an upwardly directed face to engage the face of the lower terminal but free from it in disengaged position, and an insulation handle extending downwardly from the bottom of the plug for screwing and unscrewing the plug.

7. A tubular insulator, a conducting terminal fastened to extend into the upper end thereof and downwardly threaded inside the insulator, a lower terminal fastened laterally into the lower end of the insulator and having a bore coaxial with the insulator, a conductor plug having an upper end threaded into the upper terminal, a shoulder on the plug upwardly engaging the bottom of the lower terminal, a sleeve on the plug intermediate the terminals, a downwardly directed shoulder upon the sleeve adapted to engage the lower terminal when the plug member is removed from engagement with the upper terminal, and an insulation handle downwardly extending from the plug.

8. A tubular insulator, a conducting terminal fastened to extend into the upper end thereof and downwardly threaded inside the insulator, a lower terminal fastened laterally into the lower end of the insulator and having a bore coaxial with the insulator, a conductor plug having an upper end threaded into the

upper terminal, a shoulder on the plug upwardly engaging the bottom of the lower terminal, a sleeve on the plug intermediate the terminals, an arcing thimble carried by the plug, fitting the bore and supporting the sleeve, a downwardly directed shoulder upon the sleeve adapted to engage the lower terminal when the plug member is removed from engagement with the upper terminal, and an insulation handle downwardly extending from the plug.

9. A disconnecting switch having a cylindrical body, in combination with a bracket therefor having a circular recessed seat, a strap adapted to partly surround the insulator and having screw holes through the strap, strap ends reversely bent into axial line with the screw holes and screws passing through the screw holes in the straps, engaged by the reversely bent strap ends and holding the straps to the bracket.

10. A disconnecting switch comprising a tubular insulator having circuit terminals within it and connecting approximately semi-cylindrical members projecting laterally and vertically therefrom, in combination with circuit connecting members also approximately semi-cylindrical, adapted to engage alternatively with the members projecting from the disconnecting switch, fastening devices for holding the members together and insulating sleeves fitting over the connections thus formed.

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