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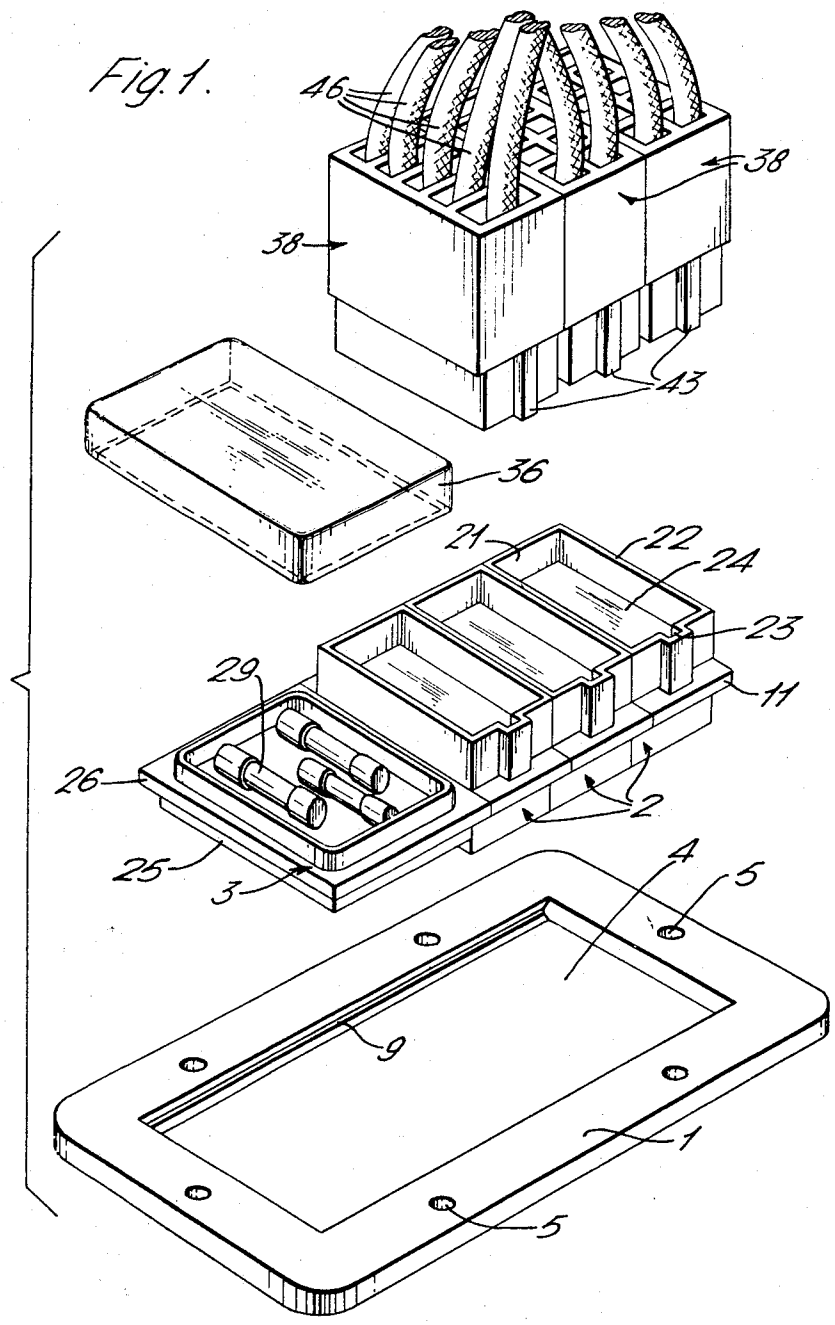
ELECTRICAL CONNECTOR HOUSING ASSEMBLY

Filed Nov. 8, 1966 3 Sheets-Sheet 1

Fig. 1.



ELECTRICAL CONNECTOR HOUSING ASSEMBLY

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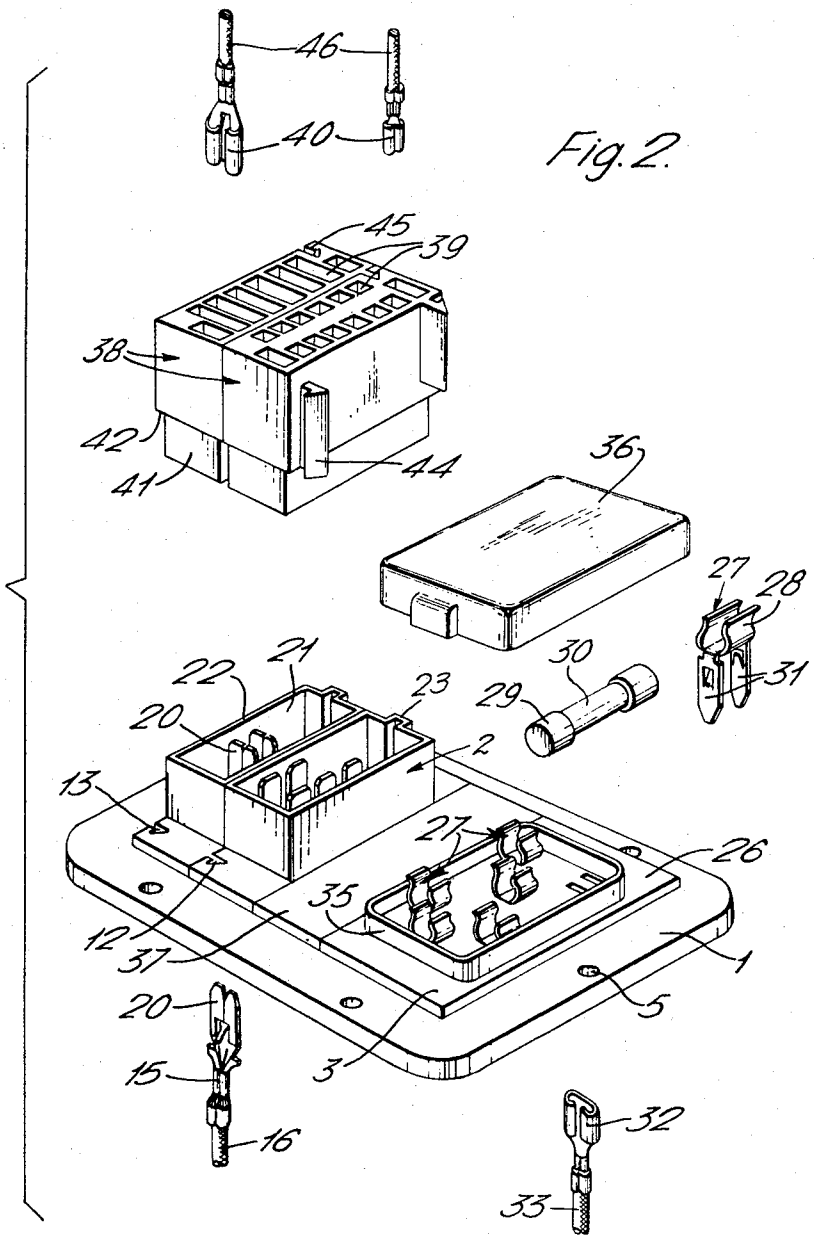

Fig. 2.

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Fig. 3.

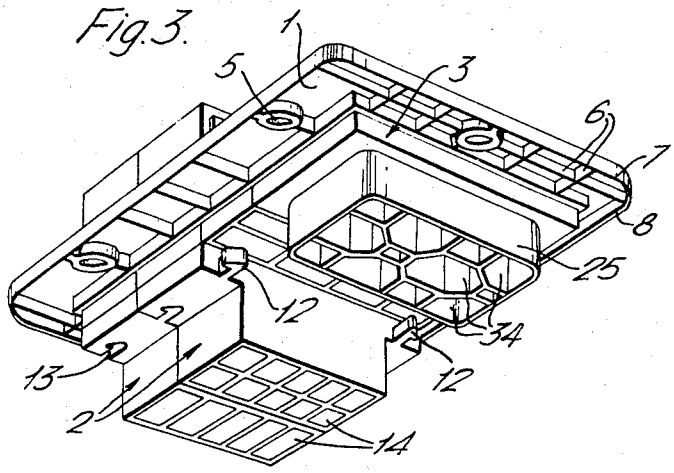


Fig. 4.

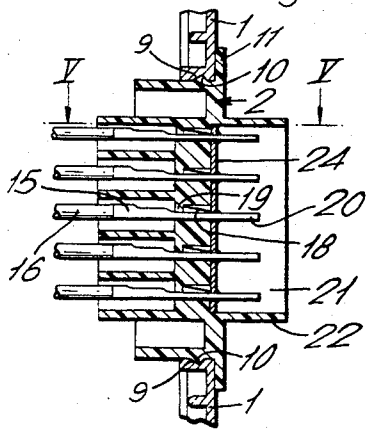
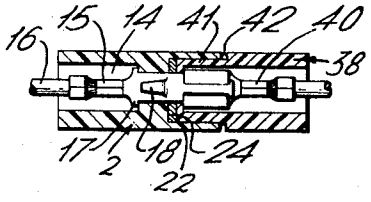


Fig. 5.



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ELECTRICAL CONNECTOR HOUSING ASSEMBLY

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7 Claims. (Cl. 339—126)

ABSTRACT OF THE DISCLOSURE

An electrical connector housing assembly according to the invention comprises an insulating plate for mounting over a bulkhead opening and having a rectangular aperture, a fuse unit and at least one rectangular connector housing having means on each of a first pair of opposite sides for releasably engaging cooperating means provided on the plate on each side of a pair of opposite sides of the plate aperture whereby the connector housing can be releasably secured in the plate aperture, the connector housing having passageways to receive connectors for connection to conductors on opposite sides of the connector housing.

This invention relates to an electrical connector housing assembly for mounting over a partition or bulkhead aperture to provide means for electrically connecting electrical devices located on opposite sides of the bulkhead and is particularly useful, for example, for interconnecting the wire harness on opposite sides of an automobile bulkhead.

In U.S. Patent 3,341,745 there has been described an electrical connector assembly comprising a plate of electrically insulating material for mounting over an aperture in an automobile bulkhead having integrally formed connector-receiving through passageways encompassed by flanges defining recesses to receive connector blocks and an integrally formed fuse box unit containing connectors which extend through the plate to receive on one side electrical conductors and on the other side cartridge fuses.

As disclosed, such a connector housing assembly facilitates electrical connection between units on opposite sides of an automobile bulkhead, the passenger compartment wiring connecting with the ends of the connectors on one side of the plate and the engine compartment wiring connecting with the ends of the connectors on the other side of the plate with some of the connections being made through the intermediary of the fuses in the fuse box unit.

In view of the need of automobile manufacturers to be able to add further electrical circuits during development of new models of their automobiles or during modification of existing models it has been found necessary to allow for the provision of additional connectors to accommodate the additional wiring. Also, as the larger or more luxurious automobiles generally have more extensive electrical circuitry than smaller or simpler automobiles it has been necessary to provide connector assemblies having a large number of connectors. This has entailed providing assemblies either matched to the electrical requirements of the automobile as designed, in which case no additional electrical circuit can conveniently be added, or having electrical connections in excess of that required by the design.

An electrical connector housing assembly according to the invention comprises an insulating plate for mounting over a bulkhead opening and having a rectangular aperture, a fuse unit and at least one rectangular connector housing having means on each of a first pair of opposite sides for releasably engaging cooperating means provided on the plate on each side of a pair of opposite sides of the plate aperture whereby the connector housing can be releasably secured in the plate aperture, the connector housing having passageways to receive connectors for connection to conductors on opposite sides of the connector housing.

Preferably the assembly includes at least two connector housings at least one of which includes the fuse unit.

An embodiment of the invention will now be described by way of example, reference being made to the accompanying diagrammatic drawings in which:

FIGURE 1 is a simplified partially exploded perspective view of an electrical connector housing assembly according to the invention;

FIGURE 2 is a view similar to FIGURE 1 showing further details of the assembly;

FIGURE 3 is a perspective view of the underside of the assembly of FIGURE 1;

FIGURE 4 is a sectional view of part of the assembly of FIGURE 1; and

FIGURE 5 is a section taken on the line V—V of FIGURE 4 and includes further detail.

Referring first to FIGURE 1, the assembly comprises a plate **1**, connector housings **2** and a fuse unit **3**. The plate **1**, of insulating material, is formed with a rectangular aperture **4** and holes **5** through which bolts or screws (not shown) can be passed for securing the plate **1** to an automobile bulkhead. As can be seen in FIGURE 3 the plate **1** is strengthened by a network of integral ribs **6** formed on its underside. A peripheral rib **7** is tapered to provide a relatively thin edge portion **8** capable of flexing on being applied under pressure to a bulkhead to form a seal about a bulkhead aperture. A groove **9** extends along each of the longer aperture-facing sides of the plate **1**.

Each connector housing **2** comprises a rectangular block of insulating material having external dimensions such that it will fit within the aperture **4** of the plate **1** with the longer side of housing **2** parallel with the shorter side of the aperture **4**. A rib **10**, hidden by a flange **11** in FIGURE 1 but shown in FIGURE 4, extends along each of the shorter sides of the housing **2** and is designed to be a snap fit in the adjacent groove **9** in the plate **1** so that the housing **2** can be secured in or released from the aperture **4** as desired. When the housing **2** is inserted in the aperture **4** the undersurface of the flange **11** seats on the upper surface of the plate **1** forming a seal. If desired a layer of resilient material may be inserted between the flange **11** and the plate **1** to improve the seal. A projection **12**, having a barbed end, extends outwardly of one side of the flanges **11** parallel to the shorter sides of the housing **2** and a correspondingly shaped recess **13** extends inwardly of the other side of the flanges **11** so that, as shown in FIGURE 1, adjacent connector housings **2** can be releasably connected together to form a single unit which can be inserted into or removed from the aperture **4**. The projections **12** and recess **13** in one flange **11** are of different dimensions from the corresponding parts in the other flange **11** so that adjacent housings **2** can be connected together in only one way.

The housings **2** are each formed with through passageways **14**. The cross-sectional dimensions of the passageways **14** formed in any one housing **2** depend upon the size of electrical connector to be located in the passageway so that, as best seen in FIGURE 3, one housing **2** may be formed with a number of large dimension passageways for receiving large connectors and other housing may be formed with larger number of smaller dimensioned passageways for receiving smaller connectors. It is possible that a housing **2** may have passageways of two or more different dimensions. In FIGURES 4 and 5 passageways **14** are shown containing electrical connectors **15** crimp-connected to conductor wires **16**. Each

connector 15 is retained in its passageway 14 by means of an integral shoulder 17 and locking tongue 18 which engage one on each side of a stop 19 extending into the passageway 14. The connectors 15 have tab ends 20 extending beyond the passageways 14 into a housing recess 21 defined by an encompassing wall 22. A part of the wall 22 is shaped to form a longitudinally extending channel 23 as is best seen in FIGURE 1. The base of the recess 21 is covered by a layer 24 of resilient material through which the tab ends 20 extend in sealing engagement. The layer 24 effectively closes the passageways 14 against the passage of gases.

The fuse unit 3 comprises a body portion 25 of an electrically insulating material formed with an integral peripheral flange 26. The body portion 25 is dimensioned to fit within the plate aperture 4 and has a rib (not shown) on each of a pair of opposite sides capable of entering into snap engagement with the groove 9 in the plate 1. The fuse unit 3 is thus releasably engageable in the plate aperture 4 with the undersurface of the flange 26 sealing against the upper surface of the plate 1 in the same manner as the connector housings 2. Three pairs of electrical connectors 27 are secured in the body portion 25 as shown in FIGURE 2. Each connector 27 is formed at one end with receptacle portions 28 for receiving a fuse end 29 of a cartridge fuse 30 and at the other end with a pair of tabs 31 for entering receptacles such as a receptacle 32 crimp-connected to a conductor wire 33. As seen in FIGURE 3 the body portion 25 is formed with cavities 34 each of which receives a pair of tabs 31. The receptacle portions 28 are encircled by an integral wall 35 having means (not shown) for releasably engaging a fuse unit cove 36.

The connector housings 2 are all of the same length and width, the length being equal to the width of the plate aperture 4 and the width equal to a whole number subdivision of the length of the plate aperture 4. The fuse unit 3 is the same length as a connector housing 2 and is twice the width, as shown, but it may be any whole number multiple of the width of a housing 2 if desired. In the assembly shown in FIGURE 1 three connector housings 2, preferably interconnected as previously explained, and the fuse unit 3 fill the plate aperture 4 with their flanges forming a seal round the periphery of the aperture. Such an assembly when mounted over an appropriate sized aperture in a bulkhead, say of an automobile, closes the aperture against the ready flow of gases from one side of the bulkhead to the other. The assembly shown in FIGURE 2 has only two connector housings 2 and a fuse unit 3 and to avoid leaving an opening through which gases may flow a plate 37 is inserted in the position occupied by the third connector housing 2. The plate 37 has the same dimensions as a connector housing 2 and like the housing has ribs (not shown) for engaging the grooves 9 of the plate 1 and flanges (not shown). The plate 37 may also be provided with projections and recesses, like the projections 12 and recesses 13 of the connector housings 2, for releasably connecting the plate 37 to a connector housing 2.

It will be seen that a fuse unit 3 and one or more connector housings 2 and plates 37 may be engaged in the plate aperture 4 to give a wide variety of assemblies. Further, a plate 37 may be replaced at any time by a connector housing 2 and vice versa.

The assembly according to the invention also includes further connector housings 38 generally similar to the connector housings 2. Each housing 38 comprises a block of insulating material formed with a plurality of through-passageways 39 for receiving electrical connectors 40. Like the housings 2, the cross-sectional area of the passageways 39 in any one housing 38 depends upon the size of the connector 40 to be received. The connectors 40 are each in the form of receptacles to receive and make good electrical contact with the tab end 20 of the appropriate connector in a housing 2. The connectors 40 are contained wholly within the passageways 39 of the housings 38 each of which is formed with a portion 41 dimensioned to fit snugly in the recess 21 of a housing 2. A shoulder 42 on the housing 38 is provided to engage the top of the wall 22 of the housing 2 and indicate when the portion 41 is fully received in the recess 21 and the connectors 15 and 40 connected (see FIGURE 5). Each housing 38 is formed with a projection 43 (FIGURE 1) which is a sliding fit in the recess 23 in the wall 22, the projection 43 and recess 23 polarise the housings 2 and 38 with respect to each other. The housings 38 have barbed projections 44 on one of their longer sides and corresponding recesses 45 on the other to permit adjacent housings 38 to be releasably secured together as a single unit in the manner of the housings 2.

To use an assembly according to the invention the plate 1 is secured to a bulkhead with the plate aperture 4 and a bulkhead aperture in register. A connector 15 is crimped onto the bared end of each of the wires on the side of the bulkhead remote from the plate 1 and the wires are passed through the registering apertures. Each connector 15 is inserted in a passageway 14 of a selected housing 2 until the locking tongue 18 engages the far side of the flange 19 to retain the connector 15 in the housing 2 with the tab end 20 projecting into the recess 21. When the required number of connectors 15 have been inserted in a housing 2, the wires associated with the connectors 15 are drawn back through the plate and bulkhead apertures until the housing 2 enters the plate aperture and the ribs 10 can be engaged in the grooves 9. Other wires associated with circuits requiring fuses have their bared ends terminated by crimping on tab receptacles 32 which are then pushed over the appropriate tabs 31 of the fuse unit 3. The fuse unit 3 is engaged in the plate aperture 4 in the same manner as described for housing 2. The remainder of the plate aperture 4 is filled with plates 37 press-fitted into the plate 1. If more than one housing 2 is required each further housing is assembled and fitted into the plate aperture 4 as previously described, a plate 37 being removed to leave room for each additional housing. If two or more housings 2 are being used it is preferred that they are locked together via projections 12 and recesses 13 to form a single unit before they are inserted in the plate aperture 4. Wires 46 on the other side of the bulkhead are secured in housings 38 corresponding in design and number to the housings 2. Each wire 46 has a tab receptacle 40 crimped on to its bared end and the receptacle 40 is received and retained in an appropriate one of the passageways 39 in the housing 38. The portion 41 of an assembled housing 38 is inserted in the recess 21 of the associated housing 2 until it is firmly engaged with the receptacles 40 each engaged on the associated one of the tab ends 20. The projection 43 and the recess 23 ensure that the two housings 2 and 38 are correctly orientated with respect to each other on engagement. If more than one housing 38 is employed it is preferred that they be inter-engaged via projections 44 and recesses 45 so that they can be inserted into the housings 2 as a single unit.

Thus the wiring on one side of a bulkhead is connected to wiring on the other side of the bulkhead but can be disconnected as desired simply by removing the housings 38 from the housings 2. Further, if an electrical circuit is required to be added at any time appropriate connectors can be added to the ends of the wires of the circuit and the connectors engaged in free communicating passageways of the housings 2 and 38. If there are insufficient or no free passageways in the housings 2 and 38 as may be the case if a number of electrical circuits are to be added, a plate 37 may be removed from the plate aperture 1 and a further housing 2 inserted to receive a further housing 38. Conversely, if an electric circuit is to be removed, housings 2 and 38 can be discarded and a plate 37 used to fill the gap left in the plate aperture 4.

We claim:

1. A panel connector for connection to a panel over an aperture thereof comprising a plate member for connection to said panel and having an opening therein for communication with said aperture in the panel, fuse-carrying housing means having projecting-section means fittable in said opening and having connector means for receiving fuse means therein and for connection with conductor means, connector-housing means having projecting-section means fittable in said opening and having further connector means connected to further conductor means secured therein, and means in at least two sides of said opening and on corresponding sides of said projecting-section means for latchably maintaining said housing means in position on said plate member.

2. A panel connector for connection to a panel over an aperture thereof comprising a plate member for connection to said panel and having an opening for communication with said aperture in said panel, fuse-carrying housing means having section means fittable in said opening and having connector means for receiving fuse means therein and for connection with conductor means, connector-housing means having section means fittable in said opening and having further connector means connected to further conductor means secured therein, means provided by said connector-housing means for connecting said connector-housing means together as a unit, and means provided by said plate member and each of said housing means for latchably maintaining said housing means in position on said plate member.

3. A panel connector for connection to a panel over an aperture thereof comprising a plate member for connection to said panel and having an opening therein for communication with said aperture in said panel, fuse-carrying housing means having projecting-section means fittable in said opening and having connector means for receiving fuse means therein and for connection with conductor means, connector-housing means having projecting-section means fittable in said opening and having further connector means connected to further conductor means secured therein, and detenting means provided by said plate member and each of said housing means for latchably maintaining said housing means in position on said plate member.

4. A vehicle panel connector comprising a plate member for connection to a panel over an aperture thereof, said plate member having an opening in communication with the panel aperture, first housing means having projecting-section means fittable in said opening between two sides thereof, connector means in said first housing means and including fuse-engaging means for connection with fuse means and conductor-engaging means for connection to conductor means, second housing means having projecting-section means fittable in said opening between the two sides thereof, other connector means in said second housing means and including conductor-engaging means for connection to other conductor means and connector-engaging means for connection with further connector means, means in the two sides and on said projecting-section means for latchably maintaining said housing means in position on said plate member, and means provided by said connector means and said housing means for securing said connector means therein.

5. A vehicle panel connector according to claim 4 wherein sealing means is provided by said housing means and said plate member to provide sealing connection therebetween.

6. A vehicle panel connector according to claim 4 wherein locking means are provided between said second housing means to lock adjacent ones of these second housing means together to form a single unit.

7. A vehicle panel connector according to claim 4 wherein third housing means is mateable with said second housing means and polarizing means is provided by said second and third housing means whereby these housing means are polarized with respect to each other.

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