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[54] **ELECTRICAL TERMINAL CONNECTOR**
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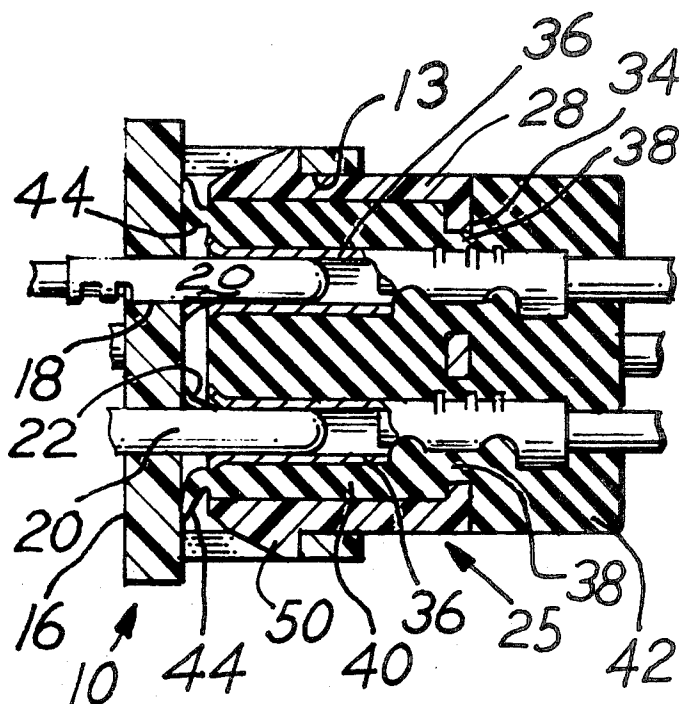
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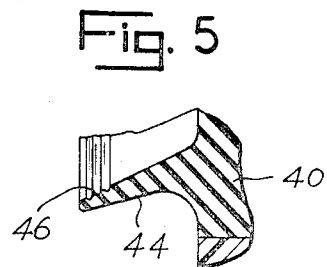
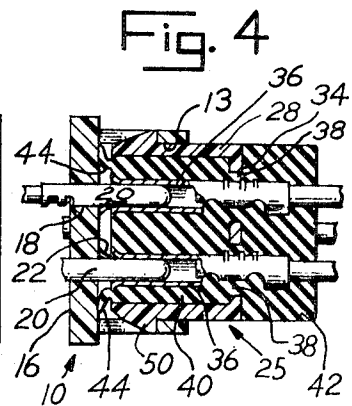
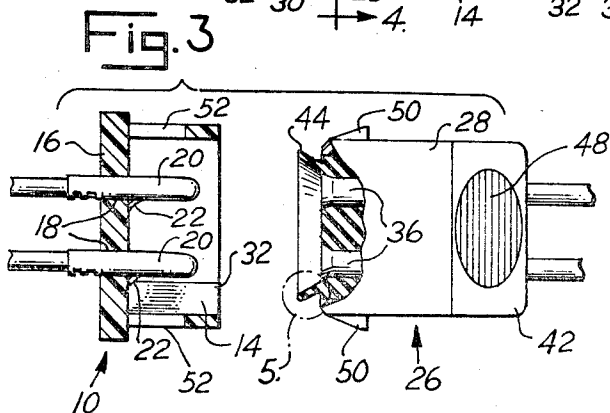
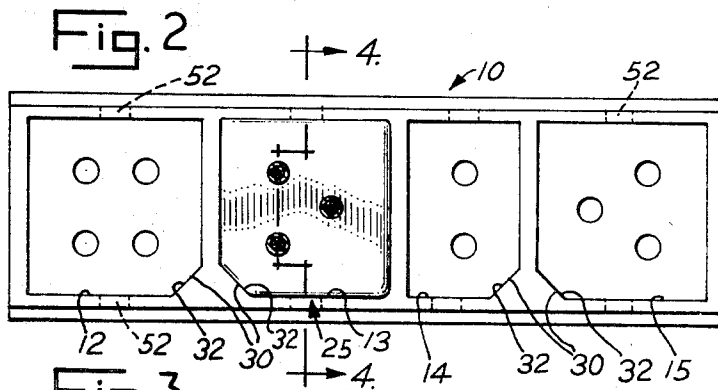
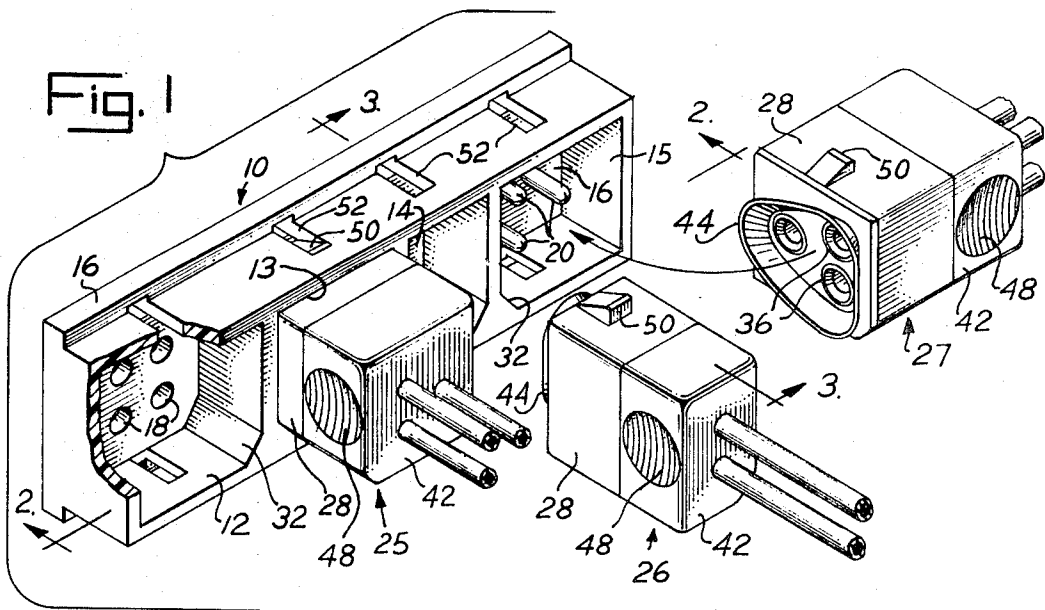
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ABSTRACT: A connector including a terminal carrying block housing having a one or more electrical terminals mounted therein and a plug. The plug is adapted to be inserted in the block housing and includes a relatively rigid housing closed at one end by a wall, the rigid housing being latched into the block housing. One or more electrical terminals are inserted through an aperture in the wall and are fixed in place in the plug housing by being embedded in a soft resilient moulded mass which fills the plug housing, the plug terminals being adapted to mate with the block housing terminals. The unitary resilient mass extends beyond one end of the plug housing to form a resilient sealing lip which surrounds the plug terminals and seals the plug against the block housing.





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ELECTRICAL TERMINAL CONNECTOR

BACKGROUND OF THE INVENTION

This invention relates to a connector and, more particularly, to an electrical connector having a plug in which the terminals are firmly embedded in a resilient mass of material and which are sealed when the connector is assembled.

In the past, terminal connectors have been provided comprising a block housing, which holds one or more electrical terminals, and a plug. The plug is generally adapted to be inserted into the block housing and carries one or more terminals which are adapted to mate with the first mentioned terminals. In the previous connectors, the mating terminals are frequently exposed to moisture and other foreign matter creating the possibility of contamination and corrosion and consequent short circuiting of the terminals. Also, the prior connectors were frequently subject to damage since the terminals of the plug portion of the connectors were only insecurely held by the plug. If the terminal wire leads of such connectors were pulled or exposed to other tension forces, the terminals and/or their wire leads would frequently separate or the terminals would be torn from their plug, necessitating replacement of the plug portion of the connector with another plug.

The connector constructed in accordance with the principles of my invention obviates the aforementioned disadvantages of the prior connectors. The terminals of the plug portion of the connector are carried in a rigid hollow housing which is filled with a unitary mass of resilient material firmly embedding the terminals within the hollow housing and preventing destruction of the plug caused by forces exerted upon the terminal leads. Moreover, an extension of the unitary resilient mass beyond the end of the rigid housing provides a sealing lip which seals the plug terminals to the block housing portion of the connector when the plug terminals are in mating relationship with the block housing terminals thereby preventing the entry of moisture and other foreign matter which might cause corrosion or short circuiting of the terminals. Finally the connector constructed in accordance with the principles of my invention is both inexpensive and easily constructed.

SUMMARY OF THE INVENTION

In a principal aspect, the connector constructed in accordance with the principles of my invention includes a plug which is adapted to be inserted into a block housing, the plug and housing carrying mating electrical terminals. The plug includes a relatively rigid hollow housing having an integrally formed wall closing a first end of the housing. The wall includes aperture means through which the elongated terminals of the plug extend toward the other end of the housing. The entire hollow housing is filled with a unitary mass of resilient moulded material embedding and retaining the terminals therein, the unitary mass of material extending beyond the second end of the housing to form a flexible sealing means for sealing the plug terminals when the latter terminals are arranged in mating relationship with the block housing terminals.

These and other objects, features and advantages of the present invention will be more clearly understood through a consideration of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

In the course of this description reference will be frequently made to the attached drawings in which:

FIG. 1 is an exploded view of a preferred embodiment of connector constructed in accordance with the principles of my invention;

FIG. 2 is a cross-sectioned elevation view of the connector taken along line 2-2 of FIG. 1;

FIG. 3 is a partially cross-sectioned elevation view of the connector taken substantially along line 3-3 of FIG. 1;

FIG. 4 is a cross-sectioned elevation view of the connector taken along line 4-4 of FIG. 2; and

FIG. 5 is an enlarged cross-sectioned view of the sealing lip of the plug portion of the connector taken within circle 5 of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, a preferred embodiment of connector constructed in accordance with the principles of my invention is shown. The connector includes a block housing 10 defining a plurality of open ended sockets 12, 13, 14 and 15. A wall 16 closes one end of each of the sockets, the wall having one or more apertures 18 opening into each of the sockets for mounting electrical terminals 20 in each of the sockets, as shown in FIG. 3. The electrical terminals 20 are conventional male pin type terminals and may be held in place in the apertures 18 of the wall 16 by bent tab fingers 22 bent outwardly from the terminals, as shown in FIGS. 3 and 4. It should be understood that any other suitable manner of holding the terminals 20 in the apertures 18 may be employed, the specific terminal construction itself not being part of the present invention.

A plurality of plugs, e.g. 25, 26 and 27, are provided, each plug varying in size and terminal number or arrangement. Each plug includes a rigid hollow housing 28 which may be moulded of nylon or other suitable rigid polymer. The rigid housing 28 is of a size and shape to be inserted into a selected one of the block housing sockets 12, 13, 14 or 15. As shown in the drawings, each rigid housing 28 is of a generally rectangular configuration except for an inclined corner 30 which is adapted to cooperate in mating relationship with a similar inclined corner 32 in an appropriate one of the block housing sockets in which the plug is to be inserted. The inclined corners 30 and 32 provide for polarization of the plug and socket and prevent the insertion of the wrong plug in the wrong socket. Thus, it will be seen that a plurality of sockets may be provided in the connector of my invention without the danger of crossing the circuits due to insertion of the incorrect plug. This is made possible not only by the polarizing inclined corners 30 and 32, but also by the differing plug sizes and shapes as well as the plug terminal arrangement. Thus only a specific plug will be able to be inserted in socket 12, plug 25 socket 13 and so on.

As shown in FIG. 4, the rigid hollow housing 28 is closed at one end by an apertured wall 34 and one or more elongated female terminals 36, which are adapted to mate with the male terminals 20, extend through the apertures 38 toward the opposite end of the housing 28. A solid unitary mass of resilient material 40, formed of polyvinyl chloride or other suitable resilient polymeric substance, is moulded into and fills the hollow rigid housing 28 firmly embedding and retaining the terminals 36 therein. The resilient material 28 extends at 42 through the apertures 38 and beyond the apertured wall 34, completely enclosing the terminals 36 and the ends of their wire leads. The apertured wall 34 is thus firmly embedded in the material to prevent longitudinal movement of the resilient mass 40 with respect to the rigid housing 28. The extending portion of the unitary mass 42 is provided with ribbed concave depression 48 for facilitating manual gripping while inserting or removing the plug from its respective block housing socket.

The resilient material is also extended beyond the second end of the housing 28 to form a resilient sealing lip 44 which encircles the terminals and engages the inner face of the block housing wall 16 when the plug is fully inserted in the proper socket. As shown in FIG. 5, the resilient sealing lip 44 may be grooved at 46 to provide a better seal against the wall 16 of the block housing 10.

The exterior surface of the rigid housing 28 carries resilient shoulder lugs 50 which are adapted to snap into coinciding slots 52 formed in the walls of each of the sockets 12, 13, 14 and 15 of the block housing to hold each of the plugs firmly in place in their associated socket with their respective terminals 36 in mating relationship with terminals 20.

It will be evident when considering the above description of the preferred embodiment of the connector of my invention, that the plug of my invention is of a predetermined fixed size and shape while a flexible resilient unitary mass of moulded material acts to embed and firmly retain the plug terminals 36 in place. The unitary mass also provides a resilient sealing lip which cooperates with the end wall 16 of the block housing to seal the terminals to prevent moisture and other foreign matter from contacting the terminals when the terminals are arranged in mating relationship with each other.

It should be understood that the embodiment of the present invention which has been described is merely illustrative of an application of the principles of the invention. Numerous modifications may be made by those skilled in the art without departing from the true spirit and scope of the invention.

I claim:

1. An electrical plug for use with mating electrical terminals comprising,
 - a relatively rigid hollow housing having first and second open ends,
 - a wall formed integrally with said housing and closing said first end of said housing, said wall defining aperture means therein communicating with said hollow housing,
 - elongated electrical terminal means extending through said aperture means into said housing toward said second end of the housing,
 - a unitary mass of resilient material moulded within and filling said hollow housing and firmly embedding and retaining said terminal means therein, said unitary mass of resilient material extending beyond said second end of said housing and through said aperture means beyond said first end of said housing and firmly embedding said wall therein, and
 - flexible sealing means formed by the portion of said unitary mass of resilient terminal retaining material which extends beyond said second end of said housing for sealing said terminal means when the terminals are arranged in mating relationship with said elongated terminal means.
2. The plug of claim 1 wherein said sealing means comprises a resilient annular lip which surrounds said elongated terminal

means adjacent the second end of the housing.

3. The plug of claim 1 including lug means carried externally of said housing for maintaining said elongated terminal means in mating relationship with the terminals.

4. The plug of claim 1 wherein said unitary mass of material is polyvinyl chloride.

5. A connector comprising in combination,
a terminal block comprising a hollow housing,
a substantially rigid wall at one end of said block housing carrying first terminal means,

a plug comprising a second rigid hollow housing adapted to be inserted into said block housing adjacent to but spaced slightly from the wall of said block housing, said second rigid housing being open at both ends,

a wall in said second rigid housing and closing a first of said open ends, said wall defining aperture means therein,
second terminal means extending into said second housing through said aperture means and into mating relationship with said first terminal means when said second housing is inserted into said block housing,

a unitary mass of resilient material moulded within and filling said second rigid housing and firmly embedding and retaining said second terminal means therein, said resilient material extending through said aperture means beyond said first end of said housing firmly embedding said wall therein and beyond the other open end to form a sealing lip between the second housing and said substantially rigid wall of the block housing, and

lug means on one of said housings cooperating with the other of said housings for retaining the housings in their inserted relationship.

6. The connector of claim 5 including a plurality of grooves formed on said sealing lip, said grooves contacting said wall of the block housing when said second rigid housing is inserted in said block housing.

7. The connector of claim 5 wherein said block housing includes a plurality of sockets, at least one of said sockets and plugs including means to allow insertion of only selected ones of said plugs into selected ones of said sockets.

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