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ELECTRICAL PLUG DEVICE

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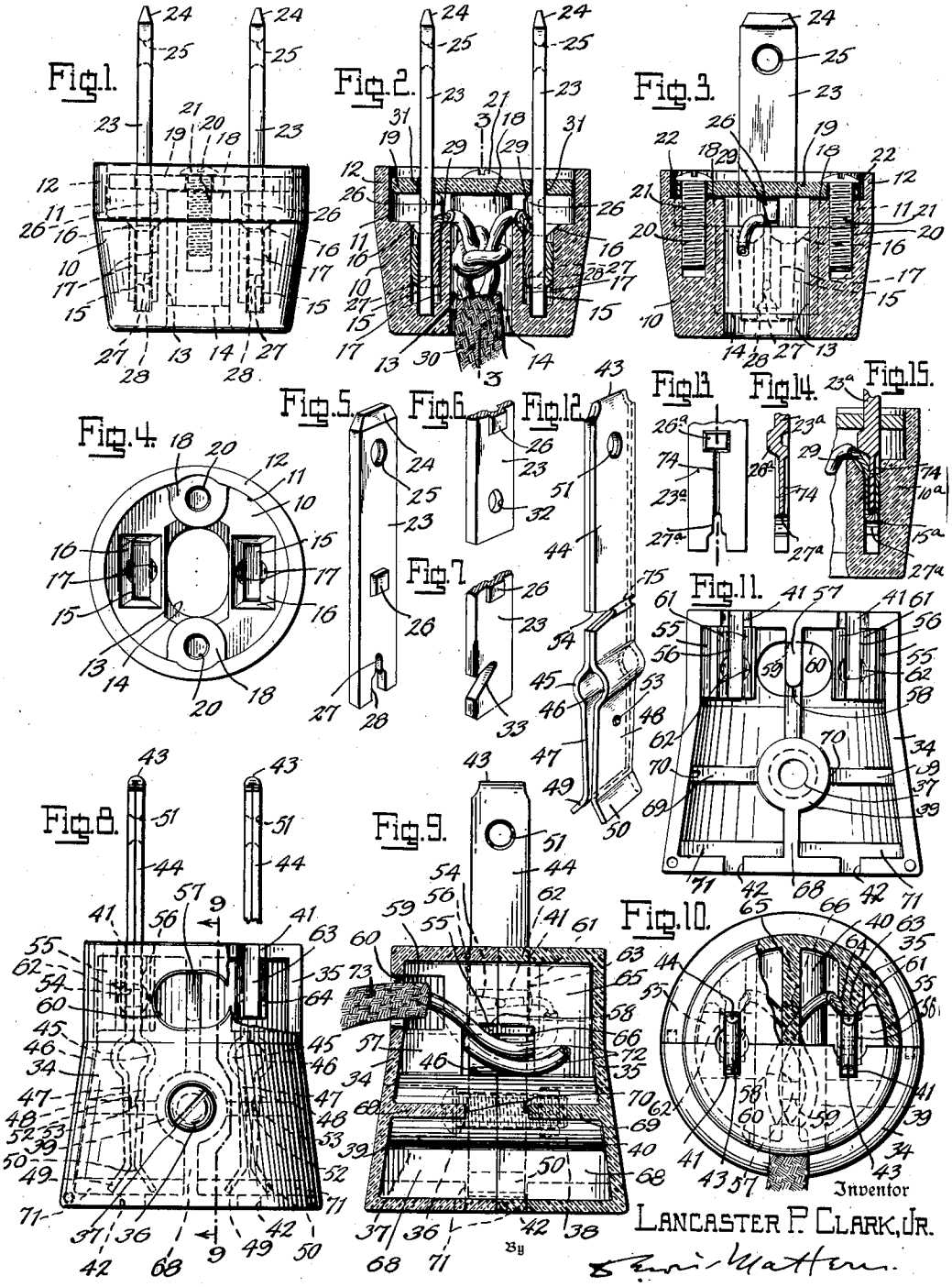


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## ELECTRICAL PLUG DEVICE

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2 Claims. (Cl. 173—361)

The present invention relates to improvements in electrical plug devices, and has for an object to provide in such a device a prong unit which may be assembled with great facility and will be securely held in the insulating housing against displacement and distortion, and further to provide a prong unit and housing construction in which the conductor wire ends may be securely connected to form proper electric contact without the use of solder, binding post screws or other such means as have been employed heretofore. To this end it is particularly proposed to provide a prong receiving recess in the insulating housing into which the wire end will be wedged into secured and tight contact relation with the prong unit, through insertion of the prong unit into the recess.

With the above and other objects in view, embodiments of the invention are shown in the accompanying drawing and these embodiments will be hereinafter more fully described with reference thereto, and the invention will be finally pointed out in the claims.

In the drawing:—

Fig. 1 is a side elevation of an electrical plug device, embodying the invention.

Fig. 2 is a vertical sectional view thereof.

Fig. 3 is a vertical sectional view, taken along the line 3—3 of Fig. 2.

Fig. 4 is a plan view of the insulating housing employed.

Fig. 5 is a perspective view of one of the prong units employed.

Fig. 6 is a fragmentary perspective view of the wire attaching end of a modified form of prong unit.

Fig. 7 is a fragmentary perspective view of the wire attaching end of a further modified form of prong unit.

Fig. 8 is a side elevation, partially broken away, of a modified form of electric plug device embodying the invention.

Fig. 9 is a vertical sectional view taken along the line 9—9 of Fig. 8.

Fig. 10 is a plan view thereof, partially broken away.

Fig. 11 is an elevation of the inner side of one of the halves of the insulating housing employed in the embodiment shown in the Figs. 8 to 10.

Fig. 12 is a perspective view of the prong contact unit similar to that employed in the embodiment shown in Figs. 8 to 11, but modified by the inclusion of grooves.

Fig. 13 is a fragmentary elevation of the wire attaching end of a further modified form of prong unit.

Fig. 14 is a vertical sectional view taken along the line 14—14 of Fig. 13.

Fig. 15 is a sectional view of a portion of the insulating housing showing the prong unit illustrated in Figures 13 and 14 inserted therein.

Similar reference characters indicate corresponding parts throughout the several figures of the drawing.

Referring to the drawing, the insulating housing or shell 10 of the plug device, according to the embodiment of the invention illustrated in Figs. 1 to 4, is preferably molded from hard rubber, "Bakelite", or other suitable material, and is provided in its upper end with a cylindrical recess 11 surrounded by an upstanding cylindrical wall 12, a central lead wire passage 13, preferably elongated in cross section, extending from the recess to the lower end of the housing, the lower end of the passage being shouldered, as at 14.

The housing is provided at each side of the lead wire opening with vertically disposed pockets 15—15, of rectangular-cross section, for receiving the prong units, beveled at their upper ends, as at 16, to facilitate insertion of the prong units, and provided in their opposed side walls with vertically disposed grooves 17. The end walls of the pockets converge slightly toward their lower ends for the purpose of binding and securing the prong and lead wire ends inserted therein, and as will hereinafter more fully appear.

Pillar posts 18—18 are found at diametrically opposed points in the recess 11 at each end of the passage 13 for mounting a closure plate 19, threaded holes 20 being provided therein for receiving the retaining screws 21—21 inserted through holes 22—22 in the plate.

A pair of prong units 23—23 are secured in the insulating housing, these being in the form of elongated metal strips of rectangular cross-section to fit into the pockets 15—15, the plugging end being of the usual form, beveled, as at 24, and provided with a contactor engaging aperture 25. A boss 26 is pressed in the prong at one side and in the inserted relation in the socket, as shown in Figs. 2 and 3, is adapted to have its upper edge engaged by the closure plate 19. The lower edge presses upon and cooperates in retaining the lead wire ends, as will presently more fully appear. At the lower end of the prong unit there is provided a notch 27, preferably slightly converging toward its closed end and having a widened entrance portion 28 at its lower end to facilitate placing of the lead wire end therein.

In operation the lead wire ends 29—29 of the cable 30, which is inserted through the passage 13, are placed in the notches 27 of the prong units which are then pressed into the pockets 15—15, through the open ends thereof, the wire ends being disposed in the grooves 17 at each side of the pockets and being tightly wedged and pressed therein against the sides of the prong units. At the same time the slight taper of the end walls of the pockets compresses the end of the prong unit thus binding the notch upon the wire and at the same time firmly holds the prong unit in place. The lower edges of the lugs 26 press the wire against the upper end of the socket wall and hold them against shifting and displacement. The closure plate 19, which has slots 31 formed therein for engaging the prong units, is secured in place by the screws 21 and through engagement with the upper edges of the lugs 26 retains the units against vertical displacement. The wire ends are thus effectually retained in tight electrical contact with the prong units by a snubbing action which prevents their displacement even under very great pulling strains.

In Figs. 6 and 7 I have shown modified forms of plug units in which the means for engaging the wire end consists of an aperture 32 in the embodiment shown in Fig. 6; and, in the form shown in Fig. 7, of an upwardly inclined tapered notch 33 extending upwardly from one of the vertical edges.

In Figs. 8 to 11 I have illustrated a modified plug device of the type in which an extension plug device may be inserted. The insulating housing, which is of generally cylindrical form, comprises two hollow half-sections 34 and 35, divided in a vertical plane, and secured together by a transverse bolt 36 extended through shouldered passages 37 and 38 provided in abutting pillar post portions 39 and 40 of the respective sections. The inner faces of the half sections have recesses and channels therein, which upon joining the sections together form pockets and passages for receiving and retaining the prong and resilient contact units and the lead wires.

The two halves are provided at their upper ends with recesses 41—41 which when the halves are bolted together form slots through which the plugging ends of the prong and contact units project, and are provided at their lower ends with recesses 42—42 in vertical alignment with the recesses 41—41, and which in the bolted together relation form slots for the insertion of the plugging ends of another plug device.

A pair of prong and contact devices or units are secured in the insulating housing, and each is preferably formed by bending a strip of suitable metal upon itself, as at 43, to form a double thickness substantially rigid plugging portion 44, the two legs being bowed outwardly at the base of the double thickness portion, as at 45 and 46, and extended in converging relation to form contact portions 47 and 48. The bowed portions 45 and 46 provide spring ends for the contact portion 47 and 48, so that they may be sprung apart into parallel prong contacting relation without bending between their ends, the spring action taking place in the bowed portions. The ends of the contact portions 47 and 48 are flared outwardly, as at 49 and 50, to provide prong guid-

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which are adapted to snap into the hole 51 of a similar prong unit when the latter is plugged into the device.

The double thickness plugging portion 44 is provided in spaced relation above the bowed portions 45 and 46 with an inwardly tapered transversely disposed notch 54 extending from one vertical edge to a point substantially midway between the two vertical edges, and into which the lead wire end is adapted to be engaged, as will presently more fully appear.

The insulating housing portion 34 is provided near the upper end with a pair of block portions 55—55 projecting above the inner face of said portion 34 and provided with slots 56—56 in line with the recesses 41—41, and into which the prong units are adapted to be engaged. The inner walls of these portions 55—55 are in parallel and spaced relation to a central vertically arranged web 57 extending from the upper end of the housing to the pillar post portion 39, this web being provided adjacent said pillar portion with a cut-out 58, the upper edge of which is near the lower ends of the block portions 55—55. The web 57 is furthermore provided adjacent the wall of the housing and near the upper end with an opening 59 adjacent and centrally disposed with relation to a lead wire opening 60 in the housing.

The slots 56—56 of the block portions 55—55 are beveled at their upper ends, as at 61—61, to facilitate engagement of the prong units and provided in their opposed side walls with transverse disposed grooves 62—62.

The insulating housing portion 35 is substantially similar to the portion 34, but instead of the slotted block portions 55—55 is provided with a pair of projecting ribs or finger portions 63—63, beveled near their outer ends, as at 64—64 and adapted in the bolted relation of the half-sections to engage the sides of the prong units to retain them firmly in the slots 56—56. The portion 35 is provided with a web 65 similar to the web 57 of the portion 34 and having a cut-out or recess 66, which with the cut-out 58 forms an interior lead wire opening.

The two housing portions 34 and 35 are provided with reinforcing webs 68 extending from the pillar posts 39 and 40 to the base and with reinforcing webs 69—69 extending from the pillar posts to the side walls, these latter webs having cut-outs 70—70 for receiving the prong units. The bases of the housing portions 34 and 35 are provided with abutment walls 71—71 registering with the ends of the slots 42—42 and which in the bolted relation of said housing portions, position the contact ends of the prong and contact units.

In operation, the lead wire ends 72—72 of the cable 73, which is inserted through the opening 60 are carried through the opening 59 at each side of the web 57 and thence in criss-cross relation through the opening 59 into relation with respective prong units, the exposed ends of the wires being placed in the notches 54—54 and the prong units then pressed in the slots 56—56 through their open ends, the wire ends being disposed in the grooves 62—62 at each side of the pockets and being tightly wedged and pressed therein against the sides of the prong units. The housing portion 35 is then bolted in place, the

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in tight electrical contact with the prong units by a snubbing action which prevents their displacement even under great pulling strains.

In Figs. 13 to 15 I have illustrated a further modification in which a prong unit 23ª, substantially similar to the unit 23 shown in Figs. 1 to 5, is provided at each side and between the notch 27ª and the boss 26ª with grooves 74—74 which may be pressed, milled, or otherwise formed therein, and in which the wire ends are adapted to engage, in the inserted relation in the socket 15ª of the insulating housing 10ª, as shown in Fig. 15. In this form the socket is provided with flat sides, the grooves as provided in the first embodiment being dispensed with.

Obviously the other embodiments may be similarly modified, by grooving the prong units and dispensing with the grooves in the socket. For instance, a prong and contact unit similar to that shown in Figs. 8 to 11 may be provided with grooves 75 at each side, as shown in Fig. 12.

I have illustrated and described preferred and satisfactory embodiments of the invention but it will be obvious that changes may be made therein, within the spirit and scope thereof, as defined in the appended claims.

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

1. In an electrical plug device, a housing of insulating material having a prong receiving pocket portion comprising a pair of opposed spaced side surfaces and an open end, and a metallic prong unit comprising a wire attaching portion disposed in said pocket portion and a plugging portion projecting therefrom, said wire attaching portion being engageable with said pocket portion through said open end and by movement parallel to the axis of said pocket portion which axis is perpendicular to said open end, said wire attaching portion having an open-ended notch extending inwardly from one surface, the wire attached to said prong unit projecting from said open end of said pocket portion and having a U-shaped end portion embracing said wire attaching portion with its bight disposed in said notch and its side legs disposed at each side of said wire attaching portion and extending from said bight toward said open end of said pocket portion, said side legs being pressed between the side surfaces of said wire attaching portion and the side surfaces of said pocket portion, the side surfaces of one of said portions each having a groove for receiving and positioning a side leg of said wire, said grooves being parallel to said axis of said pocket portion.

2. In an electrical plug device, a housing of insulating material having a prong receiving portion, said receiving portion comprising side walls and end walls, said end walls converging toward their lower ends and a metallic prong unit engaged in said receiving portion and having a bifurcated wire receiving portion adapted to position a wire end at each side of said prong, said wire end portions at each side of said prong being held between the sides of said prong unit and said side walls of said prong receiving portion through engagement of said prong unit therein, and said prong being transversely compressed by said converging end walls of the prong receiving portion.

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