United States Patent

Kunkle et al.

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[45] **Oct. 10, 1972**

[54] **ELECTRICAL CONNECTORS AND HOUSINGS THEREFORE**

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[51] **Int. Cl.**.....**H01r 31/08,** H01r 13/64

[58] **Field of Search**..339/18 R, 18 P, 19, 22 R, 22 B, 339/31 R, 31 M, 32 R, 32 M, 65, 75 R, 75 M, 176 M, 184 R, 184 M, 185, 186 R, 186 M, 191 M, 192 R, 195 R, 195 A, 195 M, 196, 198 S, 198 P, 206 R, 206 P, 211, 217 S, 222 R, 276 T

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[57] **ABSTRACT**

Disclosed is a multipart dielectric housing for holding electrical terminals. One half of the housing comprises two or more pieces which mate either singlely or jointly with the other half of the housing. The terminals disclosed include cylindrical stabilizing rings located in the wire barrel portion and designed to stabilize the terminal in a cavity of the housing disclosed.

6 Claims, 7 Drawing Figures

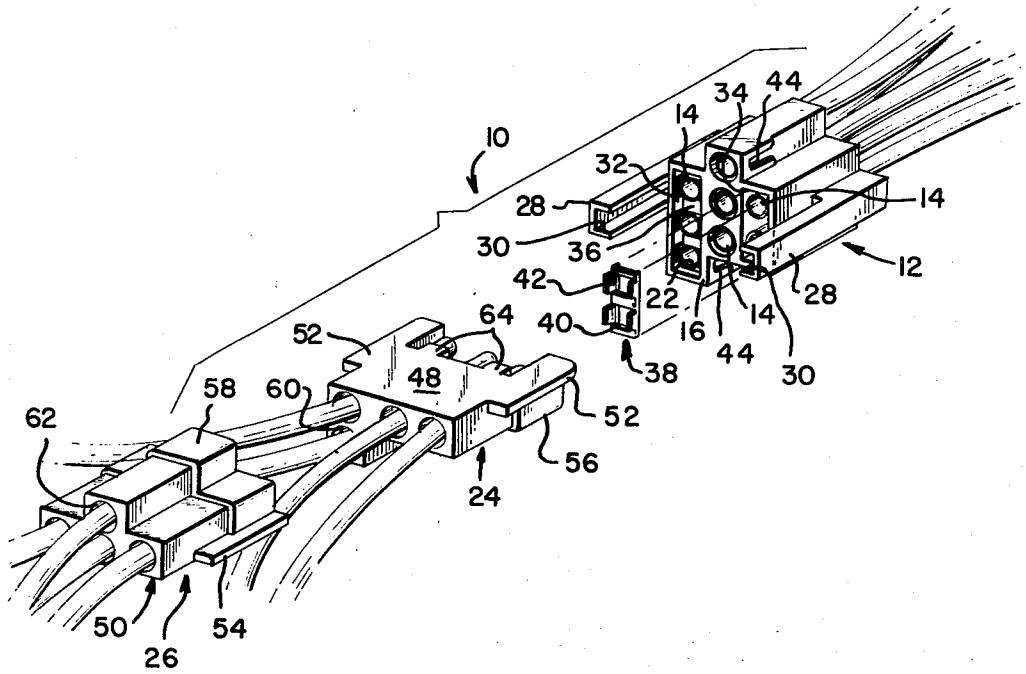


Fig. 1

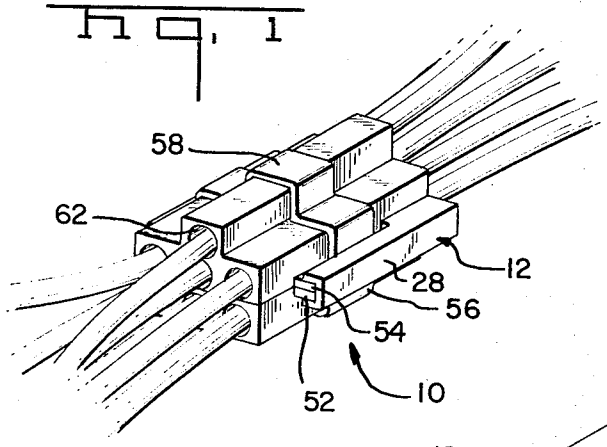


Fig. 2

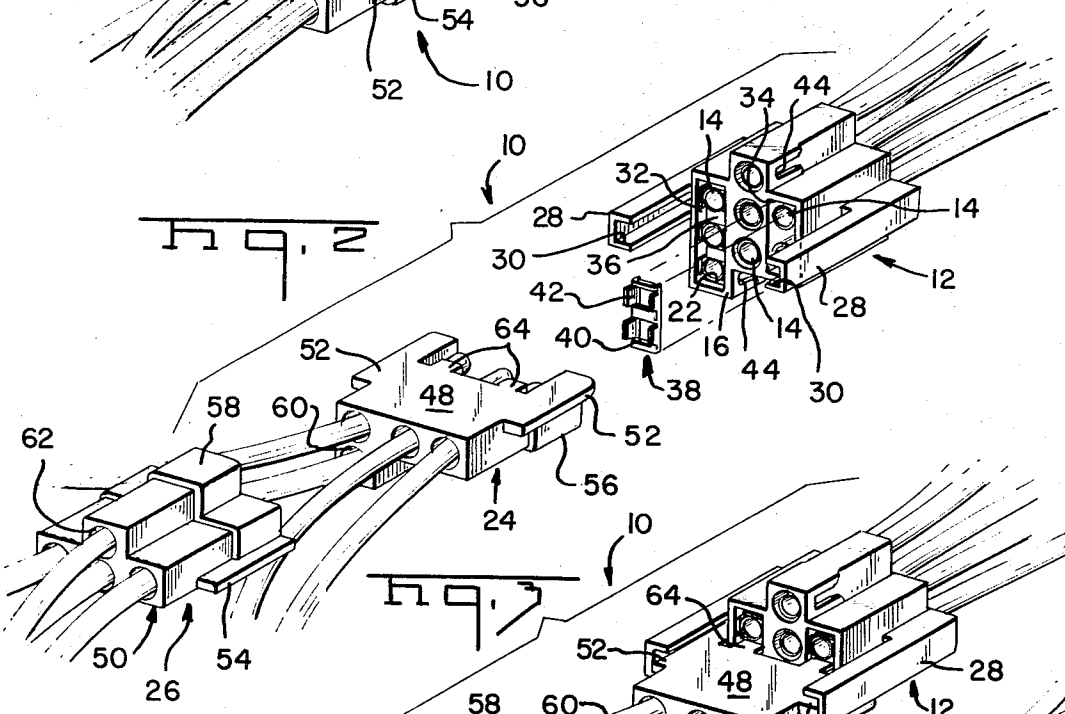


Fig. 3

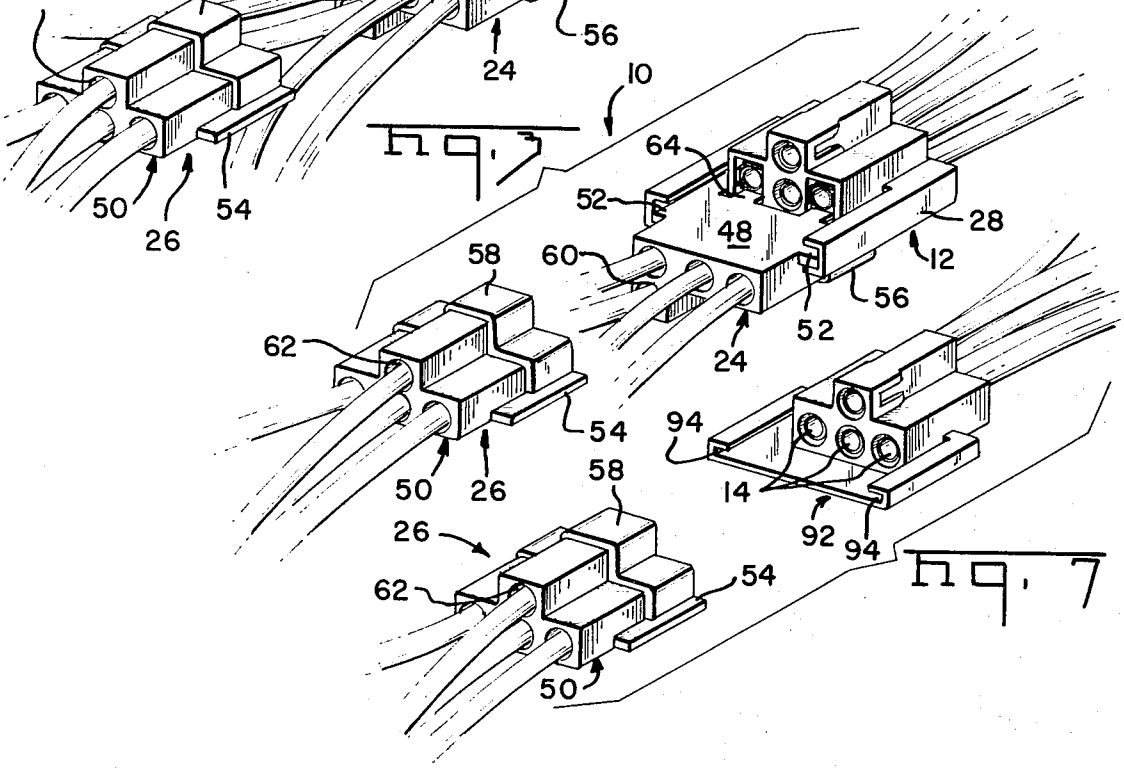


Fig. 7

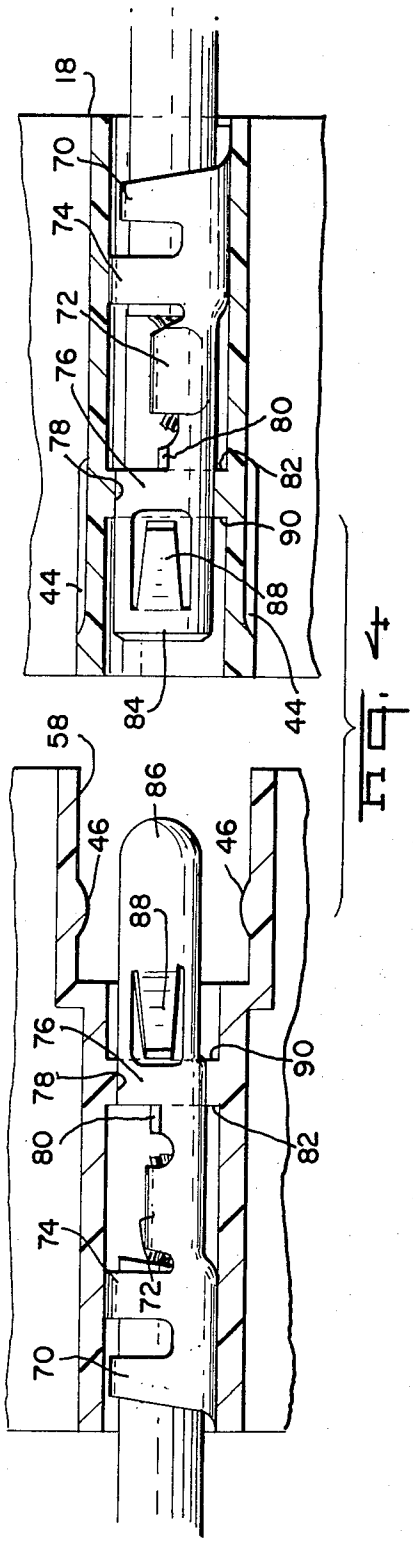


Fig. 4

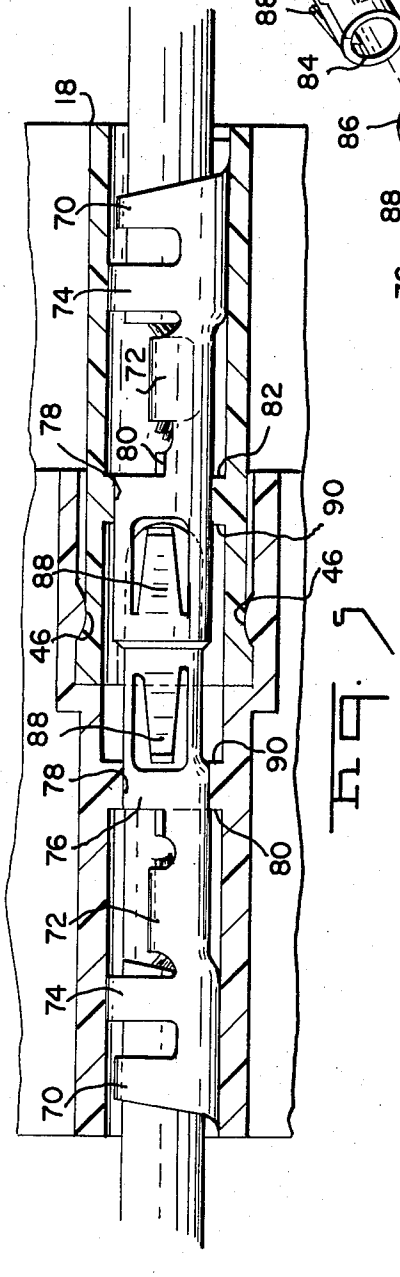


Fig. 5

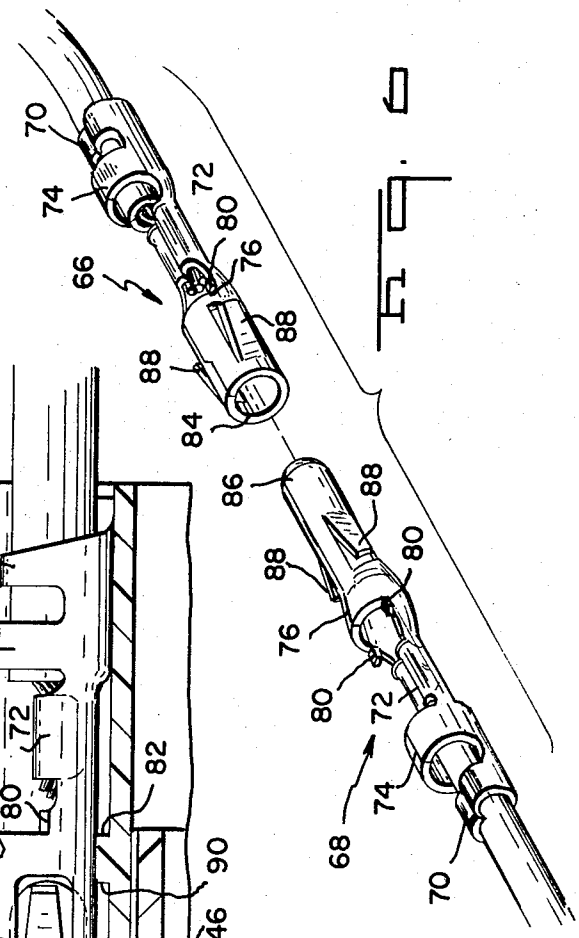


Fig. 6

ELECTRICAL CONNECTORS AND HOUSINGS THEREFORE

This invention relates to electrical connectors and, more particularly, to the type used in automotive and appliance harness making.

An object of the invention is to provide an improved electrical connector.

A further object is to provide an electrical terminal with stabilizing means integral therewith.

A still further object is to provide a multipart connector housing to facilitate harness assembly in the appliance or automobile by separating one half of the connector into several parts allowing assembly from different directions.

An additional object is to provide a connector housing wherein one mating half is comprised of two or more pieces thereby allowing a predetermined number of electrical circuits to be made.

These and other objects of the invention are achieved by providing a multipart connector housing with one half designed to mate with a second half, the second half being made up of two or more pieces. One or any number less than all of the pieces or all of the pieces making up the second half may be mated with the first half of the housing. Each separate piece of the housing has one or more cavities therein extending from a front face to a back face and designed to accept an electrical terminal. The electric terminals have cylindrical contact portions, the terminals in one half of the housing being receptacles and in the other half, pins which are received by the receptacles. Each contact portion is of a diameter designed to support itself in the forward end of the cavity. The rearmost portion of the terminal is supported or stabilized in the cavity by a stabilizing ring integral with the wire barrel portion and located between the conductor barrel and the insulation barrel. The multipart half of the connector housing has a hood extending forwardly of the front or mating face of the housing half and telescopically receives the single piece connector housing half.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there are shown and described illustrative embodiments of the invention; it is to be understood, however, that these embodiments are not intended to be exhaustive nor limiting of the invention but are given for purposes of illustration and principles thereof and the manner of applying them in practical use so that they may modify them in various forms, each as may be best suited to the conditions of a particular use.

In the drawings:

FIG. 1 is a perspective view of the assembled connector housing including terminated wires;

FIG. 2 is an exploded perspective view showing a one-piece housing half containing the receptacle terminals including separate bus bars and a multipart housing half containing the pin terminals;

FIG. 3 is a partially exploded perspective view showing one piece of the multipart half in mating relationship with the one-piece half;

FIG. 4 is a top fragmentary sectional view showing in detail the relationship of the uppermost terminal cavities and terminals of the two mating pieces with attendant latching features;

FIG. 5 is a view similar to FIG. 4 but showing the respective pieces in mating relationship;

FIG. 6 is an exploded perspective view of the pin and receptacle terminals used in the respective connector housing pieces; and

FIG. 7 is an exploded perspective view showing a housing half designed to mate only with the upper piece of the multipart housing half shown in FIGS. 1 – 3.

Referring first to FIGS. 1 – 3, the preferred embodiment is shown and depicted at **10**. The one-piece housing half is shown at **12** and contains eight cavities **14** therein extending from a front face **16** through to a back face **18** (see FIGS. **4** and **5**). The housing **12** is basically a rectangle containing six cavities with a seventh cavity **20** located above the center two cavities **14** and an eighth cavity **22** located below the left two cavities **14**. The purpose of this arrangement is to provide keying whereby the two pieces **24**, **26** of the mating housing half cannot be connected to housing half **12** improperly. Additionally, connector **12** has located on opposite sides thereof a pair of forwardly extending arms **28** which are generally channel or U-shaped in cross-section with the open sides of the channels **30** facing each other. The front face **16** of connector **12** can be recessed at the entrance of a vertical row of cavities. For example, as shown in FIG. **2**, recessed portions **32**, **34** appear in the left and right hand vertical rows of cavities. These recessed portions are designed to receive bus bars **36**, **38** which have apertures **40** designed to receive the forward end of the receptacle terminal depicted in FIG. **6**. The portions **42** struck from the bars **36**, **38** to make apertures **40** have surfaces which electrically engage the receptacle terminal.

Located on the exterior side surfaces of the housing portions containing cavities **20**, **22** are indent grooves **44** for receiving mating detents **46** (see FIGS. **4** and **5**) on pieces **24**, **26** respectively, for purposes of latching the connector pieces together.

Each connector piece **24**, **26** has a generally planar mating face **48**, **50**, respectively. At the outer side portions of pieces **24**, **26** are ribs **52**, **54** respectively, which are to be received in channels **30** of connector **12**. Extending forwardly from the front face of each connector **24**, **26** is a hood **56**, **58** which is designed to telescopically receive the forward end of connector **12** as seen in FIGS. **1** and **5**. Connector **24** includes a centrally offset cavity **60** for axial alignment with cavity **22** and connector **26** has a centrally located cavity **62** for alignment with cavity **20**. Connector **24** also includes two forwardly extending projections **64** which are designed to abut the bus bars **36**, **38** to hold the bars in the recessed positions. As can be seen in FIGS. **1** and **3** either one of the connectors **24**, **26** may be used by itself or together in mating with connector **12**, depending upon a desire for completing four or eight circuits.

Turning now to FIGS. **4** – **6** the terminals used in the respective housing halves are a receptacle terminal **66** and a pin terminal **68**. Each terminal has a wire barrel portion comprising an insulation barrel **70**, a conductor barrel **72**, and a cylindrical stabilizing ring **74** located between barrels **70** and **72** for stabilizing the rear portion of the terminal in the respective cavities, as seen in FIGS. **4** and **5**. Forwardly of the conductor barrel and rearwardly of the contact portion of each terminal is a cylindrical portion **76**. This portion **76** engages a

reduced annular portion **78** located in the forward portion of the cavities and is supported or stabilized thereby as shown in FIGS. **4** and **5**.

Adjacent the rear edge of cylindrical portions **76** are ears **80** extending generally radially outwardly of the terminal body and designed to engage the rear shoulder **82** of annular portion **78** for purposes of limiting forward travel of the terminal. Located on opposite sides of the contact portion or receptacle **84** and on the contact portion or pin **86** are resilient cantilevered wings **88** connected at the forward end to the contact portions and with the free ends extending outwardly rearwardly and in close proximity to cylindrical portion **76**. Upon insertion of the respective terminal in a respective cavity the free ends of the wings **88** are flexed inwardly by the annular portion **78** and upon full insertion of the terminal the wings spring back outwardly and engage the forward shoulder **90** of annular portion **78** to prevent rearward movement of the terminal. The diameter of the pin **86** is reduced relative to the diameter of receptacle **84** so as to be received thereby.

The embodiment of FIG. **7** shows a four cavity connector **92** designed to mate with the upper connector **26** shown in FIGS. **1 – 3** and like parts are depicted by like numerals. Thus connector **92** has three cavities **14** arranged horizontally with a fourth cavity **20** located centrally above the cavities **14**. This structure, as in the similar structure of connector **12**, is for keying purposes to prevent improper mating of connector halves. Located on connector **92** are indent grooves **44** for latching with indents **40** of connector **26**. Connector **92** has located on opposite sides thereof channels **94** facing each other which channels receive the ribs **54** of connector **26**.

It will, therefore, be appreciated that the aforementioned and other desirable objects have been achieved; however, it should be emphasized that the particular embodiments of the invention, which are shown and described herein are intended as merely illustrative and not as restrictive of the invention.

We claim:

1. An electrical connection comprising mating pin and receptacle terminals, each terminal having a contact portion, and wire barrel portion, said contact portion of said pin terminal comprising a cylindrical member including a rounded nose portion and having a pair of resilient cantilever retaining wings struck out of opposite sides thereof with the free ends of said wings extending toward the wire barrel portion, a pair of stop ears struck outwardly from opposite sides of an intermediate portion connecting said contact and wire barrel portions, said contact portion of said receptacle member comprising a cylindrical member receiving said pin terminal contact portion and having a pair of resilient cantilever wings struck out of opposite sides thereof with the free ends of said wings extending toward the wire barrel portion, a pair of stop ears struck outwardly from opposite sides of an intermediate portion connecting said contact and wire barrel portions, the wire barrel portion of each terminal comprising a conductor barrel adjacent said intermediate portion, a conductor insulation barrel spaced from said conductor barrel, and stabilizing means located between said conductor barrel and said conductor insulation barrel.

2. An electrical connection as set forth in claim **1** wherein said stabilizing means comprises a generally cylindrical ring member substantially in axial alignment with said contact portions.

3. A multipart connector housing of dielectric material comprising a first half and a second half, each half having a plurality of cavities extending therethrough from front to back, each cavity adapted to receive and hold an electrical connector, said second half comprising at least a first piece and a second piece each piece containing a plurality of said cavities, said first half including facing channels located on opposite sides of said first half, and ribs located on opposite sides of said first and second pieces, said ribs located, respectively, in said channels when front faces of said pieces are mated with a corresponding front face of said first half, said first and second pieces each having integral therewith a hood portion extending beyond said front face and telescopically receiving therein said first half, said first and second pieces being mateable with said first half either singlely or together, respective cavities in each half being in axial alignment upon mating of said halves.

4. A multipart connector housing as set forth in claim **3** wherein said first housing half has recessed portions in said front face interconnecting adjacent cavities, said recessed portions having located therein bus bar means.

5. An electrical connector assembly comprising

a first molded connector housing comprising a block having a plurality of contactreceiving cavities extending therethrough from the rearward face thereof to the mating face thereof,

two additional molded connector housings, each of said additional housings having contact receiving cavities extending therethrough from the rearward faces thereof to the mating faces thereof, the total number of said cavities in said additional connectors being no greater than the number of cavities in said first connector,

said first connector having a pair of arms integral therewith on opposite sides thereof, said arms extending forwardly past said mating face of said first connector housing, said arms having generally channel shaped cross-sections, the said channel-shaped cross-sections of said arms being opposed to each other,

each of said two additional connector housings having a pair of ribs integral therewith and extending therefrom past the mating faces of said additional connectors, the thickness of each of said ribs being substantially one half of the distance between the sidewalls of said channel-shaped cross-sections, and said ribs on each of said additional connector housings being separated by a distance equal to the distance between said channel-shaped arms whereby,

either of said additional connectors housings can be mated with said first connector housing upon movement of either of said additional housings into engagement with said first connector housing with entry of said ribs into said channels.

6. An electrical connector assembly as set forth in claim **5** wherein each of said additional connector housings has a hood extending forwardly from its mat-

ing face, said hoods being adapted to extend over portions of said first connector when said additional connectors are mated with said first connector.

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