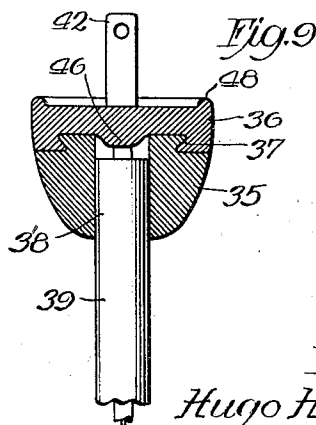
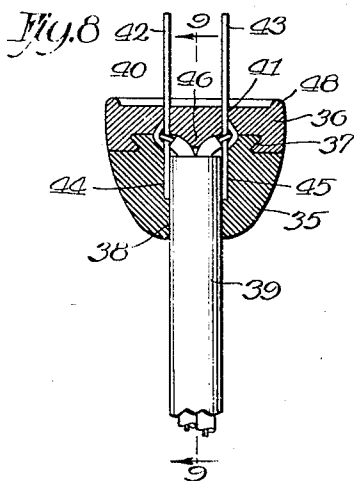
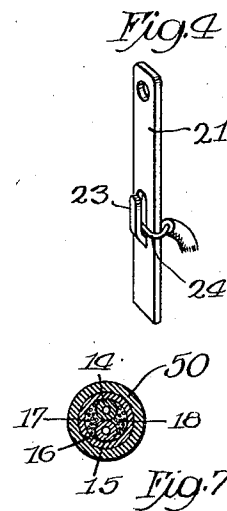
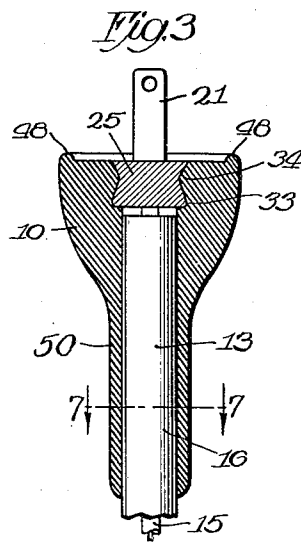
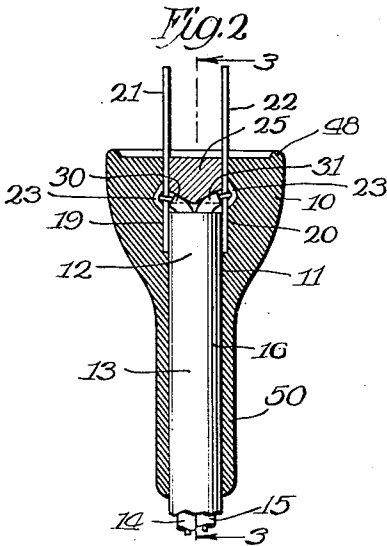
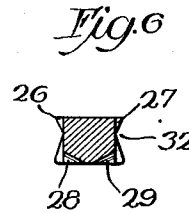
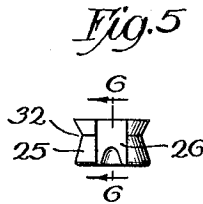
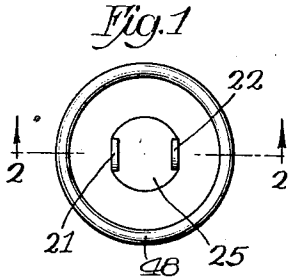


May 10, 1932.

H. H. WERMINE
ELECTRIC PLUG CONNECTER
Filed March 28, 1927

1,858,196



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UNITED STATES PATENT OFFICE

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ELECTRIC PLUG CONNECTER

Application filed March 28, 1927. Serial No. 178,945.

This invention relates to electric plug connectors of the type which are used for connecting an electrical device to an electric current supply line, a suitable socket, connected to the line, being provided for receiving the plugs.

The principal object of the invention is to provide a plug connector which will be practically unbreakable, weather proof, and consequently particularly adapted to outside use as well as other ordinary uses.

Another object of the invention is to provide a plug connector such as above described which will be easy to manufacture, relatively low in cost of production and capable of being easily and quickly connected to a suitable conductor.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings, in which I have illustrated a plug embodying the features of the invention, two forms thereof being shown, and in which drawings:

Fig. 1 is a plan.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is a perspective of one of the elements constituting the plug.

Figs. 5 and 6 are detail illustrations of another element of the plug, Fig. 6 being a section on the line 6—6 of Fig. 5.

Fig. 7 is a section on the line 7—7 of Fig. 3, and

Figs. 8 and 9 are sections corresponding to Figs. 2 and 3, but showing a modified construction.

Referring now to the drawings, and more particularly to Figs. 1 to 6 inclusive, my improved plug connector comprises a body portion 10, of resilient material, preferably rubber, which body portion is provided with an axial aperture 11 extending therethrough. The body portion 10 is preferably round in cross section as shown in Fig. 1, and is shaped preferably as shown in Fig. 2 so as to facilitate gripping thereof when the plug is to be inserted or withdrawn from a socket.

The aperture 11 is preferably round in cross section to accommodate an end portion 12 of

a cable 13. This cable comprises a pair of relatively insulated conductor members 14 and 15 which are enclosed in a sheath of insulating material such as rubber, indicated at 16. In Fig. 7 I have illustrated the structure of this cable in cross section and as indicated at 17 and 18, I provide a filler of cotton cord or the like to facilitate the formation of the round cable structure.

The body portion 10 is recessed at 19 and 20, at opposite sides of the aperture 11 to receive inner end portions of contact prongs 21 and 22 respectively. These contact prongs comprise relatively stiff metal members such as shown in Fig. 4 and are provided with a lug 23 punched outwardly therefrom and adapted to receive a bared portion 24 of the respective conductors between the lug and strip proper. The bared portion of the conductor may be soldered to the strip and the lug bent inwardly as best shown in Fig. 2, so as to clamp the conductor in place and to some extent relieve the soldered connection of strain due to pulling on the conductor. Such connection of the conductors to the contact prongs results in an abutment means extending laterally from the contact prongs which means is adapted to engage a portion of the plug, as clearly indicated in Fig. 2 and Fig. 8, so that the prongs cannot readily be pulled endwise from the plug, even in case the cable 13 could be freely drawn through the aperture by so pulling the contact prongs.

In order to maintain the contact prongs 21 and 22 in properly spaced relation, I provide a plug 25 which is adapted to be seated in the aperture in the body portion at the end of the body from which the contact prongs project. The plug 25 is provided with recesses 26 and 27 for receiving the contact prongs 21 and 22 respectively, and also with recesses 28 and 29 in its inner end portion for receiving extreme inner end portions of the conductors 14 and 15 as indicated at 30 and 31 (Fig. 2). The plug member 25 is also provided with an intermediate portion of reduced diameter as indicated at 32 and the aperture in the body portion 10 is provided with an end portion 33 of enlarged diameter, which end portion is provided with

an intermediate portion 34 of a reduced diameter to correspond to the diameter of the reduced portion 32 of the plug. As above brought out, the body portion 10 is of resilient material such as rubber, and the plug which may be of rubber also, may be forced into the enlarged portion 33 of the axial aperture, so that the reduced portion 34 thereof, engages the reduced portion 32 of the plug and thereby locks the plug in place.

It will be readily understood that both the plug 25 and body portion 10 may be made of resilient material, or that the plug may be of resilient material and the body portion of relatively hard material. Any of these combinations may of course, be assembled in the above described manner.

As above brought out, the cable member 13 may, if desired, be provided with a rubber sheath 16, in which case the cable may be easily vulcanized or cemented in place in the body portion 10 so as to prevent separation therefrom. However, I have found it sufficient to make the aperture 11 in the body portion of such a diameter that it will be a fairly snug fit over the cable end portion so that the cable will be thereby gripped and held in the said body portion. The connection of the conductors 14 and 15 to the prongs 21 and 22 also serve to prevent separation of the cable from the plug since the contact prongs 21 and 22 are seated in the recess in the body portion, which limit their movement inwardly thereof.

When the plug is connected to a cable used in connection with a device which subjects the cable to a relatively large amount of flexing, I have found it desirable to provide means for preventing sharp bending of the cable adjacent the plug. In the present instance I provide a sleeve 50 of rubber or other material of which the plug is made, integral with the plug and extending therefrom a distance sufficient to reinforce the cable for a short distance adjacent the plug. It will be seen that such a sleeve will be effective to prevent sharp bending of the cable in the vicinity adjacent the plug and thereby to prevent breakage of the conductors in the said vicinity.

In Figs. 8 and 9 I have illustrated a modified construction of my improved plug, and in this form, I provide a body portion 35 and a cap member 36, either or both of which may be of resilient material such as rubber and provided with a dovetail interlocking connection 37 whereby the two members are adapted to be locked together. In this form, the body portion 35 is provided with an axial aperture 38 for receiving the cable 39 and the cap member 36 is apertured as indicated at 40 and 41 for permitting passage therethrough of a pair of contact prongs 42 and 43 respectively. The contact prongs 42 and 43 are seated in the body portion 35 by

means of recesses 44 and 45 provided in the body portion for receiving the inner ends of the said contact prongs. The conductors of the cable may be connected to the contact prongs in a manner similar to that described above in connection with Figs. 1 to 6 inclusive and the cap member 36 may conveniently be provided with a separating or spreading boss 46 for spreading the extreme inner end portions of the said conductors.

I have found it desirable to provide an upstanding bead or edge portion 48 as shown in both of the above described forms of construction, which bead portion is of resilient material and adapted to engage the face portion of a socket with which the connector plug is connected. This bead is effective to produce a substantially water-tight joint between the socket and the plug by conforming closely to the shape of the socket portion which it engages, the frictional contact between the socket elements and the contact prongs of the plug being sufficient to maintain the plug, and the bead thereon, in relatively tight engagement with the socket.

It will be apparent to those skilled in the art that the above described plug connector structure will be practically unbreakable, the body portion being of resilient material such as rubber, and further, that the plug will be weather-proof since there are no openings through which water or moisture can readily find its way to the interior of the plug.

I am aware that various other changes in the form, construction and arrangement of parts in my improved plug may be made without departing from the spirit of the invention, the scope of which should be determined by reference to the following claims, which should be construed as broadly as possible consistent with the state of the art.

I claim as my invention:

1. In a male connector plug for separable electric connectors, the combination of a conductor cord, a contact prong connected to the end of said cord and a two-part body comprising a shank part apertured to receive and fit the cord, and a front or closure part shaped to position the prong, one of said body parts being provided with an undercut recess, the other body part being provided with a dovetail portion interlocked and fitting within said recess, one of said parts being made of resilient material capable of being distorted to permit insertion of the dovetail into the recess.

2. In an electric plug connector, the combination of a body member provided with an aperture extending therethrough, a pair of spaced contact prongs having inner end portions disposed in the front end of said aperture at opposite sides thereof and outer end portions projecting therefrom, a cap member fitting over the front end of said body member and having a pair of spaced apertures ex-

tending therethrough for receiving and maintaining said contact prongs in spaced relation, said cap member being interlocked with said body and forming a closure for the front end of said aperture, said body member and said cap member being relatively distortible to permit said parts to be assembled in said interlocking engagement, and a pair of electric conductors extending out of the rear end of said aperture and respectively connected to said contact prongs within said body member.

3. In an electric plug connector, the combination of a body member, having an aperture extending therethrough, a pair of spaced contact prongs having inner end portions disposed in said aperture at opposite sides thereof and outer end portions projecting therefrom, a cable fitting one end of the aperture and comprising a pair of electrical conductors having their ends connected respectively to the inner end portions of said contact prongs, said cable being provided with a sheath of insulating material and being of substantially the same cross sectional size as said aperture, an end portion of said cable being disposed between the inner end portions of said contact prongs and serving to space said inner end portions of said prongs, and a member secured to said body member for closing the other end of the aperture and also serving to maintain said contact prongs in spaced relation.

4. In an electric plug connector, the combination of a body member, having an aperture extending therethrough, a pair of spaced contact prongs having inner end portions disposed in said aperture at opposite sides thereof and outer end portions projecting therefrom, a cable fitting one end of the aperture and comprising a pair of electrical conductors having their ends connected respectively to the inner end portions of said contact prongs, said cable being provided with a sheath of insulating material and being of substantially the same cross sectional size as said aperture, an end portion of said cable being disposed between the inner end portions of said contact prongs and serving to space said inner end portions of said prongs, and a member secured to said body member for closing the other end of the aperture and also serving to maintain said contact prongs in spaced relation, the body being provided with shoulders engaging said prongs to prevent endwise movement of the prongs relative to the body.

5. In a male connector plug for separable electric sockets, the combination of a conductor cord, a contact prong connected to the end of said cord, a two part body comprising a main body part apertured to receive and fit the cord, and a front or closure part shaped to position the prong, one of said body parts being provided with an undercut recess and

the other part being provided with a dovetail portion interlocked and fitting within said recess, one of said parts being made of resilient material capable of being distorted to permit insertion of the dovetail into the recess, and said front part being in effect an axial extension of said main body part, and forming with the latter an enclosure for the connection between said prong and conductor.

6. A body for a male connector plug comprising a rear or main part and a front or closure part, said rear part having an annular, forwardly facing seat adjacent its periphery and an undercut shoulder adjacent the inner edge of said seat, said front part being provided with a rearwardly facing annular seat adapted to engage said forwardly facing seat, said front part being also provided with an undercut part adapted to interlock with the undercut part on said main body part, and said front part being made of resilient material capable of being distorted to permit assembly of said parts into interlocking engagement, and said resilient part comprising the part of the plug having the largest transverse dimension.

7. An electric plug connector including a contact prong and a body divided transversely intermediate its ends into a front part and a rear part, one of said parts having an undercut recess and the other part having a dovetail part adapted to interlock with said recess for locking said parts together, one of said parts being made of resilient material capable of being distorted to permit assembling or disassembling of said parts in said interlocked relation, said parts cooperating to support and to maintain said contact prong in operative position relative to the plug body.

8. In an electric plug connector, the combination of a body member divided transversely intermediate its ends into a front part and a rear part, one of said parts having an undercut recess and the other part having a dovetail part adapted to interlock with said recess for locking said parts together, one of said parts being made of resilient material capable of being distorted to permit assembling or disassembling of said parts in said interlocked relation, said rear part having an aperture extending therethrough, a pair of spaced contact prongs extending through said front part and having their respective inner end portions seated in the front end of said rear part adjacent opposite side portions of said aperture, and a pair of conductors disposed in the aperture in said rear part and respectively connected to said inner end portions, within said divided body.

9. A connector member comprising a base made of a soft, flexible, elastic rubber-like material, removable connector pins supported in said base, and a retainer for said pins,

the elastic base cooperating with the retainer to hold all of the parts removably in assembled relation.

10. An electric plug connector comprising
 5 a body and a pair of independent, spaced contact prongs projecting from the front end of said body, said body including a plurality of independent parts, one of which is an
 10 outer member formed of resilient, substantially non-breakable, insulating material, and arranged to interlock with another body part to maintain such parts in assembled relation, the resilient part being distortable to
 15 permit assembly and disassembly of said parts, said body being provided with an opening for receiving a duplex electric conductor and with seats for receiving inner end portions of said contact prongs, said body
 20 parts cooperating to maintain said prongs in operative position.

11. In an electric plug connector, the combination of a contact prong, a conductor connected to said contact prong and a two part housing for said connection, comprising an
 25 inner part and an outer part, the latter having an opening for admitting said inner part, one part having a recess therein for receiving a portion of the prong and into which recess said prong portion is capable of
 30 being introduced after the connection is effected, said recess constituting a means for initially positioning said prong in said recessed part before said parts are assembled together, the other part constituting a closure
 35 for the said recess, the inner part having a transverse dimension normally superior to the interior dimension of the opening in said outer part, one of said parts being made
 40 of elastic material so as to permit assembly of said parts together and so as to maintain said parts in position after assembly and thereby complete the positioning of said
 prong securely in said recess.

12. In an electric plug connector, the combination of a contact prong, a conductor connected to said contact prong and a two part housing for said connection, comprising an
 45 inner part and an outer part, the latter having an opening for admitting said inner part, one part having a recess therein for receiving a portion of the prong and into which recess said prong portion is capable of
 50 being introduced after the connection is effected, said recess constituting a means for initially positioning said prong in said recessed part before said parts are assembled together, the other part constituting a closure
 55 for the said recess, the inner part having a transverse dimension normally superior to the interior dimension of the opening in said outer part, one of said parts being made
 60 of elastic material so as to permit assembly of said parts together and so as to maintain said parts in position after assembly, and thereby complete the positioning of said
 65

prong securely in said recess, the prong member being interposed between said parts and the prong member and one of said parts being provided respectively with parts having an interlocking engagement therebetween so as to prevent movement of the prong
 70 longitudinally relative to said housing.

13. In an electric plug connector, the combination of a contact prong, a conductor connected to said contact prong and a two
 75 part housing for said connection, comprising an inner part and an outer part, the latter having an opening for admitting said inner part, one part having a recess therein for receiving a portion of the prong and into which recess said prong portion is capable of
 80 being introduced after the connection is effected, the other part constituting a closure for the said recess, said recess constituting a means for initially positioning said prong in said recessed part before said parts are assembled together, the inner part having a
 85 transverse dimension normally superior to the interior dimension of the opening in said outer part, one of said parts being made of elastic material so as to permit assembly of said parts together and so as to maintain said
 90 parts in position after assembly and thereby complete the positioning of said prong securely in said recess, the prong member being interposed between said parts and the prong member and one of said parts being
 95 provided respectively with parts having an interlocking engagement therebetween so as to prevent movement of the prong longitudinally relative to said housing, the recess and the prong portion within the housing being
 100 shaped to provide mutual interlocking engagement for preventing rotation of the prong within the housing.

14. An electric plug connector comprising a body member having an opening therein, another body member entering the opening in said first-mentioned body member and
 105 locked thereto, one of said members being formed of resilient material, and said members being formed so as to be capable of being assembled and locked in assembled relation as an incident to the resiliency of the resilient-material member, and a contact prong positioned in the opening in
 110 said first-mentioned body member and having a portion engaging said first-mentioned body member and another portion engaging said other body member, whereby said body
 115 parts co-operate to support said contact prong in predetermined position relative to both of said body members.

15. An electric plug connector comprising a body member having an opening therein, a
 125 second body member interlocked therewith, one of said members being formed of resilient material so as to be capable of being distorted for permitting interlocking thereof with the other body member and a pair of
 130

contact prongs extending through said second body member in relatively spaced relation and having inner end portions disposed in the opening in said first-mentioned body member, the latter having recessed seats for receiving and positioning said inner end portions in predetermined spaced relation, the outer end portions of said contact prongs projecting outwardly from said second body member and the latter serving to maintain said outer end portions in said spaced relation.

16. In an electric connector of the class described, the combination of a body formed of a pair of parts mutually interlocked, one of the parts being formed of resilient material and being capable of being distorted to permit assembly of said parts into said interlocked relation, and a contact prong having an outer portion projecting from the front end of the body and an inner portion extending rearwardly from said front end into the interior of said body, said contact prong being supported at spaced points, respectively, by said body parts for preventing lateral displacement of the contact prong.

17. A connector member comprising a base made of a soft, flexible, elastic, rubber-like material, removable connector pins supported in said base, and a retainer for said pins, all of the parts being removably held in assembled relation by the elastic properties of the material of the base.

18. A connector cap comprising a base made of a soft, flexible, elastic, rubber-like material, and having a chamber therein, a passage for conductors through said base and communicating with said chamber, removable inwardly and outwardly extending connector pins in said chamber, a retainer for said pins removably mounted in said chamber and secured therein by the elastic properties of the base, the inwardly extending ends of the pins being removably held in cavities in the elastic base, said conductors being electrically connected to said pins.

19. In an electric plug connector, the combination of a two-part plug body comprising an outer part having an opening therein and an inner part disposed in the opening in said outer part, and a contact prong having an outer end portion projecting from one end of said body and an inner end portion extending into the body between said body parts and thereby supported in operative position relative to the body, said inner body part having a transverse dimension normally superior to the transverse dimension of the opening in said outer body part, and one of said body parts being made of flexible material capable of being distorted to permit assembly of said body parts.

20. In an electric plug connector, the combination of a two-part plug body comprising an outer part having an opening therein and

an inner part disposed in the opening in said outer part, and a contact prong having an outer end portion projecting from one end of said body and an inner end portion extending into the body between said body parts and thereby supported in operative position relative to the body, the inner end portion of said prong being provided with laterally offset means for interlocking with said body to prevent endwise displacement of said prong, said inner body part having a transverse dimension normally superior to the transverse dimension of the opening in said outer body part, and one of said body parts being made of flexible material capable of being distorted to permit assembly of said body parts.

21. In an electric plug connector, the combination of a main body member provided with an opening, a pair of contact prongs having inner end portions disposed in the opening in said main body member and outer end portions projecting beyond the front end of said main body member, an auxiliary body member disposed within said main body member and interposed between said contact prongs so as to constitute a spacer for maintaining said contact prongs in spaced relation and the latter being interposed between said body parts, said auxiliary body member also serving to close the opening in said main body member, said spacer member having a transverse dimension normally superior to the transverse dimension of said opening, one of said body members being made of resilient material, and said body members formed so as to require distortion of said resilient-material body member to permit said members to be assembled, and said members being locked in assembled relation as an incident to the resiliency of said resilient body member.

22. In an electric plug connector, the combination of a main body member provided with an opening, a pair of contact prongs having inner end portions disposed in the opening in said main body member and outer end portions projecting beyond the front end of said main body member, an auxiliary body member disposed within said main body member and interposed between said contact prongs so as to constitute a spacer for so maintaining said contact prongs in spaced relation and the latter being interposed between said body parts, said auxiliary body member also serving to close the opening in said main body member, one of said body members being made of resilient material and said body members being formed so as to be capable of being assembled and locked in assembled relation as an incident to the resiliency of said resilient-material body member.

23. In an electric plug connector, the combination of a body member provided with an opening extending therethrough, a pair of contact prongs having inner end portions

seated in said body member in relatively spaced relation to each other and outer end portions projecting from said body member, a cap member extending across the front end of the opening in said body member and interlocked with the latter, said cap having a pair of relatively spaced apertures extending therethrough for receiving and maintaining said contact prongs in said spaced relation, said cap member and said body member being relatively distortable to permit assembly thereof in said interlocked relation.

24. In an electric plug connector, the combination of a body member provided with an opening extending therethrough for admitting an electric conductor to the interior thereof, an auxiliary body member extending across and closing the front end of said opening and interlocked with said main body, said members being relatively distortable to permit assembly thereof in said interlocked relation, said auxiliary member having a pair of relatively spaced apertures extending therethrough, a pair of contact prongs respectively extending through the apertures in said auxiliary member and having inner end portions seated in said body in relatively spaced relation, and outer end portions projecting forwardly from said auxiliary member, and means carried by said prongs for engaging said auxiliary member to prevent outward endwise displacement of the prongs.

25. In an electric plug connector, the combination of a body member provided with an opening extending therethrough for admitting an electric conductor to the interior thereof, an auxiliary body member extending across and closing the front end of said opening and interlocked with said main body, said members being relatively distortable to permit assembly thereof in said interlocked relation, said auxiliary member having a pair of relatively spaced apertures extending therethrough, a pair of contact prongs respectively extending through the apertures in said auxiliary member and having inner end portions seated in said body in relatively spaced relation and outer end portions projecting forwardly from said auxiliary member, and means formed integral with said prongs for engaging a portion of said auxiliary member to prevent outward endwise displacement of the prongs.

26. An electric connector comprising inner and outer body parts, one of which is made of resilient material, said parts being manufactured independently of each other and capable of being subsequently assembled in interfitting relation only because of the resiliency of said resilient material part, and spaced connector prongs having inner end portions interposed between said body parts.

27. An electric connector comprising inner and outer body parts, one of which is made of resilient material, said parts being manu-

factured independently of each other and capable of being subsequently assembled in interfitting relation only because of the resiliency of said resilient material part, and spaced connector prongs having inner end portions interposed between said body parts, said inner body part being interposed between said prongs.

28. An electric plug connector comprising a body member having an opening in its front end, a second body member entering said opening and interlocked with said first-mentioned body member, one of said body members being formed of resilient material so as to be capable of being distorted for permitting interlocking thereof with the other body member, said second body member having a pair of relatively spaced apertures extending therethrough, and a pair of contact prongs extending respectively through said apertures in said second body member so as to be thereby maintained in relatively spaced relation, the inner end portions of said prongs engaging said first-mentioned body member to thereby prevent longitudinal displacement of said prongs.

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