April 16, 1946. C. A. GEERS ET AL 2,398,634

ELECTRICAL PLUG AND SOCKET

Filed July 14, 1943

FIG. 1

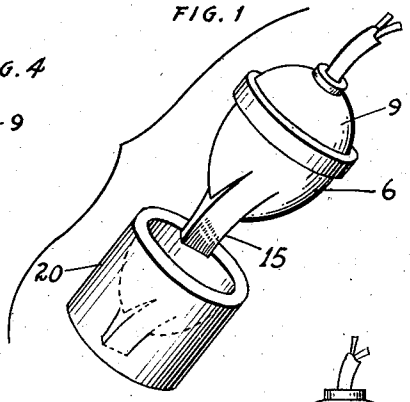
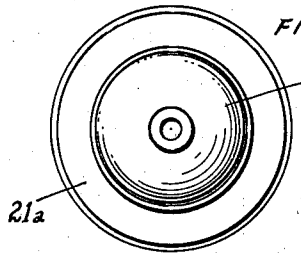


FIG. 4



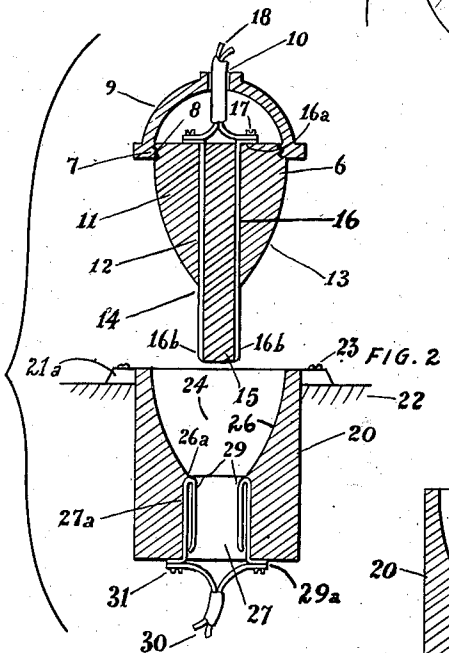


FIG. 2

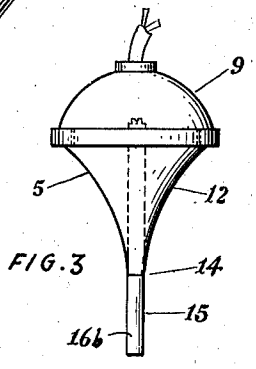


FIG. 3

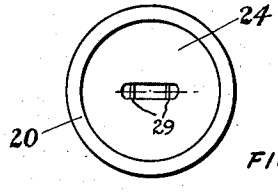


FIG. 5

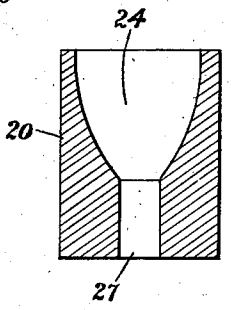


FIG. 6

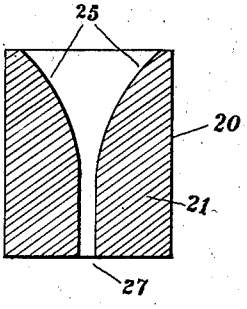


FIG. 7

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ELECTRICAL PLUG AND SOCKET

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Application July 14, 1943, Serial No. 494,664

1 Claim. (Cl. 173—332)

This invention relates to electrical plugs and sockets for the conveyance of electrical current from the bus or power lines to electrical utilities to be operated thereby, and the general object of the invention is to provide a relatively simplified method and means for making such connections.

A further object of the invention is to provide an electrical plug comprising a base or body portion defined by four side walls, of which two of the opposite walls thereof are convexed in formation on a longitudinal section, and the remaining two opposite walls are concaved on a similar longitudinal section, the surfaces of the four walls merging laterally and gradiently into one another and also tapering inwardly from the outer end of the plug towards the inner end thereof, in such manner that any cross section of the base of the plug inwardly of the flat and narrow extremity thereof would be oval, ovate or elliptical in outline, the ovateness of the sections increasing from the outer end towards the inner end of the plug, the said plug having an elongated and regularly formed flat stem, prong or tongue axially extended from its inner end, and a receptacle having a socket formed therein nicely complemental to the described plug and thus adapted to freely and snugly receive and seat the plug, there being electrical conductors extended through the plug and along the opposite edges of the said flat stem thereof, with the inner ends of the said conductors arranged and adapted for slidably contacting electrical terminals seated within the inner end of the socket of the receptacle, the said terminals being in turn conventionally connected with the main bus or power lines of the installation.

A further object is to provide an electrical plug defined on its sides by concavo-convex walls tapered inwardly to form a base that is ovate in cross section, and a receptacle formed with a socket complemental to the plug, to receive and seat the latter, whereby electrical connections are more easily made than with the usual two-pronged plugs, even in darkness or where the receptacle may be located in a rather inaccessible or difficult position, the complemental formations of plug and socket being such as to lead the plug readily and almost automatically into the socket, to complete the electrical connection.

A further object of the invention is to provide an electrical receptacle formed with a socket having two opposite sides or walls convexed from end to end of the socket, and the remaining two opposite sides or walls concaved from end to end of the socket, the surfaces of these walls merging laterally and gradually into one another and being also tapered inwardly from the outer to the inner end of the socket, so that various cross sections as taken through the socket would be increasingly oval or ovate in form from the outer to the inner end of the socket, the said socket terminating in a regularly elongated and flat channel or duct opening out through the inner end of the receptacle, there being electrical terminals or contacts seated within the opposite constricted margins of the channel arranged for connection with the power or bus lines of the installation, and an electrical plug formed complementally to the socket of the receptacle and thereby adapted to nicely and freely slide into and seat itself within the socket of the receptacle, the plug being formed with a flat stem or prong adapted to slidably pass within the flat channel of the socket of the receptacle, there being conductors extended through the plug and along the edges of the flat stem thereof adapted to slidably contact the said terminals of the flat channel at the inner end of the socket of the receptacle.

A further object is to provide an electrical receptacle formed with a socket having a single opening at the inner end thereof, the said opening being oval or oblong in cross section, and an electrical plug formed complementally to seat within the socket of the receptacle and having a single prong extended at its inner end, said prong being ovate or oval in cross section, to slide into the complemental opening at the inner end of the socket of the receptacle and conductors and terminals mounted in the plug and in the socket of the receptacle for completing an electrical connection when the plug is seated in the receptacle.

With the foregoing objects in view, together with such other and further objects and advantages as may appear from the following specification, attention is now directed to the accompanying drawing wherein are shown certain preferred embodiments of the invention, and wherein:

Figure 1 is a perspective view of a socketed receptacle and its associate complemental plug, formed in accordance with this invention, the plug being shown as partially withdrawn from the receptacle.

Figure 2 is a longitudinal section through the plug and receptacle as represented in Figure 1.

Figure 3 is a side elevation of the plug as represented in Figure 1, taken at an angle of ninety degrees from the view of Figure 2, and showing an edgewise view of the plug stem.

Figure 4 is a top plan view of the assembled plug and receptacle.

Figure 5 is a bottom plan view of the assembled plug and receptacle.

Fig. 6 is a sectional view of the body of the receptacle shown in Fig. 2.

Fig. 7 is a section of the body of the receptacle taken at an angle of ninety degrees from the view of Fig. 6.

The invention comprises an electrical plug represented generally at 5 and made of any suitable non-conductive or dielectric material, such as "Bakelite," rubber or plastic. The plug 5 is here shown as formed with a circular head 6 which is exteriorly threaded as indicated at 7 for engaging the interiorly threaded margin of the semi-spherical cap 9, as indicated at 8. The cap 9 is apertured as at 10 for passing electrical wires or conductors from the plug outwardly. Thus this cap may be readily secured on the plug, or it may be removed when necessary for inserting, replacing or repairing the wires.

For the sake of clarity and convenience, the capped end of the plug is hereinafter referred to as the outer end thereof, and the opposite end is referred to as the inner end thereof.

Inwardly of the circular head 6 the base or body portion 11 of the plug is formed with and defined by four sides or walls, including two oppositely disposed and inwardly inclined and tapered concaved walls 12, designated as side walls, and two oppositely disposed and inwardly inclined and tapered, convexed end walls 13. The walls 12 and 13 gradiently merge into one another at their margins, and they also taperingly meet inwardly at a common point 14. Thus all cross sections as taken through the base or body portion 11 of the plug, will be defined by oval, ovate or elliptical margins, with the characteristic of ellipticity regularly increasing from the outer end of the plug to the inwardly located point 14, the common meeting point of the inner ends of the walls 12 and 13. From the point 14 the plug is axially and regularly extended in the form of a relatively thin, flat and narrow contact stem, prong or tongue 15, which is also oblong or elliptical in cross section, and the plane of which coincides with the medial plane cutting through the convexed end walls 13, as clearly shown in the drawing.

A pair of short wires or strip metal conductors are extended through the base and head of the plug in a spaced relation, through bores formed therethrough for the purpose. These conductors are indicated at 16, and they emerge at the inner end of the plug immediately at the lateral edges of the contact stem 15, to which edges they may be secured in any conventional manner. These extended ends of the conductors 16 are indicated at 16*b*, and they serve as contact terminals in manner later to be pointed out. The outer ends of the conductors 16 are turned angularly out and flattened upon the head of the plug, as indicated at 16*a*, and are tapped through to receive small screws 17, whereby outer service wires 18 may be operatively secured to the ends 16*a* of the conductors 16, after passing through the aperture 10 of the cap 9. The screws 17 also pass into the head of the plug, for firmly anchoring the wires or conductors thereto. Thus the plug is completed.

A receptacle for the described plug is provided, the same being represented generally at 20 and including a body portion 21 of dielectric material adapted for seating in a base-board 22 or in any other desirable location. For this attachment the outer end of the body portion is formed with an encircling flange 21*a* through which screws 23 may be passed into the base-board.

The receptacle 20 is formed with a socket 24 which is substantially complemental to the shape and configuration of the base or body portion of the plug 5. Hence this socket has two oppositely disposed and convexed side walls 25 which are inwardly inclined and tapered towards the inner end of the socket, and two oppositely disposed and concaved end walls 26 which are likewise inwardly inclined and tapered towards the inner end of the socket, whereby the socket is adapted to freely and snugly receive and seat the base or body portion 11 of the plug. It is to be noted that the walls of the socket 24 also gradiently merge at their margins, as do the walls of the plug, thus ensuring the exact inter-fitting of the plug and socket. At its inner end the socket 24 is extended in the form of a straight, narrow and flat duct or channel 27, the plane of which is disposed in the plane cutting medially through the concaved end walls 26 of the socket. Thus this duct 27 extends axially from the inner end of the main socket, from the point 28 thereof which marks the meeting point of the inner ends of the walls of the socket, to a length approximately equal to the length of the stem or prong 15 of the plug 5. The duct 27 is dimensioned to freely receive the stem 15 of the plug, but the duct is slightly widened relative to this stem, as indicated at 27*a*, thus providing elongated recesses which are over-hung and protected by the overlying margins 26*a* of the inner ends of the end walls 26 of the socket 24. Within these elongated recesses 27*a* a pair of looped terminal conductors or contacts 29 are mounted and secured in place in any conventional manner, as by passing small screws 31 through the angularly out-turned ends 29*a* of one leg of each of these looped terminals. It is to be noted that the terminals 29 are formed of spring wire or spring metal strips which are doubled medially upon themselves, and that they are disposed within the recesses 27*a* with the bights of the loops located upwardly immediately within or under the overhanging margins 26*a* of the end walls 26 of the socket 24. Thus these terminals are not only protected from dislodgement in the operation of inserting the plug, but because of the narrowness of the channel or duct 27 it is impossible for children to insert their fingers into this channel or into contact with the terminals or contacts 29. Conductor wires 30 running from the power or bus lines (not shown) are connected to the screws 31 of the terminals 29, for completing the installation.

In use and operation and owing to the described unique construction of the plug and socketed receptacle, the former is readily and almost automatically seated within the latter without any trouble or difficulty, even in the dark. In this operation the single prong or stem of the plug is easily led into the single duct or channel at the inner end of the socket of the receptacle, and the ovate and concave or concavo-convex formations of the walls of the plug and of the socket, cooperate through the ellipticity of the resulting cross-sectional structures, to automatically lead the plug to its seat in the socket, so that the terminal contacts 16*b* may be readily inserted in the duct or channel 27 of the socket 24, and into slidable engagement with the terminals 29 located in the margins of this channel, thus com-

pleting the electrical connection. The resilience of the looped terminals 29 ensure at all times a positive contact thereof with the terminals or contacts 16b.

The head 6 of the plug 5 is here shown as circular, for the purpose of threading it to engage the threaded cap 9. Otherwise this cap as well as the head itself, might also be of oblong or elliptical formation conformably with the base of the plug, and any conventional means might then be employed for covering or protecting the lead out wires at their juncture with the conductors passed through the plug.

While we have here shown and described certain preferred embodiments of the invention, together with certain specific structural features thereof, it is understood that minor changes and modifications may be made in the structural features as here shown, not departing however from the coverage or limits of the appended claim.

We claim:

In a device of the kind described, an electrical receptacle having a socket formed therein elliptical in cross section, with the side and end walls thereof taperingly converging from the outer end of the socket towards the inner end thereof, the socket being increasingly elliptical in successive cross sections from its outer end towards its inner end, the inner extremity of the socket being formed regularly as a straight, flat and relatively narrow duct extended axially from the main socket, electrical terminals mounted in the constricted margins of the said duct, whereby the said receptacle as so formed is adapted to removably receive a complementally formed electrical plug.

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