

Oct. 31, 1933.

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1,933,506

ELECTRICAL CONNECTING MEANS

Filed Jan. 16, 1933

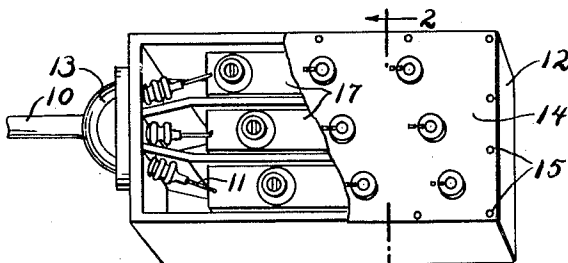


Fig. 1

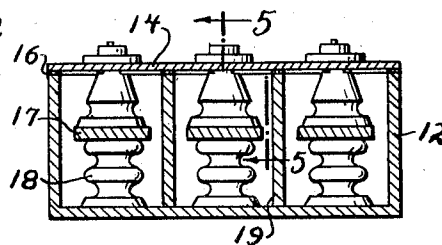


Fig. 2

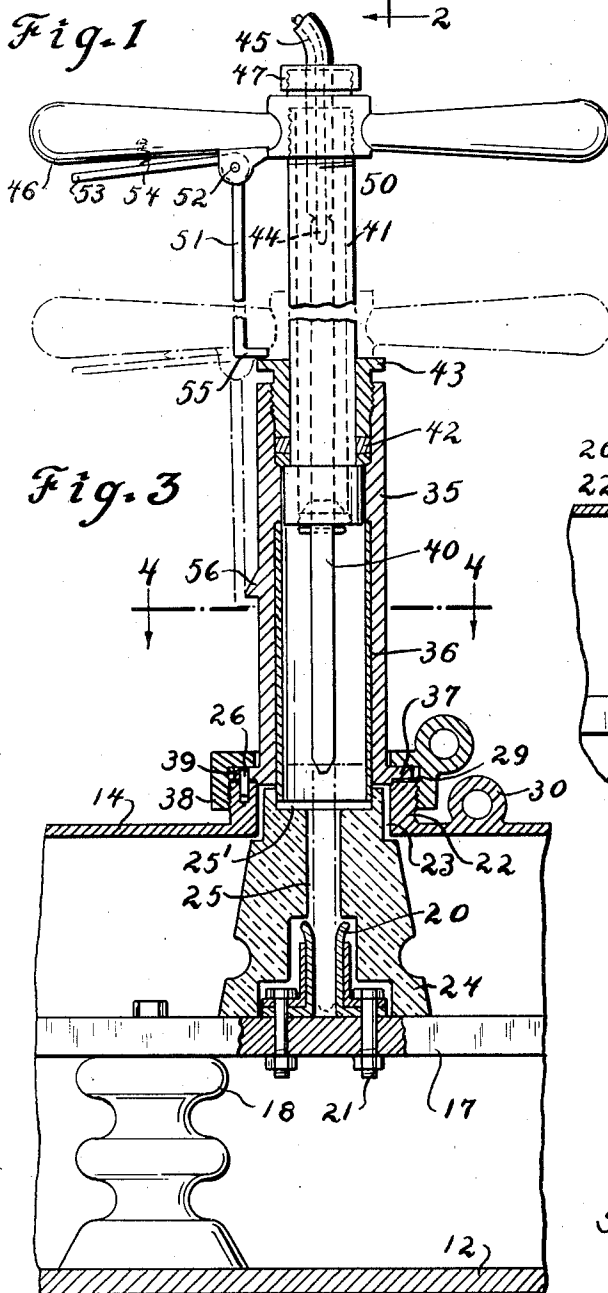


Fig. 3

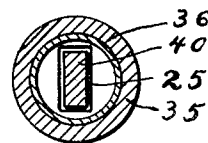


Fig. 4

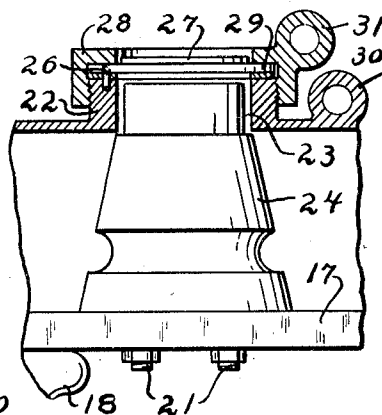


Fig. 5

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1,933,506

ELECTRICAL CONNECTING MEANS

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Application January 16, 1933. Serial No. 651,892

6 Claims. (Cl. 200-163)

This invention relates to electrical connecting devices, and particularly to connectors and connection boxes for underground and other uses requiring moisture-proof enclosures of conducting parts. An important object of the invention is the provision of an improved jack-connection box enabling selective plug-in connections to be made to any or all the conductors of a power line very easily and quickly, yet so constructed that both the plugs and the box are weather and moisture-proof.

Another object is the provision of such water-tight plug and jack box connecting means capable of carrying relatively heavy voltages and currents, and enabling quick and easy connecting and disconnecting of apparatus and changing of connections, yet so designed that an operator may work while the lines are "hot" without danger of shocks.

A further object is the provision of an improved cable plug connector suitable for use in conjunction with such a water-proof jack box, and so designed that whether the plug is attached to or detached from the jack box, its current-carrying parts and parts electrically connected thereto are so shielded against accidental contact that the device may be safely handled without breaking the circuit at another point.

Still another object is the provision of a jack box adapted to cooperate with such a plug connector and to handle relatively high voltages, in which the conducting parts are enclosed in a moisture and water-proof housing and also so guarded that they cannot be accidentally contacted by a workman, and that the workman can make and break connections, insert and remove plugs, and cap and uncap jack openings without danger, although the conductors may be at high potential.

A still further object is the provision of an improved plug and jack box assembly for high voltages, so designed that the plug may be connected and disconnected at will while it remains mechanically attached to the box.

Further objects comprise provision of improved shield insulating means guarding the jack contacts and jack orifices, and the provision of improved latching means for preventing both unwanted disconnection and/or unwanted connection of the plug when attached to the box, as well as preventing exposure of the current-conducting parts of the plug when removed from the box.

Other objects and advantages will be apparent to those skilled in the art upon reference to the

following description and the accompanying drawing in which

Figure 1 is a perspective view of a jack box incorporating the principles of this invention, with the cover partly broken away;

Figure 2 is a vertical section taken substantially on the line 2-2 of Figure 1 and looking in the direction of the arrows;

Figure 3 is an enlarged vertical section fragmentarily showing a portion of the jack box and showing one of my improved plugs attached thereto;

Figure 4 is a horizontal section taken substantially on the line 4-4 of Figure 3 and looking in the direction of the arrows; and

Figure 5 is a detail vertical section taken substantially on the line 5-5 of Figure 2 and looking in the direction of the arrows.

Referring now to the drawing, reference character 10 designates an electrical cable, which in the illustrative instance encases three wires, (each designated 11) and is of the moisture-proof underground variety. The cable is shown entering a jack box 12 through a pothead 13. All joints at the points are water tight. The box may be of cast or sheet metal construction with moisture-proof joints. To its open top a cover 14 may be tightly attached, as by means of screws 15, a sealing gasket 16 being also provided. Each of the conductors 11 is connected to a bus bar 17 within the box, and each bus bar is supported from the bottom of the box as upon insulators 18, and spacedly arranged within an isolated compartment. The compartments are shown separated by partitions 19.

At suitable intervals along each bus bar 17 are arranged jack or contact clips 20 electrically connected to their supporting bus bar and mechanically attached thereto by means of nuts and bolts 21. In alignment with each such pair of contact clips the cover plate 14, which the clips face, is apertured, and as shown in Figures 3 and 5, a threaded boss or flange as 22 may surround the aperture. Extending into the boss from within the box and partly closing the aperture (designated 23) is a shield insulator 24 surrounding the contact clips and supported upon the bus bar in the manner best shown in Figure 3.

In the embodiment shown the clips 20 are so shaped and positioned relatively to one another as to be adapted to receive a contact blade of rectangular cross section, and above and in alignment with the blade-receiving portion of the clips, the shield insulator is provided with a rectangular orifice of like cross section, which

may be but slightly larger than the blade, so that it will admit nothing larger or of improper shape. The upper end of the shield insulator extends partly through the cover aperture 23 as above remarked, and may be counterbored as at 25'. Up-

standing from the boss 22 surrounding the aperture 23 is a locating pin 26. As shown in Figure 5, when no connection is desired to be made to a particular pair of contact clips, the appurtenant cover opening may be sealed by means of a cap, designated 27, tightly held over the open top of the boss 22 by a separate threaded securing ring 28 screwed upon the boss. Beneath the cap may be arranged a gasket 29, and the cap may be either sealed or padlocked in position, eyelets 30—31 being provided for such purpose.

For selective connection and disconnection with respect to the jack clips 20, I preferably provide a plug of the type generally designated 50, the body of which may comprise a cylindrical tube 35, which, if of metal, may be provided with an insulating liner 36. In the construction shown the tube is flanged at its bottom, as at 37, and the liner projects beyond the flange, being adapted, when the plug is secured in place, to fit into counterbored upper portion 25' of the socket aperture 25 in the shield insulator. The securing ring or nut 38 encircling the tube above the flange enables securing the plug to the boss 22 in the fashion shown in Figure 3, the gasket 29 being preferably left in place to seal the plug housing to the cover opening. The flange 37 is apertured as at 39 for a locating pin 26 which projects thereinto when the plug is in place to hold the plug assembly in alignment with the clips 20.

Slidably supported within the sleeve-like plug housing 35 is a contact blade 40, shown mounted in a plunger 41 slidably in the housing and preferably formed of insulating material. The plunger 41 is slidably supported by the upper portion of sleeve 35, and a stuffing-box, designated 42, may be provided to seal this portion of the assembly, the packing nut, which also closes the top of the housing, being designated 43. As shown in Figure 3, the plunger 41 is axially apertured, and the blade may extend upwardly therethrough to a point near its top where it may be socketed, as at 44, to receive a conductor 45 which may extend into the plunger from above through the axial aperture and be soldered in the terminal socket 44 in the blade.

An operating handle, as 46, is secured to the top of the plunger and of course apertured for passage of the wire 45 therethrough, a sealing cap as 47, of soft rubber or the like, and adapted to snugly fit the wire 45 being arranged over such aperture to seal the entrance of the wire.

Latching means is also preferably provided to prevent expulsion of the plug blade from the contact clips' under line surges, and also to prevent the blade when in out position from being pushed into contact with the clips, save when the latch is released. The latch is shown as comprising a latch hook 51 formed as a small bell-crank lever pivoted to handle 46, as upon pin 52, and the upper arm 53 of which forms a finger piece lying along the underside of the handle. In a bore in the handle is trapped a compression spring 54 bearing against the top of the finger piece to force it downwardly and so urge the lower hooked end 55 of arm 51 inwardly toward the plug body. When the handle is in the fully out position shown in full lines in Figure 3, the latch hook 55 over-engages packing nut 43 and

prevents inward movement of the plunger, unless the latch is first released by forcing the finger piece toward the handle to move the hook clear of the upper end of the plug body, while when the plunger is pushed in to the position shown in dot-dash lines, the hook 51 engages beneath a projection 56 on the side of the plug body and prevents outward movement of the plunger, unless the latch is first released, thus holding the blade 40 in engagement with the contact clips.

The parts are so proportioned as to length, as will be apparent from the drawing, that when the blade is fully retracted it is not only latched in disconnected position, but lies inside the plug housing and liner tube 36. It will be apparent that the plug can then be removed and handled with safety even though line 45 may carry a voltage, while the contact clips are so guarded by their positioning and by the shield insulator 24, as are also bus bars 17, that they also are practically inaccessible insofar as accidental contact-ing is concerned.

Once assembled, the plug parts need never be separated, the entire plug thereafter being attachable and removable by means of the ring 38. If desired moreover, the plug may be left permanently attached to the box cover in the manner shown in Figure 3, and connection and disconnection effected by merely pushing and pulling the plunger, first releasing the latch, in the manner described. In whichever position the plug is left, the moisture-proof sealing of plug and box, as well as all connections, is maintained, while if it is desired to use the same plug at another point, a cap assembly such as that shown in Figure 5 may be applied in its place.

While it will be apparent that the illustrated embodiments of my invention herein disclosed are well calculated to adequately fulfill the objects and advantages primarily stated, it is to be understood that the invention is susceptible to variation, modification and change within the spirit and scope of the subjoined claims.

What I claim is:

1. A cable plug connector comprising a shell open at one end, a member slidably in the shell and sealed relatively thereto but projecting from the other end thereof, a contact blade carried by the slidable member, insulated from the shell, exposed to the open end of the latter, and movable into and out of the shell, means for connecting a conductor to the blade, and latch means for securing the slidable member and so the blade in either of two positions relatively to the shell.
2. Electrical connecting means including a connection box, a conductor therewithin, contact clips carried by the conductor, said box having an opening in alignment with the clips, a plug body affixed and sealed to the box and closing said opening, a contact member slidably in the plug body into and out of engagement with the contact clips, and means projecting from the plug body for sliding the contact member relatively thereto.
3. Electrical connecting means including a connection box, a conductor therewithin, jack contacts within the box and connected to the conductor, said box having an opening therein, a plug body affixed at one end to the box and sealing said opening, a contact member slidably carried by the plug body and movable into and out of the end of the plug affixed to the box to break and make contact with the jack clips, and means carried by the plug body and manipulat-

able from outside the same for moving the contact member.

4. In combination with a plurality of electrical line conductors, means for selectively making and breaking connection therewith, including a jack box, conducting members within the box adapted to be connected to the line conductors, jack contacts within the box and connected to the contact members, an aperture in the box in alignment with each jack contact, a plug member having a body portion adapted to be secured at one end to the box appurtenant one of said openings, in such manner as to seal the same, a contact member carried by the plug body and having a portion slidable into and out of the end of the plug which is securable to the box, and means carried by the plug body and manipulatable from outside the same to move the contact member, said parts being so proportioned that when secured to the box in the described manner such movement of the contact plug moves it into and out of engagement with desired jack contacts.

5. In combination with a plurality of electrical line conductors, means for selectively making and breaking connection therewith, including a jack box, conducting members within the box adapted to be connected to the line conductors, jack contacts within the box and connected to the conducting members, an aperture in the box in alignment with each jack contact, a plug member having a body portion adapted to be secured at one end to the box appurtenant one of said openings in such manner as to seal the same, a contact member carried by the plug body and having a portion slidable into and out of the end of the plug

which is securable to the box, operating means for said contact member operable from outside the plug, said parts being so proportioned that when secured to the box in the described manner such movement of the contact member moves it into and out of engagement with desired jack contacts, and means including a manually releasable latching member also operable from outside the plug for latching the contact member in either engaged or disengaged position.

6. In combination with a plurality of electrical line conductors, means for selectively making and breaking connection therewith, including a jack box, conducting members within the box adapted to be connected to the line conductors, jack contacts within the box and connected to the conducting members, an aperture in the box in alignment with each jack contact, a plug member having a body portion adapted to be secured at one end to the box appurtenant one of said openings in such manner as to seal the same, a contact member carried by the plug body and having a portion slidable into and out of the end of the plug which is securable to the box, operating means for said contact member including a manually operable plunger movably extending through and from the plug body but sealed therein, said parts being so proportioned that when secured to the box in the described manner such movement of the contact member moves it into and out of engagement with desired jack contacts, and means including a manually releasable latching member for locking the plunger and so the contact member in desired position.

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