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(71) Applicant: AMPHENOL CORPORATION [US/US];
358 Hall Avenue, Wallingford, CT 06492 (US).

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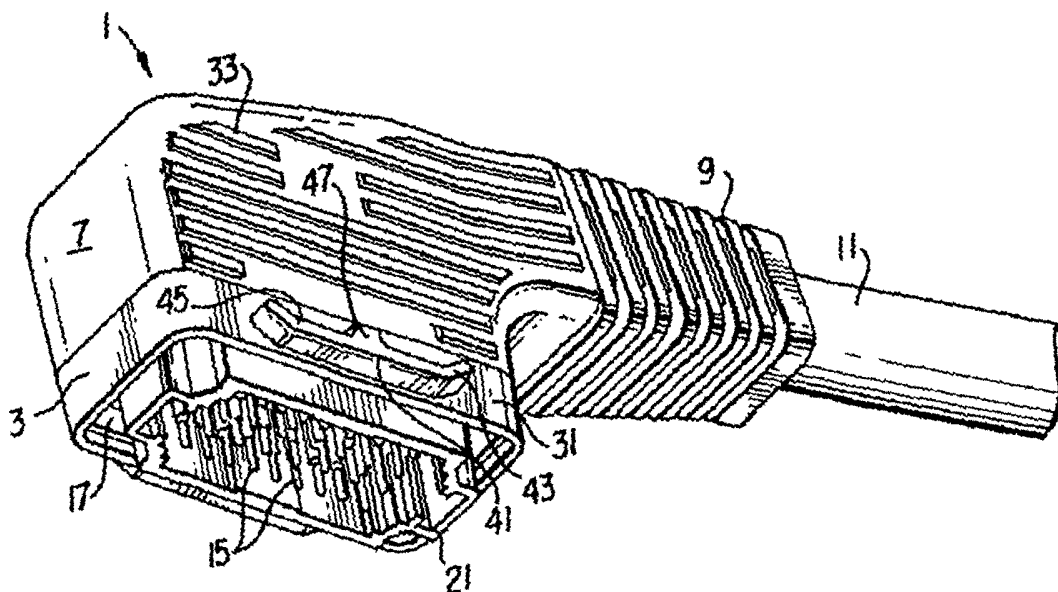
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(72) Inventors: DOLINSHEK, Thomas, J.; 52647 Bree, New Baltimore, MI 48047 (US). ROBINSON, Daniel, D.; 35934 Union Lake Road, #334, Harrison Township, MI 48048 (US). BUDD, Walter; 607 Springview, Rochester, MI 48307 (US). WILTON, Scott; 1623 Boulder Court, Rochester, MI 48306 (US).

(74) Agent: WOLFE, Charles, R., Jr.; Blank Rome Comisky & McCauley, 900 17th Street, N.W., Washington, DC 20006 (US).

(54) Title: ELECTRICAL CONNECTOR WITH OVERMOLD HOUSING



(57) Abstract: An electrical connector assembly has a base housing (3), a pre-mold housing (5) and an overmold housing (7) with a strain relief (9).



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ELECTRICAL CONNECTOR WITH OVERMOLD HOUSING

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to electrical connector housing construction.

Description of the Prior Art

10 A drawback of the electrical connectors of the prior art is that metallic outer connector housings have been made with strain reliefs and cable terminations that are fastened onto the rigid metal housing using hardware. The hardware typically consists of a threaded adapter and nut, a washer, and a rubber grommet. Tightening the nut compresses the grommet around the cable and provides a strain relief. This requires many parts and results in a heavy outer housing. In addition, the nut can come loose, allowing foreign contamination to enter and pulling the cable from the housing.

SUMMARY OF THE INVENTION

15 To overcome the deficiencies in the prior art as discussed above, the present invention provides an electrical connector comprised of a base housing which is overmolded in a plastic material to form an overmold housing. Preferably, the base housing is made of metal and the overmolding is cast around it in resilient plastic material that seals and provides a strain relief. A pre-mold housing is preferably applied to a portion of the base housing before the overmold housing is formed.

20 Other features of the invention may include: cable strain relief fittings to prevent damage to the plug-cord connection; use of special construction materials (i.e., die cast metal and plastics) that withstand chemical and high/low temperature environments; and audible and/or tactile confirmation that a latch is engaged.

25 With these and other objects, advantages and features of the invention that may become hereinafter apparent, the nature of the invention may be more clearly understood by reference to the following detailed description of the invention, the appended claims and to the several drawings attached herein.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of an electrical connector cable assembly in accordance with the invention.

5 Fig. 2 is a perspective view of the base housing of the electrical connector of the invention.

Fig. 3 is a perspective view of the base housing with a pre-mold housing formed thereon;

Fig. 4 is a partial cross-sectional view along lines IV-IV of Fig. 3.

DETAILED DESCRIPTION OF THE INVENTION

10 Fig. 1 shows the electrical connector of the invention. The connector 1 is comprised of three main parts, a base housing 3, a pre-mold housing 5 molded onto a rear portion of the base housing (see, Fig. 3) and an overmolded housing 7, which is molded over the pre-mold housing, as described in more detail below.

15 The overmolded housing 7 is preferably molded of plastic material with resilience or elasticity, such as a thermoplastic elastomeric material, although hardened plastic, such as thermosetting material, may be also used. The overmolded housing 7 preferably includes a strain relief extension 9 molded around the cable 11 which supplies the wires 13 which enter the rear of the base housing 3 and are attached to the contacts 15 of internal connector 21.

20 Fig. 2 shows base housing 3 which includes internal connector 21 disposed in passageway 17 having electrical contacts 15 which are attached to wires 13 which enter through an open rear of base housing 3 from cable 11. The rear portion of base housing 23 includes a circumferential groove 25 and flange 27, which aid in the attachment of the pre-mold housing as discussed below.

25 Fig. 3 shows base housing 3 with pre-mold housing 5, molded thereon. Pre-mold housing 5 may be molded from any of the thermoplastic or thermosetting plastic materials used for the overmolded housing. To attach the pre-mold housing 5 to the base housing 3, the base housing with attached cable is placed in a mold and the pre-mold housing is molded thereon, covering the rear portion of the base housing 23, wires 13 and
30 a portion of cable 11, as shown in Fig. 3.

The pre-mold and overmold housing are preferably made by injection molding plastic material into the mold to form the structures shown in Figs. 1 and 3.

To facilitate attachment of the pre-mold housing to the rear of the base housing, a circumferential groove 25 and flange 27 are preferably provided on the rear of the base housing. As shown in Fig. 4, the material which forms the pre-mold housing is held in groove 25, locking the pre-mold housing to the base housing.

Overmolded housing 7 is then molded over the pre-mold housing and central portion 29 of base housing 3 to form the connector of the invention shown in Fig. 1. Overmold housing 7 is, preferably, molded such that its outer surface is flushed with the outer surface of the exposed front portion of base housing 31. The surface of the overmold housing may contain ribs 33 to facilitate gripping of the connector.

In a preferred embodiment, the front portion 31 of the base housing 3 is provided with lug ridge 41. The lug ridge 41 is an optional feature that is preferably cast into base housing 3. It includes two rounded ends 43, reinforcement members 45, and a reinforcement extension 47. The mating connector (not shown) includes two latches having detents, on swing arms, that catch onto the rounded ends 43. The latches are shown in the co-pending application entitled "General Motion Connector," Serial No. 09/805,330, filed March 14, 2001, the contents of which are entirely incorporated herein by reference. The rounded ends 43 take the place of cylindrical lug pins, which are prone to break under the high forces exerted by the latches.

The reinforcement members 45 are preferably of the same height above the surface of the housing as is the rounded ends 43, but may be of a different height. The same is true of the extension 47.

Although certain presently preferred embodiments of the present invention have been specifically described herein, it will be apparent to those skilled in the art to which the invention pertains that variations and modifications of the various embodiments shown and described herein may be made without departing from the spirit and scope of the invention. Accordingly, it is intended that the invention be limited only to the extent required by the appended claims and the applicable rules of law.

What Is Claimed is:

1. An electrical connector assembly comprising:
an electrical connector having one or more electrical contacts;
a base housing surrounding said electrical connector, said base housing having a passageway through for receiving said electrical connector, a first opening at one end of the passageway to permit said electrical connector to mate with another electrical component and a second opening at another end of the passageway for receiving one or more wires for attachment to one or more contacts in said electrical connector;
a cable having one or more wires which run from the cable through said second opening of the base housing and attach to said one or more contacts of the electrical connector; and
an overmold housing which covers said second opening of the base housing, said one or more wires and a portion of said cable.
2. The electrical connector assembly as claimed in Claim 1, further comprising a pre-mold housing formed over said second opening of the base housing, beneath said overmold housing.
3. The electrical connector assembly as claimed in Claim 1, wherein said overmold housing is made of an elastomeric material.
4. The electrical connector assembly as claimed in Claim 3, wherein said base housing is made of metal.
5. The electrical connector as claimed in Claim 2, wherein the end of the base housing adjacent the second opening of the base housing comprises a circumferential groove and flange.

6. The electrical connector assembly as claimed in Claim 5, wherein said flange is embedded in said pre-mold housing.

7. The electrical connector assembly as claimed in Claim 1, wherein the outer exposed surface of said overmold housing is flush with the outer exposed surface of the base housing.

8. The electrical connector assembly as claimed in Claim 1, wherein the overmold housing comprises a strain relief extension attached to said cable.

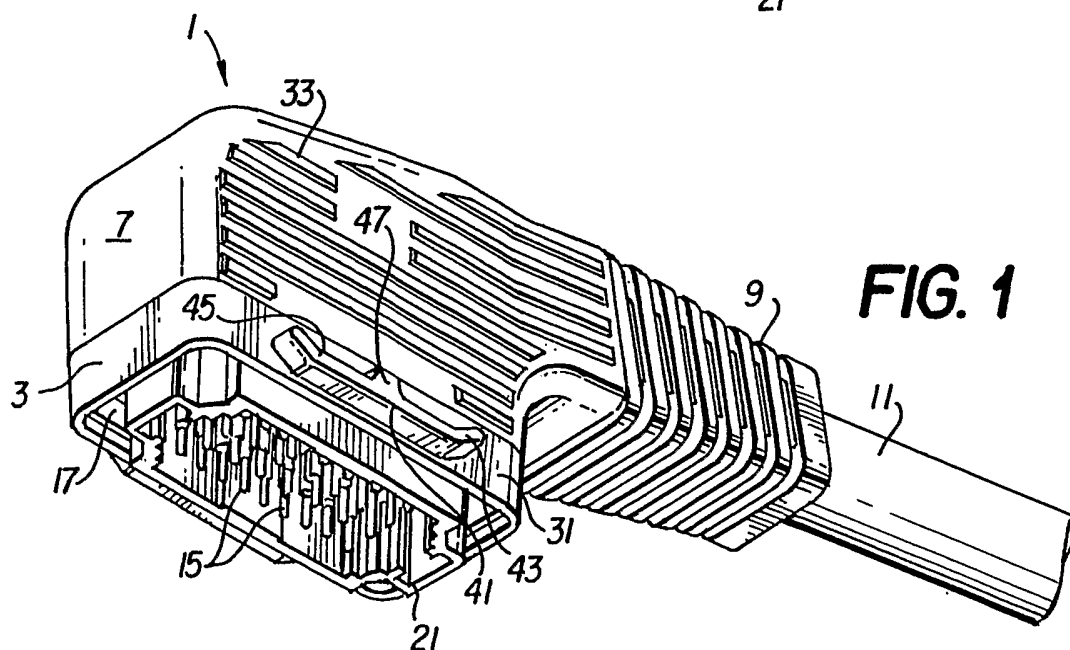
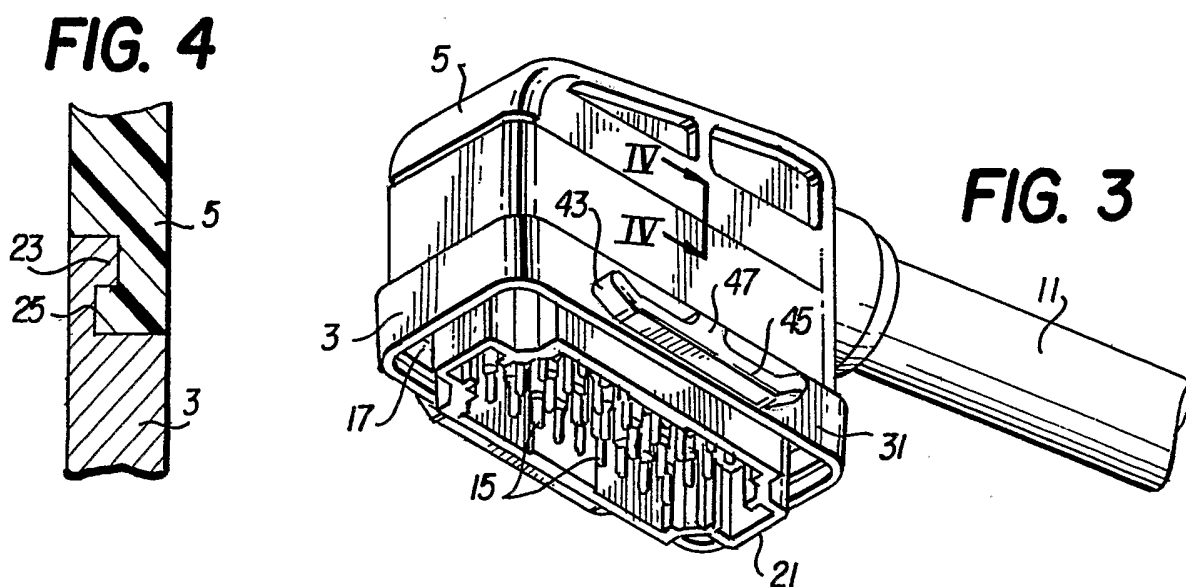
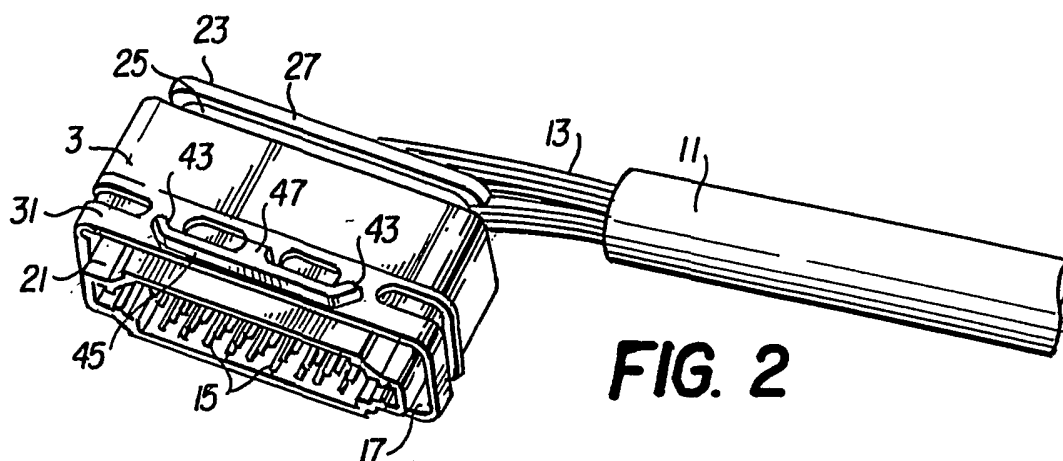
9. The electrical connector assembly as claimed in Claim 1, wherein the base housing includes a lug adapted to engage a latch-arm detent in a locking position.

10. A method of assembling an electrical cable assembly comprising:
positioning an electrical connector within a passageway in a base housing having a first opening to permit the electrical connector to mate with another electrical component and a second opening which receives one or more wires from an electrical cable which are attached to one or more contacts in the electrical connector;
overmolding a plastic pre-mold housing onto the base housing over the second opening; and
overmolding a plastic overmold housing over the pre-mold housing, base housing and cable.

11. The method as claimed in Claim 10, comprising forming a flush outer surface common to the exposed outer surface of the base housing and the exposed outer surface of the overmold housing.

12. The method as claimed in Claim 10, wherein said pre-mold housing and overmold housing are formed of an elastomeric material.

13. The method as claimed in Claim 10, wherein the step of overmolding comprises forming a strain relief extension around the cable.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/19125

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H01R 13/58

US CL : 439/606

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 439/606, 604, 341, 344, 372, 676, 604; 29/858, 856, 883

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
x	US 4,960,389 A (FRANTZ et al.) 02 October 1990 (02.10.1990), see entire document.	1-4, 9
x	US 5,833,495 A (ITO) 10 November 1998 (10.11.1998), see entire document.	1,2,5,6,7,8
y		11
y	US 6,230,405 B1 (LIU et al.) 15 May 2001 (15.05.2001), see entire document.	10, 11, 12, 13
y	US 6,206,734 B1 (Liu) 27 March 2001 (27.03.2001), see entire document	10-13

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703)305-3230

Authorized officer

Paula Bralley

Telephone No. (703) 308-0956