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(72) Inventor: **Mitra, Niranjan Kumar**
5629 GH Eindhoven (NL)

(74) Representative:
Aalbers, Arnt Reinier
De Vries & Metman B.V.,
Overschiestraat 180
1062 XK Amsterdam (NL)

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(71) Applicant:
FCI's Hertogenbosch BV
5222 AV's - Hertogenbosch (NL)

(54) **Connector and header or receptacle for use in the same**

(57) The invention pertains to a connector comprising a header and a receptacle, each comprising a housing provided with at least one contact element and with a conductive coating which, at least upon mating, forms a shield. The header and/or the receptacle comprises a spring contact attached to its conductive coating parallel to the surface of the housing, which spring contact

serves, upon mating of the header and the receptacle, to establish an electrical connection between the respective conductive coatings. Further, the spring contact is attached to a protrusion or a recess respectively on or in the housing.

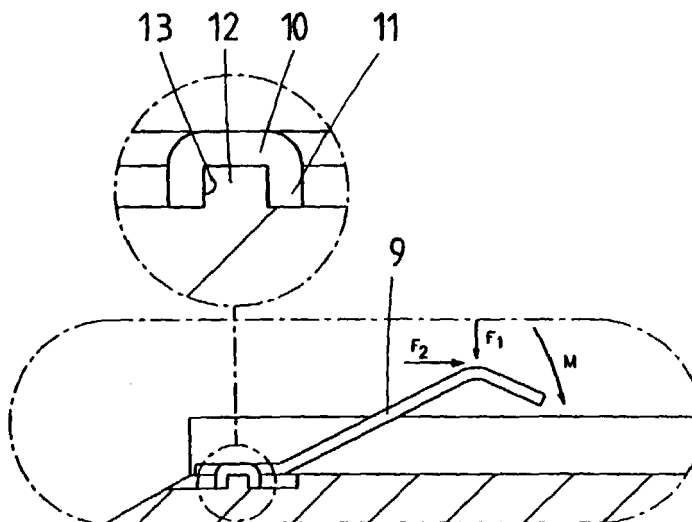


fig. 3

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Description

[0001] The invention pertains to a connector comprising a header and a receptacle, each comprising a housing provided with at least one contact element and with a conductive coating which, at least upon mating, forms a shield, which shield is connected or connectable to a ground contact or electrode, wherein the header and/or the receptacle comprises a spring contact attached to its conductive coating parallel to the surface of the housing, which spring contact serves, upon mating of the header and the receptacle, to establish an electrical connection between the respective conductive coatings.

[0002] It is known to use a metal leaf spring attached to the outer periphery of the metallized plastic housing of the header or receptacle of a connector in such a way that this spring abuts against an adjacent metallized plastic housing of, respectively, the receptacle or the header of the connector. Thus, a good electrical and mechanical connection is established between the respective metal coatings and a shield cover is established to ensure a good signal integrity within the connector.

[0003] However, loading of the spring, usually resulting in a normal force of say 50 g, gives rise to, amongst others, considerable tensile forces in the connection of the spring contact to the housing. These forces will in many cases result in the metal coating being peeled off the housing.

[0004] The invention aims to provide a connector of the above mentioned type which does not exhibit the said disadvantage, or wherein the said disadvantage is at least substantially reduced.

[0005] To this end the invention is characterised in that the spring contact is further attached to a protrusion or a recess respectively on or in the housing.

[0006] Thus, at least part of the tensile forces is replaced by shearing forces, parallel to the interface between the metal coating and the housing, and by compressive forces, neither of which forces poses a great threat to the integrity of the connection between the spring contact and the housing.

[0007] In a preferred embodiment, at least part of the surface of contact between the spring contact and the housing builds an angle with that part of the spring contact that runs parallel to the housing, which angle is in excess of 45 degrees.

[0008] It is especially preferred that at least part of the surface of contact between the spring contact and the housing runs perpendicular or substantially perpendicular to that part of the spring contact that runs parallel to the housing.

[0009] Such a configuration allows both easy attachment of the spring contact to the housing and very effective absorption of the bending moments and forces applied to the spring contact. After all, the significant part of the peeling forces has now been replaced

by shearing and compressive forces which can be born more easily by the conductive coating and may even contribute to a strong connection between the spring contact and the housing.

[0010] It is further preferred that the surface of contact between the spring contact and the housing comprises at least two parallel or substantially parallel parts, which build an angle, preferably of about 90 degrees, with that part of the spring contact that runs parallel to the housing. Thus, it becomes possible to clamp or press fit the spring contact on the housing.

[0011] The invention will be further explained by reference to the drawings in which an embodiment of the spring contact according to the present invention is schematically shown.

Fig. 1 shows a cross section of a connector comprising a spring contact in accordance with the prior art.

Fig. 2 shows the spring contact according to fig. 1 in more detail.

Fig. 3 shows a spring contact in accordance with the present invention.

[0012] Fig. 1 shows, on the left-hand side, a header 1, comprising a housing 2 which is attached to a substrate 3 and which is provided with five contact elements 4. The housing 2 is made of plastic, e.g. a liquid crystalline polymer (LCP) or nylon (for example PA6), and has been provided with an electrically conductive metal coating (not shown). Such coatings are known to the person skilled in the art, and may, for instance, comprise a copper layer with a thickness of say 1 - 2 μm on which a nickel or aluminium layer of say 2 - 3 μm has been deposited. The metal coating on the housing 2 is electrically connected to a ground electrode (not shown).

[0013] Fig. 1 further shows a receptacle 5 which comprises a housing 6 in which five contact elements 7 are placed. The housing 6 may be made of the same material as the housing 2 of the header 1 and has been provided with a similar electrically conductive metal coating. On this metal coating a metal spring contact 8 has been attached which, upon mating of the header 1 and the receptacle 5, establishes an electrical and mechanical connection between the respective metal coatings.

[0014] Fig. 2 shows the spring contact 8 in more detail. It further shows a force F2, exerted on the spring contact 8 during the mating of the header 1 and the receptacle 5, and a force F1 exerted on the metal spring during and after mating. The force F2 will mainly result in a shearing force at the surface of contact between the spring contact 8 and the housing 6, whereas the force F1 will result in a bending moment M and a peeling force at the said surface, which, in turn, will often result in failure of the connection between spring contact 8 and the metal coating on the housing 6.

[0015] Fig. 3 shows a metal spring contact 9 in

accordance with the present invention. This spring contact 9 is provided with a clamp or clip 10 with two parallel legs 11. Through these parallel legs 11 the spring contact 9 has been clamped on a countersunk protrusion 12 provided on the housing 6.

[0016] The aforementioned force F2 will now be born primarily by the left flank 13 of the countersunk protrusion 12, whereas the force F1 and the bending moment M are distributed over the entire countersunk protrusion 12, resulting primarily in compressive forces on the right flank of the countersunk protrusion 12.

[0017] Owing to this construction, the spring contact 9 is firmly attached to the housing 6 and repeated mating an unmating of the header 1 and the receptacle 5 is made possible without endangering the integrity of the metal coating on the housing 6.

[0018] The spring contact 9 is preferably made of a metal, more specifically of a copper alloy such as phosphorus bronze or beryllium copper.

[0019] Although the protrusion or recess may be provided after the conductive coating has been applied to the housing, it is preferred that the protrusion or recess is provided beforehand so that the surface of the protrusion or recess is covered in its entirety by the conductive coating.

[0020] It is further preferred that, after the connection between the spring contact and the housing has been established, an amount of solder is applied so as to render the connection airtight or substantially airtight.

[0021] The present invention also relates to individual headers and receptacles for use in the connectors described hereinbefore.

[0022] The invention is not restricted to the above described embodiments which can be varied in a number of ways within the scope of the claims. For instance, the housing or the header and/or the receptacle may be an integral whole, obtained through e.g. injection moulding, but it may also be an assembly of two or more parts.

Claims

1. Connector comprising a header (1) and a receptacle (5), each comprising a housing (2, 6) provided with at least one contact element (4, 7) and with a conductive coating which, at least upon mating, forms a shield, wherein the header (1) and/or the receptacle (5) comprises a spring contact attached to its conductive coating parallel to the surface of the housing (2, 6), which spring contact serves, upon mating of the header (1) and the receptacle (5), to establish an electrical connection between the respective conductive coatings, **characterized in that** the spring contact (9) is further attached to a protrusion (12) or a recess respectively on or in the housing (6).

2. Connector according to claim 1, wherein at least

part of the surface of contact between the spring contact (9) and the housing (6) builds an angle with that part of the spring contact (9) that runs parallel to the housing (6), which angle is in excess of 45 degrees.

3. Connector according to claim 2, wherein at least part of the surface of contact between the spring contact (9) and the housing (6) runs perpendicular or substantially perpendicular to that part of the spring contact (9) that runs parallel to the housing (6).

4. Connector according to any one of the preceding claims, wherein the surface of contact between the spring contact (9) and the housing (6) comprises at least two parallel or substantially parallel parts (11), which build an angle with that part of the spring contact (9) that runs parallel to the housing (6).

5. Connector according to any one of the preceding claims, wherein the surface of the protrusion (12) or recess is covered in its entirety by the conductive coating.

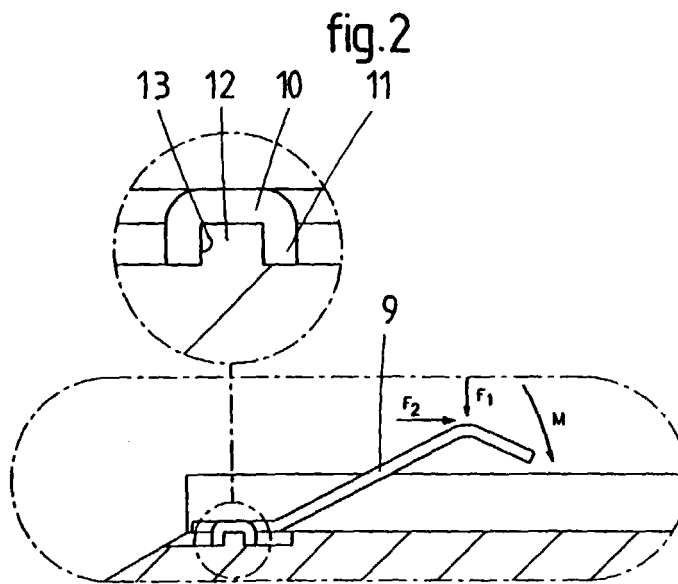
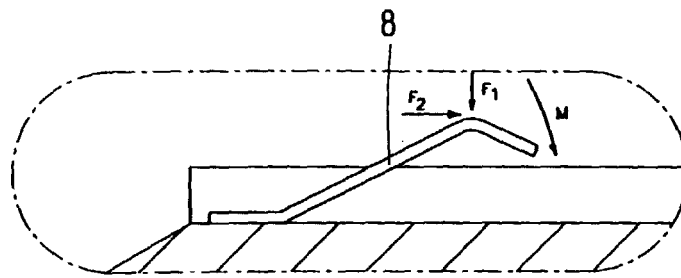
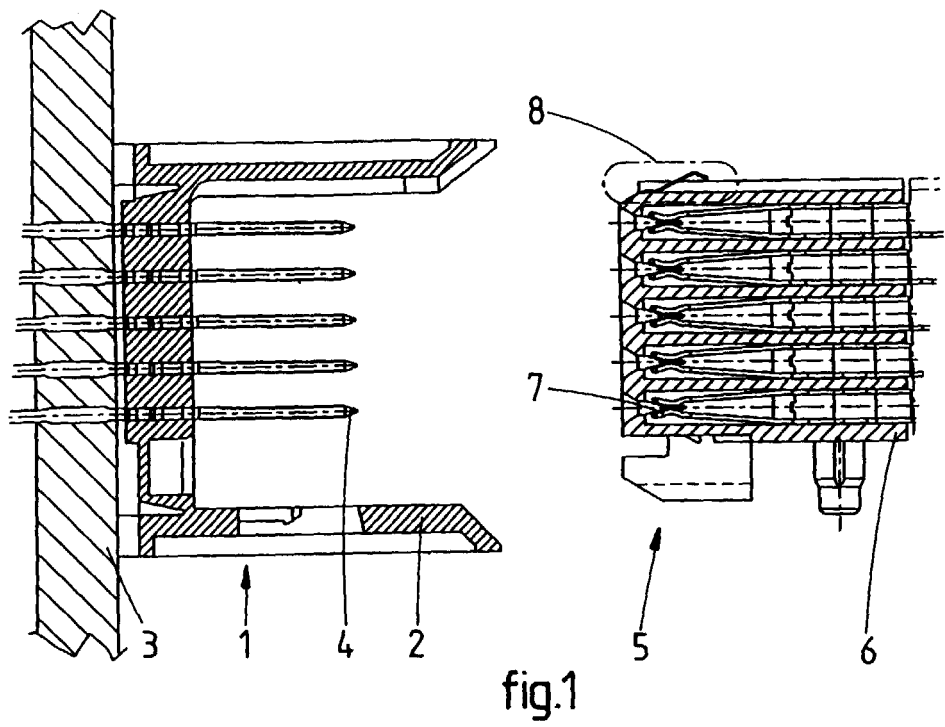
6. Connector according to any one of the preceding claims, wherein the spring contact (9) is attached to a countersunk protrusion (12) on the housing (6)

7. Connector according to any one of the preceding claims, wherein the spring contact (9) is clamped to the housing (6).

8. Connector according to any one of the preceding claims, wherein the spring contact (9) is welded to the housing (6).

9. Connector according to any one of the claims, wherein solder is applied to the connection between the spring contact (9) and the housing (6).

10. Header or receptacle for use in the connector according to any one of the preceding claims, which comprises a housing (6) and wherein the spring contact (9) is attached to a protrusion (12) or a recess respectively on or in the housing (6).





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EUROPEAN SEARCH REPORT

Application Number
EP 00 20 2271

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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Place of search	Date of completion of the search	Examiner	
THE HAGUE	30 October 2000	Salojärvi, K	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 00 20 2271

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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