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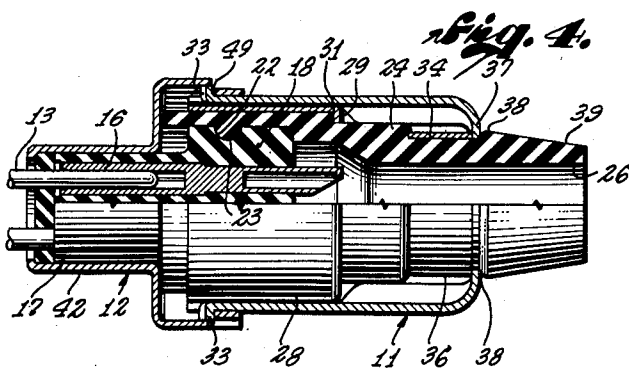
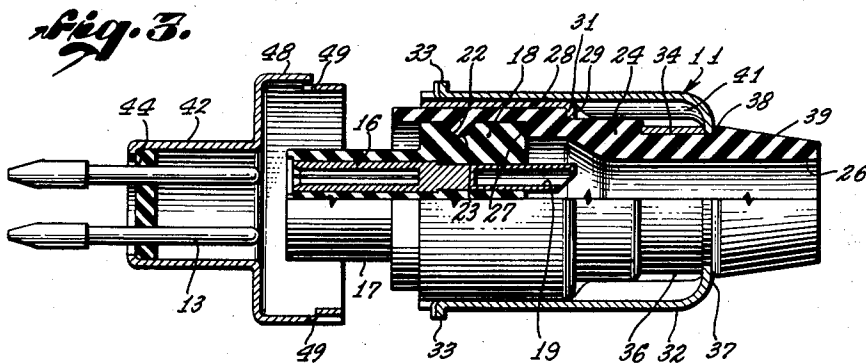
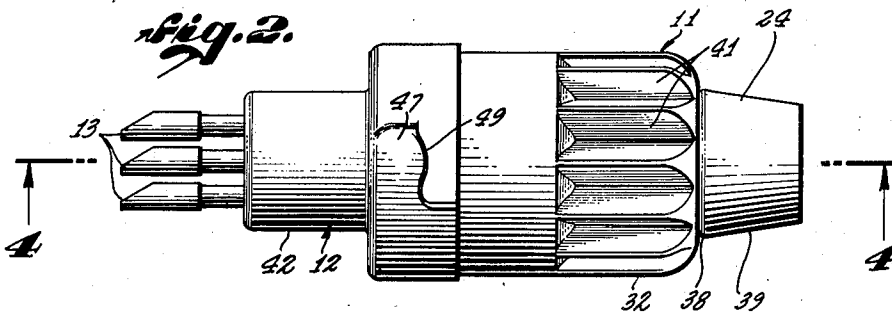
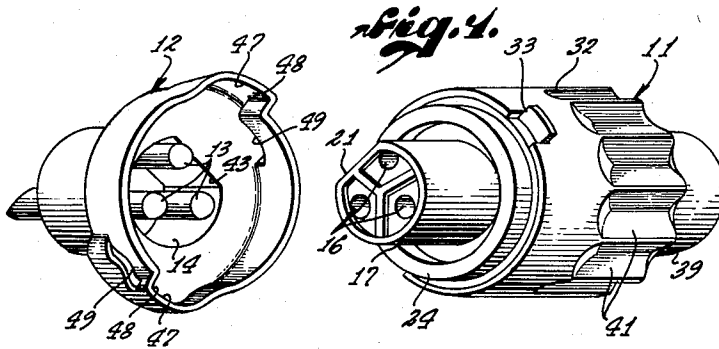
S. L. ARSON

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ELECTRIC CONNECTOR HAVING PLIANT BODY PORTION

Filed May 29, 1953

2 Sheets-Sheet 1



SAMUEL L. ARSON,
INVENTOR.

HUEBNER, BEEHLER,
WORREL & HERZIG,
ATTORNEYS.

BY Warren T. Jessup

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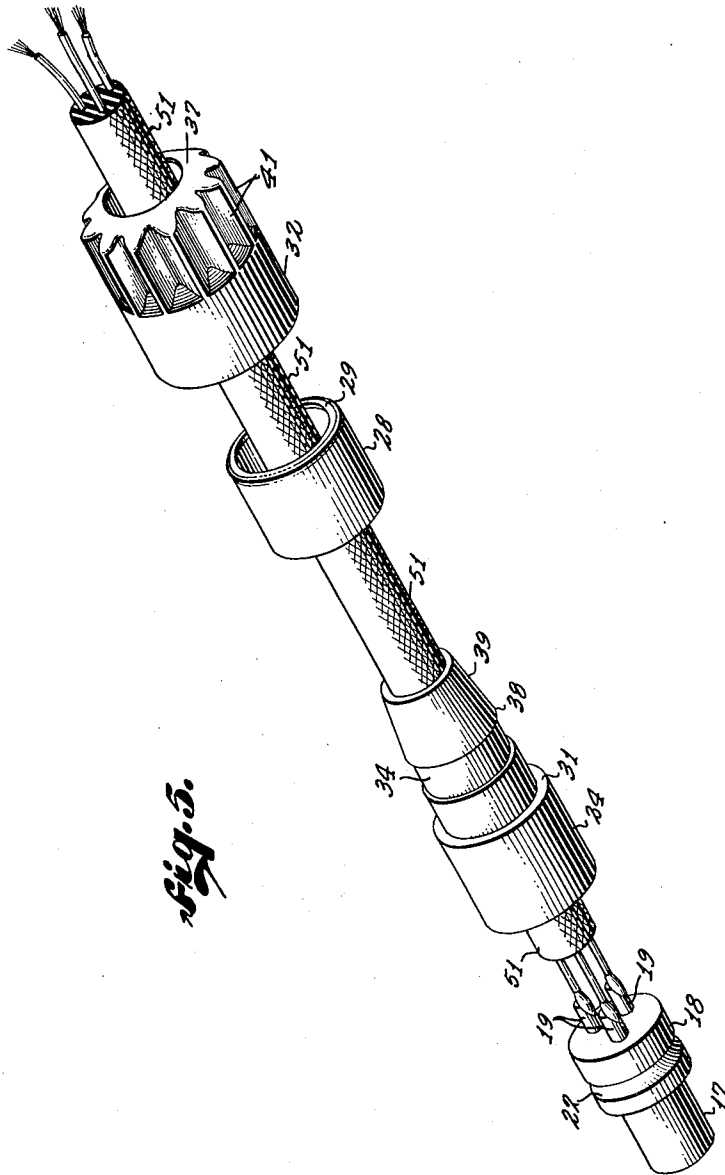


Fig. 5.

SAMUEL L. ARSON,
INVENTOR.

HUEBNER, BEEHLER,
WORREL & HERZIG,
ATTORNEYS.

BY *Warren T. Jessup*

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ELECTRIC CONNECTOR HAVING PLIANT BODY PORTION

Samuel L. Arson, Glendale, Calif., assignor to Cannon Electric Company, Los Angeles, Calif., a corporation of California

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4 Claims. (Cl. 339—63)

This invention relates to electric connectors, and more particularly to connectors of the plug and socket type.

It is an object of this invention to provide an electric connector which may be readily assembled and disassembled.

It is another object of this invention to provide an electric connector which may be assembled without the use of special fastening means such as screws, nuts, bolts, rivets and the like, and yet which may be readily disassembled if desired.

It is another object of this invention to provide an electric connector which may be readily disassembled for connection of conductors or wires thereto, and which may be readily reassembled, all without use of special connecting devices, such as screws and the like.

It is another object of this invention to provide an electric connector made of resilient, deformable portions, in which the resiliency of the portions is employed to achieve ready assembly and disassembly of the portions, and including means for positively preventing undesired separation of the body portions.

In accordance with these and other objects which will become apparent hereinafter a preferred form of the present invention will now be described with reference to the accompanying drawings wherein:

Fig. 1 is a perspective view illustrating two complementary connectors, one being constructed in accordance with the primary principles of the present invention.

Fig. 2 is a side elevation showing the two complementary connectors in engaged, or connected, position.

Fig. 3 is a longitudinal cross section showing the connectors of Fig. 2 separated and aligned.

Fig. 4 is a section view similar to Fig. 3, showing the connectors engaged, and taken along line 4—4 of Fig. 2.

Fig. 5 is a perspective view showing the parts of the connector 11 during the assembling operation.

Referring to the drawings, 11 designates one of a pair of complementary connectors, and for identification will be called a socket connector. The principal features of the present invention are embodied in this socket connector 11. A complementary connector, called a plug connector, is illustrated at 12.

The plug connector 12 has three pins 13 disposed within a recess 14. The pins 13 are adapted to mate with three complementary terminals or socket contacts 16 embedded in a forward portion 17 of the connector 11.

As best seen in Fig. 4, the connector 11 includes a generally circular socket insulator or body portion 18, in which are embedded the socket contacts 16. The contacts 16 are elongate and extend from the forward face of the insulator 18 longitudinally through the insulator 18 to project rearwardly thereof and terminate in conductor receiving recesses 19. The forward portion of the socket insulator 18 is circumferentially relieved to form the above mentioned forward or engagement portion 17. Portion 17 has a polarizing flat 21 formed thereon to insure correct engagement with the plug connector 12.

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Around the periphery of the socket insulator or body portion 18, and transverse to the axis thereof, is formed a semicircular groove 22. The groove 22 mates with a corresponding semicircular ridge 23 formed on the interior of a sleeve or shell 24. The sleeve 24 has a generally axial passageway 26 extending therethrough, the forward portion of which is occupied by the socket insulator 18, and the rearward portion of which accommodates a cable of electric conductors (not shown) which extends rearwardly away from the connector 11.

In order to effect engagement and disengagement between the groove 22 and ridge 23, for assembly of the connector 11, it is necessary that at least one of the members 18 or 24 be of resilient, deformable material such as rubber or pliant resin. It is desirable that this be the outer member or sleeve 24, since it will readily expand to effect the interlocking engagement. It is further preferred to make both of the members 18 and 24 of resilient, deformable material.

Around the interior of the passageway 26 of the sleeve 24 is formed a forwardly facing shoulder 27, so positioned as to engage the rear edge of the socket insulator 18 when the ridge 23 and groove 22 are in engagement. The shoulder 27 thus serves to prevent the insulator 18 from being pushed too far into the sleeve 24 during assembly of the parts.

Around the outside of the forward portion of the sleeve 24, circumjacent the groove and ridge 22—23, is an annular means in the form of a metal ferrule or band 28. The ferrule 28 is fitted snugly over the sleeve 24 from the rear of the connector. The ferrule 28 is rigid, being made of metal, and serves as an effective lock, preventing deformation of the members 18 and 24. Since such deformation is prevented, the members are securely locked together by the groove and ridge 22—23. The ferrule 28 is positioned on the sleeve 24 by an inwardly extending flange 29 thereon, which abuts a rearward facing shoulder 31 formed on the exterior of the sleeve 24.

The ferrule 28 also serves as a rotative bearing surface for an end bell or housing 32 which is engaged over the ferrule 28 from the rear of the connector. A pair of tabs 33 are bent outward on the forward edge of the end bell 32 to form interlocking means to hold the connector 11 to the connector 12. Since the interlocking of the connector 11 to the connector 12, requires that the tabs 33 be rotated with respect to the connector 12 after the pins 13 are engaged in the sockets 16, it is necessary that the housing 32 be rotatable with respect to the other parts of the connector 11. Such rotatability is rendered more frictionless by the bearing engagement between the ferrule 28 and end bell 32.

The rearward portion of the sleeve 24 is provided with a wide groove 34 around the exterior periphery thereof. In this groove 34 resides a cable clamping ring 36. The ring 36 is not quite as wide as the groove 34, leaving room at the rear of the groove 34 to accommodate an inwardly extending flange 37 formed at the rear of the end bell 32. The end bell 32 is thus secured against longitudinal displacement with respect to the shell 24 by engagement of the flange 37 between the rear edge of the ring 36 and the shoulder 38 forming the rear edge of the groove 34. At the same time the end bell 32 may be rotated with respect to the sleeve 24, employing the outer surface of the ferrule 28 as a bearing surface.

Rearwardly from the shoulder 38, the exterior surface of the sleeve 24 tapers inwardly as shown at 39. This forms a wedge-like surface over which the flange 37 may readily slide as the end bell 32 is pushed forwardly over the sleeve 24 during assembly of the connector 11. When the flange 37 drops into place in the groove 34, the re-

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silency of the shoulder 38 causes it to snap outwardly to retain the connector 11 in assembled position.

The rear half of the end bell 32 is provided with a plurality of inward indentations 41 disposed longitudinally. The forward edges of these indentations 41 constitute a barrier cooperating with the flange 29 of the ferrule 28 to prevent the ferrule 28 from moving rearwardly with respect to the sleeve 24. On the outer surface of the end bell 32 the indentations 41 form finger knurling to assist in rotation of the end bell 32, during interlocking of the connector 11 to the connector 12.

The rear ends of the socket contacts 16, having the wire receiving recesses 19, emerge into the passageway 26, which provides communication between the socket contacts 16 and the rear of the connector 11, to accommodate an electric cable.

The other connector or plug 12 is formed of a metal casing 42, the interior of which constitutes the recess 14 into which the forward portion 17 of the connector 11 fits. The casing 42 is provided with a flat wall 43 corresponding to the flat 21 of the connector 11. The two cooperating flats thus serve to polarize the connectors so that only the proper pins 13 may engage the proper socket contacts 16.

The pins 13 are secured in the casing 42 by a glass seal 44.

The forward end of the casing 42 is enlarged to form a connecting bell, in which are located a pair of opposed bayonet type sockets 47 for receiving the interlocking pins or tabs 33 formed on the end bell 32 of the connector 11.

The connectors 11 and 12 are engaged in the following manner: first the connectors are aligned, with respective flats 21 and 43 in registry. The end bell 32 is rotated on the connector 11 until the tabs 33 are in registry with the tab receiving recesses 48 of the bayonet sockets 47. The connectors 11 and 12 are then pressed together. This action causes the pins 13 to mate in the socket contacts 16, and brings the tabs 33 into the expanded recesses 48 in the forward portion 46 of the connector 12. The end bell 32 is then rotated to cause the tabs 33 to engage in the slots 49 of the bayonet sockets 47, to thus hold the two connectors 11 and 12 firmly together.

In order that conductors or wires of a cable may be connected, as by soldering, to the socket contacts 16, it is necessary to disassemble the connector 11. This is achieved in the following manner. The shoulder 38 at the rear of the sleeve 24 is squeezed in, by hand or by pliers, and the end bell 32 is slipped off the rear end of the connector 11. Removal of the end bell 32 with its inward indentations 41 removes the rearward restraint on the flange 29 of the ferrule 28, so that the latter may now be slid rearwardly off the sleeve 24. Removal of the ferrule 28 permits the resilient sleeve 24 and insulator 18 to be deformed enough to permit disengagement of the ridge 23 from the groove 22. Thus the sleeve 24 may be separated from the socket insulator 18, leaving the rear end of the socket contacts 16 exposed for reception of the cable 51.

The end bell 32, ferrule 28, and sleeve 24 (with ring 36) are then slipped over the cable 51 in that order, as shown in Fig. 5. The conductors of the cable 51 are welded, as by soldering, into the recesses 19 projecting from the rear of the socket insulator 18. Next the sleeve 24 is brought forward and slipped over the socket insulator 18 until the ridge 23 engages in the groove 22. The ferrule 28 is brought forward and slipped over the sleeve 24 until the flange 29 engages the shoulder 31. With a pair of pliers, the cable ring 36 is deformed inwardly, clinching the sleeve 24 hard against the cable. This relieves the strain on the soldered connections at 19 in the event there is a separating pull between the cable 51 and the connector 11. Care is taken to insure that the ring 36 when squeezed inward, occupies its forward position in the wide groove 34.

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Finally the end bell 32 is brought from the cable over the sleeve 24 and ferrule 18 until the flange 37 drops into position over the shoulder 38. During this operation the conical face 39 permits easy forward movement of the end bell 32. With the snapping back of the shoulder 38, the connector is completely assembled.

To disassemble the connector the above assembly steps are simply reversed. In the disassembly, the presence of the cable in the bore 26 requires somewhat greater inward pressure on the shoulder 38 in order to remove the end bell 32, because the cable limits and inhibits the inward compression applied to the resilient sleeve 24. This added difficulty of compression lends security to the integration of the assembled connector 11.

While the instant invention has been shown and described herein in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is therefore not to be limited to the details disclosed herein but is to be accorded the full scope of the claims.

What is claimed is:

1. An electric connector comprising: a generally circular body portion made of resilient deformable material, a conducting terminal passing through said body portion substantially parallel to the axis thereof, a generally circular shell portion made of resilient deformable material engaged coaxially around said body portion, said shell portion having a generally axial passageway communicating with one end of said terminal, said passageway being adapted to receive electric conductors connected to said terminal, one of said portions having an annular groove therein disposed transverse of said axis, the other portion having an annular ridge engaged in said groove, thereby forming a ridge and groove securement between said portions, a rigid annular band engaged around said shell coaxially thereof to prevent disengagement of said portions, and a cylindrical housing engaged over and around said band and rotatable with respect thereto, said housing having connecting means whereby the connector may be secured to another connector.

2. An electric connector comprising a generally cylindrical socket insulator made of resilient deformable material, the forward portion of said insulator being relieved to form an engagement portion, said engagement portion having a polarizing flat thereon, a plurality of elongate, electrically conductive socket contacts mounted in and extending longitudinally through said insulator, said contacts communicating with the forward face of said relieved portion, said insulator having a peripheral groove therearound, a generally cylindrical sleeve made of resilient deformable material and engageable over the rearward portion of said insulator, said sleeve having an inwardly extending ridge mating in said groove, and an inwardly extending shoulder engaging the rear edge of said insulator when said ridge and groove are engaged, the outer periphery of said sleeve having a rearward facing shoulder thereon, a metal ferrule snugly engaged over said sleeve to maintain the interlocking engagement between said insulator and sleeve, said ferrule having an inwardly extending flange at the rear thereof engaging with said sleeve shoulder to limit forward positioning of said ferrule on said sleeve, a cylindrical end bell engaged over said ferrule and projecting rearwardly thereof, the rear portion of said sleeve having externally thereof a wide groove, a clamping ring disposed in said groove, said bell having at its rear end an inwardly extending flange engaged in the rear end of said wide groove to retain said bell against longitudinal movement with respect to said sleeve while permitting rotation, said ferrule serving as a bearing surface for said bell during such rotation, said bell having a plurality of longitudinal indentations therearound extending inwardly to form a barrier preventing rearward motion of said ferrule with respect to said sleeve, said indentations constituting, ex-

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ternally, finger knurling to assist in rotation of said bell with respect to said insulator, sleeve, and ferrule, said sleeve having a passageway communicating between said insulator and the rear of the connector, the rearwardly extending portion of said socket contacts residing in said passageway, said passageway being adapted to accommodate electrical wires connected to the rear ends of said socket contacts, said ring being adapted to be deformed inwardly to clamp the wires within the connector through the resiliency of said sleeve, said bell having interlocking means on the forward edge thereof adapted to mechanically interlock the connector to another, complementary connector.

3. Electrical connector comprising a body of deformable material having a tapered portion at the rear thereof, said body having a bore therein adapted to receive electric wires, an annular clamp member disposed at least partially around said body and forwardly of said tapered portion, said clamp member being adapted to clamp said wires in said body by compression of said deformable body, a housing around said body, including an inwardly extending flange adapted to slip over said tapered portion by deformation of said tapered portion and to reside between said clamp member and said tapered portion.

4. An electric connector comprising: a generally circular body portion, a conducting terminal passing through said body portion substantially parallel to the axis thereof, a generally circular shell portion made of resilient deformable material, the forward portion of which is en-

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gaged coaxially around said body, the rearward part of said shell portion being tapered and being circumferentially relieved forward of the taper, passageway communicating from the rear of said shell portion to said body portion, said passageway being adapted to receive an electric conductor connected to said terminal; one of said portions having an annular groove therein disposed transverse of said axis, the other portion having an annular ridge engaged in said groove, thereby forming a ridge and groove securement between said portions; a rigid annular band engaged around said shell coaxially thereof to prevent disengagement of said securement; and a cylindrical housing engaged over and around said band and rotatable with respect thereto, said housing having an inwardly extending flange on the rear edge thereof adapted to be slipped over the tapered part of said shell portion by inward deformation of said tapered part and to reside in the relief immediately forward of said tapered part, said housing having connecting means whereby the connector may be secured to another connector.

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