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A. J. WIER

2,625,577

SWITCHBOARD PLUG

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FIG. 1

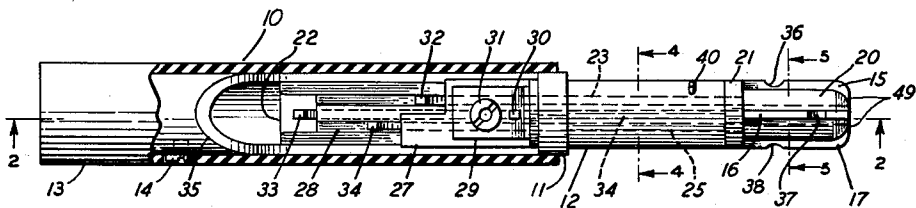


FIG. 2

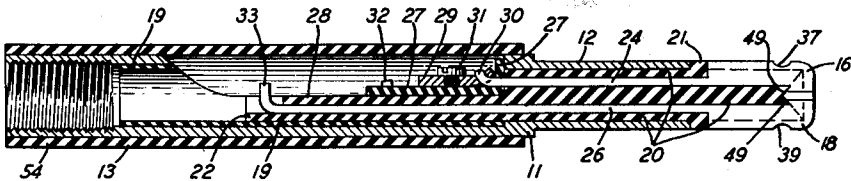


FIG. 3

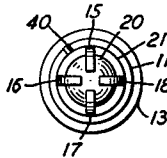


FIG. 4

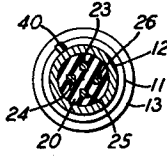


FIG. 5

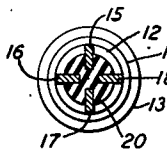
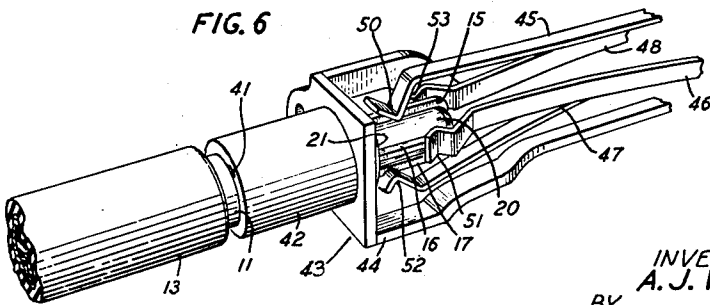


FIG. 6



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SWITCHBOARD PLUG

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2 Claims. (Cl. 173-361)

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This invention relates to switchboard plugs and more particularly to telephone switchboard plugs having more than three conductors.

Conventional three-conductor telephone switchboard plugs have a small diameter tip portion which is a requirement so that the switchboard jacks with which such plugs are used can be closely spaced to permit as many jacks as possible in a given area of a switchboard face.

The introduction of four-wire toll line circuits in the telephone plant has created the need for switchboard plugs and jacks having more than three, for example five, conductors but retaining the same diameter of the tip portion of the plugs and the same switchboard jack spacing as is used with the conventional three-conductor plugs and jacks.

An object of this invention is the provision of switchboard plugs having more than three conductors, without increase in the diameter of the tip portion of the plugs as compared to the diameter of the tip portion in the conventional three-conductor telephone switchboard plugs.

A feature of this invention relates to an arrangement of contact pieces on the tip of a plug, insulated from the plug sleeve and body and also from each other and each terminating within the body of the plug and arranged therein for connection to a flexible electrical conductor of a switchboard cord.

Another feature relates to a means for guiding the plug into the sleeve of a switchboard jack in a predetermined manner so that the contact pieces in the tip of the plug will engage springs of the jack in the same definite relationship upon every insertion of the plug in the jack.

The invention will be more fully understood from a consideration of the embodiment illustrated in the accompanying drawing in which:

Fig. 1 is a plan view of a switchboard plug made in accordance with the features of this invention, in which the shell of the plug is partially cut away to show the arrangement within the body of the plug;

Fig. 2 is a sectional view showing the plug cut in a plane along the line 2-2 of Fig. 1;

Fig. 3 is an end elevational view of the tip end of the plug of Fig. 1;

Fig. 4 is a cross-sectional view of the plug in a plane along the line 4-4 of Fig. 1;

Fig. 5 is a cross-sectional view of the plug in a plane along the line 5-5 of Fig. 1; and

Fig. 6 is a perspective view of a portion of the

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plug of Fig. 1 with the plug inserted in the sleeve of a switchboard jack, portions only of the jack frame and jack springs being shown.

Referring now to the drawing, the switchboard plug 10 has a metallic tubular body 11 of uniform diameter with a tip 12 of lesser uniform diameter, body 11 and tip 12 being formed, advantageously, in one piece. A sleeve 13 composed of phenolic fibre or similar insulating material covers almost the entire length of body 11. Sleeve 13 is held in place on body 11 by a machine screw 14 which threads into body 11 through a countersunk clearance hole in sleeve 13, in such a manner that the edge of the screw head is below the surface of sleeve 13.

Four contact members or fins 15, 16, 17, 18 protrude from the end of tip 12 and are imbedded in insulating material 20 which may be, for example, a phenolic condensation product. The insulating material 20 extends through the bore of tip 12 into the interior portion of the body 11 of the plug 10. An insulating ring 21 is formed as part of the protruding insulation material 20 and has a diameter equal to the diameter of tip 12. End 22 of the insulation material 20 within body 11 lies at a point about mid-way of the axial length of body 11. An inner shell 19 lies within body 11 as a spacer required due to the difference in the bores of body 11 and tip 12.

Fins 15, 16, 17, 18 have shanks 23, 24, 25, 26, respectively, which extend through insulation material 20 into the interior of body 11. An insulating piece 27 composed of, for example, a phenolic condensation product, lies within body 11 upon a flat surface 28 of the insulation material 20. A metal plate 29 lies upon insulating piece 27. End 30 of shank 24 is inserted through a hole in plate 28 and is soldered or brazed to plate 28. Plate 28 carries a machine screw 31 which threads into it for use in attaching a conductor of a switchboard cord to plate 28. End 32 of shank 23 protrudes from insulation material 20 and is formed for attaching a conductor of a switchboard cord thereto, as for example, by soldering or other suitable means. End 33 of shank 26, and end 34 of shank 25 also protrude from the insulation material 20 and are formed in a manner similar to end 32 of shank 23 for attaching a conductor of a switchboard cord to each. An opening 35 is provided in body 11 to give access to the interior thereof for attaching the conductors of a switchboard cord to screw 31 and shank ends 32, 33, 34.

Fins 15, 16, 17, 18 are each provided with a

hook 49 which projects longitudinally along the axis of plug 10 with the hook pointing toward the body 11. Hooks 49 engage the outer end of insulation 20 which is countersunk or beveled at an angle with the axis of plug 10, this angle corresponding to the angle of the inwardly projecting faces of hooks 49. The engagement of hooks 49 with the beveled end of insulation 20 secures the tip ends of fins 15, 16, 17, 18 to prevent their movement outward from the axis of plug 10. Plastic material is moulded on the end of insulation 20 between fins 15, 16, 17, 18 to form a round end to the plug.

Fins 15, 16, 17, 18 are also provided with detents 36, 37, 38, 39, respectively, as shown in Fig. 1 and Fig. 3. These detents are for engagement with the angular end portions 50, 51, 52, 53, respectively, of jack springs 45, 46, 47, 48, shown in Fig. 6.

A metallic pin 40 protrudes from tip 12 near the insulating ring 21. Pin 40 is for guiding the plug tip 12 into a slot 41 of the sleeve 42 of a switchboard jack 43, of which sleeve 42 and parts of a frame 44 and jack springs 45, 46, 47, 48 are shown in Fig. 6.

The inner surface of the end portion of body 11 has a threaded portion 54 as shown in Fig. 2, which is provided for screwing the plug 10 onto the end portion of the braided outer covering of a switchboard cord not shown. The connection between the sleeve conductor of the cord and the body 11 of plug 10 is made in the conventional manner by bending this sleeve conductor of the cord backwards along the braided outer covering of the cord before the plug is screwed onto the cord. This forces the sleeve conductor of the cord into intimate contact with body 11 of plug 10, and provides the fifth conductor for the plug 10.

The operation of the plug of this invention is by insertion of the tip portion thereof in the sleeve 42 of jack 43 with pin 40 inserted in slot 41 of sleeve 42. This pin insures that the contact fins 15, 16, 17, 18 of the plug can only make contact with certain of the jack springs 45, 46, 47, 48. Specifically, fin 15 can only make contact with spring 45, fin 16 with spring 46, fin 17 with spring 47 and fin 18 with spring 48. Until pin 40 enters slot 41 the tip portion of the plug cannot enter jack sleeve 42 far enough for any of the fins 15, 16, 17 or 18 to make contact with any of the jack contact springs 45, 46, 47, 48.

When pin 40 enters slot 41 and the tip portion of plug 10 is pushed into jack sleeve 42, the fins 15, 16, 17, 18 press against the ends of jack springs 45, 46, 47, 48 which are bent outwardly from the axis of jack sleeve 42. As the fins move into the jack 43 each fin lifts the end of its related jack spring slightly. When the shoulder of sleeve 11 reaches the face of jack sleeve 43, the fins 15, 16, 17, 18 have progressed

into jack 43 to a position whereby the angular end portions 50, 51, 52, 53 of jack springs 45, 46, 47, 48 drop into detents 36, 37, 38, 39, respectively, due to their spring tension, and this spring tension of the angular end portions of the jack springs in the detents secures the plug in the jack until sufficient pull is exerted to overcome this tension and allow the withdrawal of the plug from the jack.

While this invention has been disclosed with reference to one specific embodiment, it is, of course, understood that modifications may be made in the detail assembly without departing from the scope and spirit of the invention.

What is claimed is:

1. An electrical connecting plug comprising an outer shell of insulating material, a metal sleeve positioned in said shell and extending some distance beyond one end thereof, an insulating member positioned in said sleeve and having a portion thereof extending beyond said end thereof, a quad of conducting members embedded in said insulating member extending longitudinally therewith and having at one end thereof notched fin-like portions projecting radially beyond the surface of the exposed portion of said insulating member and arranged in space quadrature, the inner ends of said conducting members having connections thereon for securing electrical conductors thereto.

2. An electrical connecting plug comprising an outer shell of insulating material, a metal sleeve positioned in said shell and extending some distance beyond the end thereof, an insulating member positioned in said sleeve and having a portion thereof extending beyond the end thereof, a quad of conducting members embedded in said insulating member extending longitudinally therewith and having at one end thereof fin-like portions projecting radially beyond the surface of the exposed portion of said insulating member and arranged in space quadrature, said fins having staggered notches therein for the reception of contact springs, the inner ends of said conducting members having connections thereon for securing electrical conductors thereto, and means on said sleeve for making an electrical connection thereto.

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