

March 11, 1930.

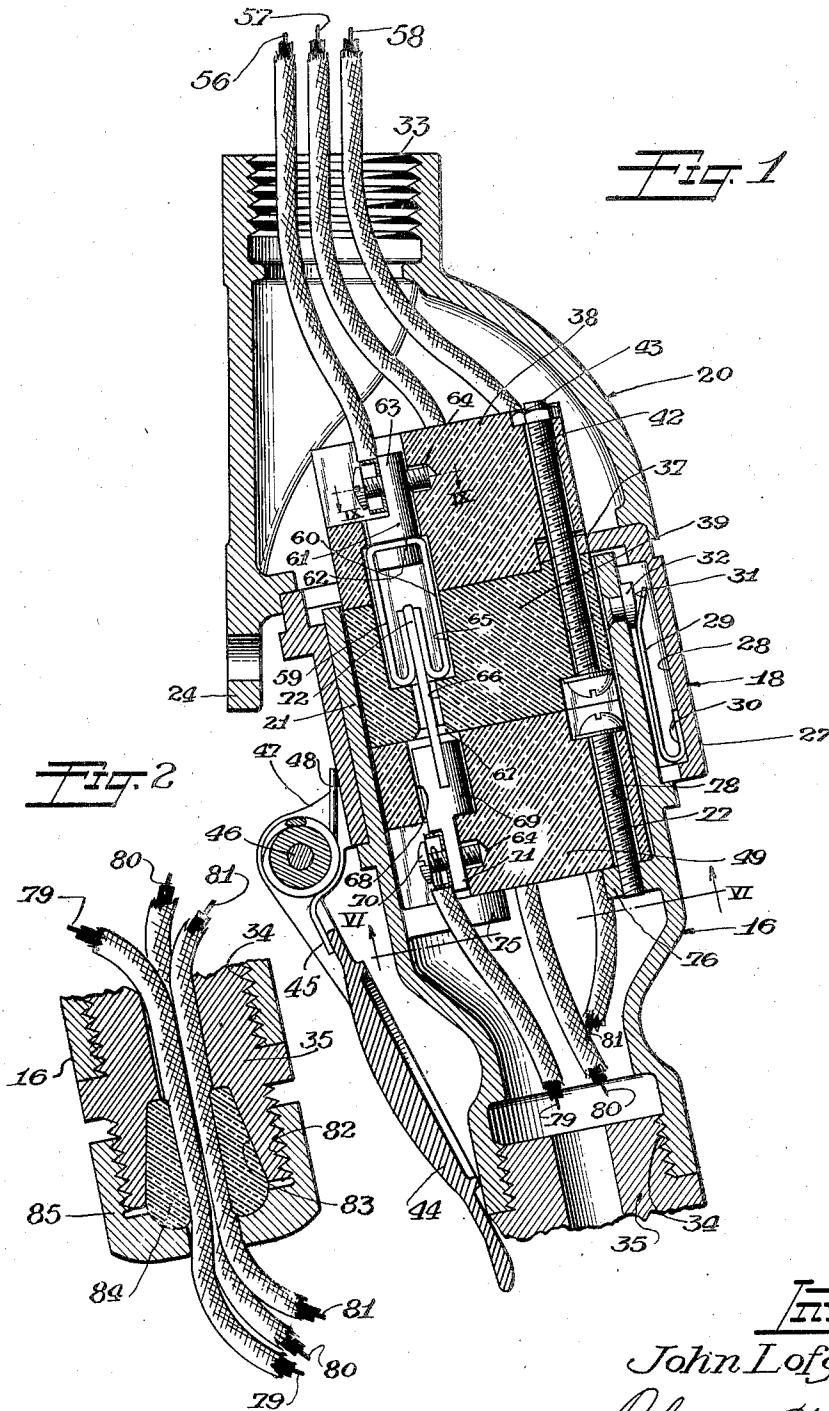
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1,750,014

ELECTRIC CURRENT CONNECTION

Filed Jan. 6, 1928

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

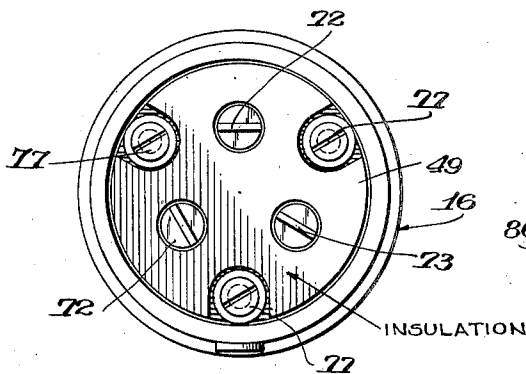
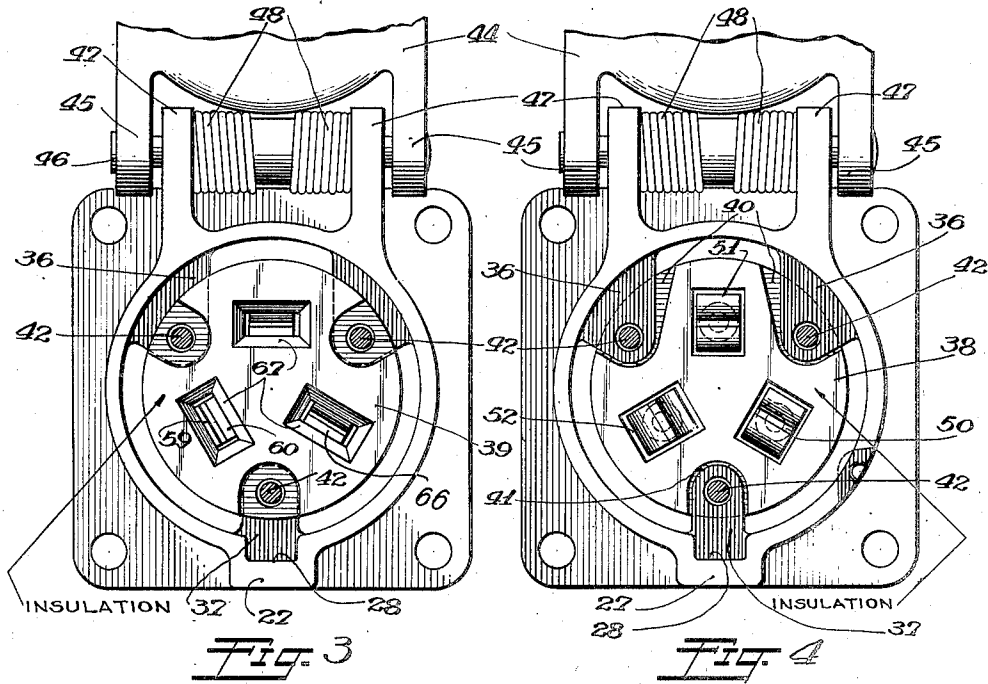


Fig. 5

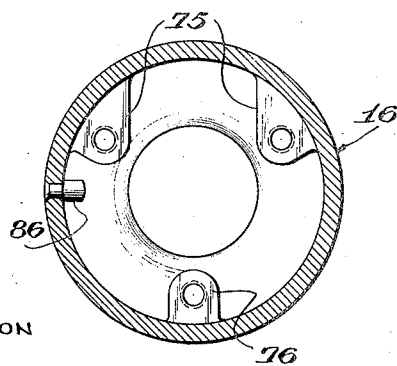


Fig. 6

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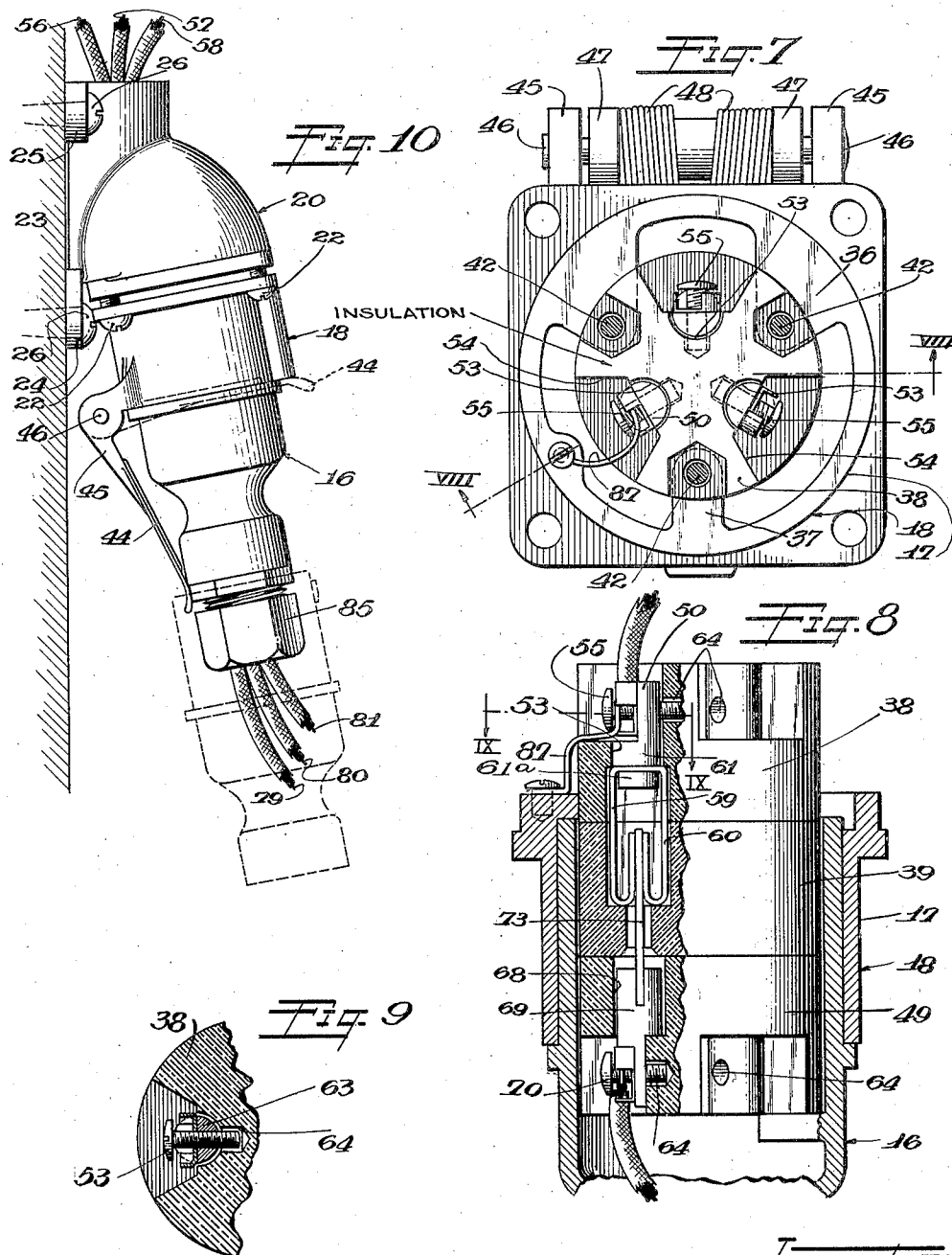
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ELECTRIC CURRENT CONNECTION

Filed Jan. 6, 1928

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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ELECTRIC-CURRENT CONNECTION

Application filed January 6, 1928. Serial No. 244,793.

This invention relates to improvements in electrical power line connectors and more especially to connectors of the plug and socket type.

5 The connector, which is an embodiment of this invention is especially adaptable for heavy currents used in power circuits and the like.

One of the objects of the invention is to provide a strong, durable, reliable, water-proof connector having ample capacity.

Another object is to provide a connector having its parts so arranged and fashioned that the connector members, the plug and the 15 socket, can be connected only in proper relation to prevent change of polarity or phase relation.

Another object is to so fashion and arrange the parts that they can be assembled only 20 in the manner intended, so that a novice may dissociate the parts and reassemble them only in the manner in which they are intended to be related.

A further object is to provide means by 25 which the plug is invariably caused to leave the socket with a quick snap action, thereby to eliminate a persistent, enduring and destructive arc between the terminals of the socket and plug.

30 A further object is to provide a weather-proof casing or housing for the socket terminal, which will become automatically closed as soon as the plug has been removed.

A still further object is to provide a connector of this character which is entirely and 35 completely closed when the plug is in cooperative position with the socket and which is then weatherproof against driving rains, sleet, spray, snow, and the like.

40 Another object is to provide a plug and socket connector in which the electrical terminals, characteristic of the two connector elements, are mounted in respective insulating blocks and are loosely supported therein 45 in such manner that they will infallibly and intimately register when the plug is inserted within the socket housing and in which the terminal holding block, within the housing, is loosely supported with respect to the housing, so that it may have some relative move-

ment when the two said connector elements are brought together, thereby to produce and to maintain maximum surface contact between the respective terminals without requiring expensive machining and accurate 55 initial positioning of the parts.

Other objects, advantages and benefits of my invention will readily appear to persons skilled in the art, from a consideration of the following description and the accompanying 60 drawings forming a part hereof, wherein:

Figure 1 is an axial central section of the switch with the plug casing within the socket casing or housing.

Figure 2 is a similar view of the lower end 65 of the plug.

Figure 3 is a plan view looking into the lower end of the socket with both insulating blocks thereof in place.

Figure 4 is a similar view with the lower 70 block of the two-part block removed.

Figure 5 is a plan view looking into the upper open end of the plug.

Figure 6 is a section of the plug housing taken on line VI—VI of Figure 1, with the 75 terminal block removed.

Figure 7 is a plan view looking down upon the socket when the canopy thereof has been removed.

Figure 8 is a partial section taken on line 80 VIII—VIII of Figure 7.

Figure 9 is a fragmentary section taken on line IX—IX of Figure 8.

Figure 10 is a side elevation of the device 85 in reduced size.

In all of the views the same reference characters indicate similar parts.

The device, as shown, consists of three casings, the casing of the plug 16, the casing of the socket 18 and the casing of the 90 canopy 20. These casings constitute water-proof housings of the live or electrically conducting parts of the switch structure. The cylindrical portion 21 of the plug neatly telescopes within the cylindrical part of the 95 socket 18, thus providing a double, imperforate wall about said electrical conducting parts and making it impossible for rain or sleet to enter the aforesaid housing where 100

the plug and socket join because of the long overlapped joint thus provided.

The canopy 20 and socket 18 are secured together by screws 22 engaging outstanding flanges. The canopy has three perforate ears 5 by which the canopy 20 and socket 18 may be secured to a wall, as wall 23. The ear 24 is below the canopy and in a plane with the vertical axis thereof, and there are two ears 10 25—25, one on each side of said axis. Screws 26 pass thru said ears and into the wall 23.

The socket 18 has an outstanding hollow rib 27 providing an interior channel 28. Secured in said channel is a leaf spring 29 15 which is bent upon itself and secured to the socket casing 18 by a rivet 30. The free end 31 is turned outwardly. A button 32 is secured to the portion 21 of the plug and slides along the spring blade 29 when the plug is 20 being withdrawn or inserted. This spring and button interpose a yielding resistance to the removal of the plug, thus maintaining the plug in place and requiring furthermore such application of force to separate the parts that, 25 a quick break between the switch terminals results. The button and channel also serve as a guide for properly inserting the plug in the socket. The canopy 20 has a threaded opening 33 for a threaded conduit pipe (not 30 shown). The plug 16 has a similar opening 34 to receive a closure fitting plug 35.

Near the upper end of the socket 18 there are three inwardly extending lugs 36—36 and 37 by which to secure the insulation 35 blocks 38 and 39 in position in the socket. The block 38 has three cavities 40—40 and 41 to receive the lugs 36—36 and 37 respectively. The cavities are deeper than the lugs are thick, so that the blocks may be loosely held 40 in place by screws 42, which pass thru both blocks 38 and 39 and thru the lugs 36—36 and 37.

It will be observed that the holes thru these lugs, for the accommodation of the screws, 45 are larger than the diameters of the screws 42, so that the blocks, as a unit, may have some free lateral movement. The screws 42 terminate in nuts 43, thus holding blocks 38 and 39 firmly together as one block but permitting some free lateral and axial movement 50 with respect to the lugs 36—36, 37 in the socket casing 17.

A spring pressed closure or lid 44 has two rearwardly extending arms 45 that are 55 hinged on the pintle 46 which extends thru a pair of spaced arms 47 of the socket casing 18. A coiled spring 48 is wound about the axis of the lid or the pintle 46, and yieldingly holds the lid or closure 44 over the open 60 lower end of the socket when the plug 16 has been removed, as evident from a consideration of Figures 1 and 10.

When the plug 16 is in the socket, the door or lid 44 is held thereby in open position, as 65 will be seen, so that when the plug has been

removed the spring 48 will urge the lid to closed position and thus protect the contents of the socket from deleterious action of the weather, dust, dirt, spray, and the like.

So far as described, any sort of terminal 70 structure for opening and closing an electric current, controlled by the plug 16, may be employed within the socket and plug.

The preferred connector members or terminals are mounted in and on the insulating 75 blocks 38 and 39 in the socket 18. In the plug casing 16 an insulating block 49 carries the switch members or terminals which co-operate with the terminals of the socket. Block 38, see Figure 4, has three rectangular perforations or recesses 50, 51 and 52, all of 80 which terminate in a bore 53. Part of the upper end of block 38 is cut away to provide notches or depressions 54 to render wire binding screws 55 accessible. These binding 85 screws 55 receive the service wires 56—57 and 58.

Electric connector terminals are arranged in the recesses 50, 51 and 56 of the socket 18 and consist of a flat conductor strip bent into 90 inverted U-shape forming a yoke 62 with two spring blades 59 and 60, with their free ends intumed, as shown in Figure 1. A short piece of round rod 61 is connected to the yoke 62 of the dual blade terminal and has a part of its 95 upper end cut away to provide the semi-circular part 63 to receive the binding screw 55. The lower end of the rod 61 is reduced in diameter and threaded. A nut 61^a is threaded onto this reduced end after same has been 100 passed thru an aperture in the yoke 62 to fasten the terminal strip to the rod 61. It will be seen that the inner end of the binding screw 55 enters a depression 64 in the block 38. By this means the two-blade terminals 105 are loosely mounted and held in the block. The bore 53 is considerably larger in diameter than the part 61 of the terminal, thus permitting some lateral free movement of the latter. 110

The block 39 has rectangular openings 65 which confront similar openings 50, 51 and 52 in block 38 and which register therewith to receive the lower ends of the dual blade terminals 59 and 60 which extend downwardly 115 from block 38. The openings 65 in block 39 each terminates in a smaller rectangular opening 66, which are chambered at the lower ends, as at 67, to more readily receive the single-blade terminals 72 of the plug block 49. 120

The plug block 49 is bored, as at 68, to receive round rod lugs 69. The lugs 69 are cut away at the lower ends to receive wire clamping screws 70 which are threaded into the 125 tail pieces 71 of 69. Secured in the upper ends of the lugs 69 and projecting upwardly from block 49 are flat switch blades 72—72 and 73 respectively.

It will be observed that blade 73 is in a radial plane with respect to the circular block 130

49 and that blades 72—73 are in the planes of chords drawn across the circular outline of the aforesaid block 49. This arrangement renders it impossible to insert the terminal blades 72—73 of the plug between the pairs of ring blades 59 and 60 except in the proper manner as the blades 59 and 60 are arranged in the same position in the socket. However, the button 32, which slides in channel 28, safeguards the proper entrance of the blades. The angular relation of the blades, as described, contributes to certainty of assembling the parts so that a novice cannot make a mistake in restoring the parts to their true positions. The terminals 72—73 cannot be returned to their places in the block 49 except in the manner shown with the blades 72 converging outwardly and the blade 73 in a radial plane, as the blades 72 and 73 are so carried by the lugs 69 in angular relation to the tail pieces 71 as to prevent any assembly thereof except in the proper manner.

Lugs 75—75 and 76 extend inwardly of the plug casing 16, and screws 77 engage thru enlarged holes 78 in block 49 and are threaded into the aforesaid lugs to loosely hold the block 49 within the casing 15. Wires 79, 80 and 81 are connected to the respective terminals 72—72 and 73 of the plug by clamping screws 70. The plug may be wired by removing screws 77 and moving the block 49 from the upper open end of the plug casing 15. The socket 18 may conveniently be wired by removing screws 22 (Fig. 10) and taking the socket from the canopy 20.

A perforate metal or insulating plug 35 may be screwed into the lower end 34 of the plug 16, thru which wires 79—81 pass. The plug 35 is also threaded at its lower end, as at 82, and the lower end of its bore is tapered as at 83. A perforated soft rubber stopper 84 is tapered to fit into said bore 83. A cap 85, when screwed up on the threaded end 82 of the plug 35, compresses the rubber stopper 84 about the wires 79—81 and then seals the lower end of the plug against entrance of moisture within the component casing.

A guiding lug may be provided which extends inwardly of the casing of the switch plug 16, to be received in a channel extending upwardly from the lower edge of the block 49 to accurately position the latter in the plug casing 16. The terminal 50 (Figs. 7 and 8), which may well be the neutral terminal of a three-wire system, is directly connected to casing, of the socket 18, or "grounded" by the jumper wire 87, when desired.

The terminal 50—59—60 may be longer than its neighbors, or the blade 73 may be longer than its neighbors so that contact is broken between these grounded terminals after contacts have first been broken between the other terminals, for greater safety.

The invention is shown and described as a three wire connection, but is understood that the connection may be used for two, three or four wire lines.

The gist of the invention lies in the fact that the plug can be inserted in the proper manner only, thus eliminating any chance of changing the polarity or phase relation of the current in the line. It will be observed that the insulating block 38 and its connected block 39 cannot be arranged in the socket member in any but the proper position. This is because of the arrangement and shape of the cavities 40—40 and 41 and the lugs 36—36 and 37 as may be readily observed from Figure 4 of the drawings. Likewise the lug 86 in the plug member 16 engages a channel formed in the block 49 to properly position the blocks in the lug casing so that the same will properly register with a socket member in order that the connecting members may be arranged in proper manner to prevent changing of polarity or the phase relations.

It will be observed that the connector is so designed and assembled as to allow assembly of the various parts in only the proper relation so that even an inexperienced workman cannot possibly assemble the parts in any but the proper relation.

It will also be observed from an inspection of Figures 3 and 4 of the drawings that the connectors or contact members in the plug and socket are disposed in angular relation one to another as a further aid in effecting proper connection between the socket and plug of the connector.

I am aware that many changes may be made, and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:

A connector comprising a socket member and a plug member, insulating blocks removably supported in each member, lugs in said socket member of different shapes and positions, said insulating block for said socket having correspondingly shaped and positioned recesses for assembly in but one position, said plug member and its insulating block having cooperating means for allowing assembly in but one direction, and each block carrying flat contacts arranged in different angular positions in the blocks to allow plug insertion in but one position.

In testimony whereof I have hereunto subscribed my name.

JOHN LOFGREN.