

PATENT SPECIFICATION

(11) 1 446 345

- (21) Application No. 54021/73 (22) Filed 21 Nov. 1973
(31) Convention Application No. 313 021 (32) Filed 7 Dec. 1972 in
(33) United States of America (US)
(44) Complete Specification published 18 Aug. 1976
(51) INT. CL.² H01R 13/58//13/36 13/40
(52) Index at acceptance
H2E 10B 22B 3A1 3A2 3A5 3B6 3C6D2 3D10 3E9
(72) Inventor CLAIR WILSON SNYDER JR.



(54) ELECTRICAL CONNECTOR HOUSING

(71) We, AMP INCORPORATED, a corporation organised and existing under the laws of the State of New Jersey, United States of America, of Eisenhower Boulevard, Harrisburg, Pennsylvania, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an electrical connector housing which has an integral strain relief portion for securing wires terminated in the housing against pull-out forces.

The present invention is an electrical connector housing of insulating material having a plurality of through cavities for receiving respective electrical terminals, the cavities extending between a mating face of the housing and a rear face of the housing, two mutually spaced flexible arms integral with the housing and extending from the rear housing face in a direction generally away from the mating housing face, and means for joining together the free end portions of the arms at two locations spaced laterally of each other with respect to the longitudinal direction of the arms whereby terminated wires may be clamped between the two arms.

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

Figure 1 is a perspective view of an electrical connector shown terminating electrical connector wires shown terminating electrical conductor wires;

Figure 2 is a side view of the housing of the connector of Figure 1;

Figure 3 is an enlarged side view of the connector after termination of the electrical

conductor wires, parts of the connector being sectioned and parts being broken away to illustrate details of the connector; and

Figure 4 is a side view of the connector looking in the direction from right to left of Figure 3.

An electrical connector 1 comprises a housing 2 and having an integral strain relief portion illustrated generally at 4, which strain relief portion is provided to resist pull-out of a plurality of electrical conductor wires 6 from the housing 2 in which the wires are terminated. The housing 2 is generally rectangular with a plurality of planar outer peripheral side surfaces 8, 10, 12 and 14, a forward or mating face 16 and a rear face 18. The housing is provided with a plurality of internal cavities 20 which extend generally parallel to one another and communicate with each of the faces 16 and 18. The cavities 20 are arranged in two superposed rows but any convenient configuration may be used and the housing itself may be some shape other than rectangular. For example, the housing 2 may be cylindrical with the cavities arranged in a generally circular configuration. As shown in Figure 3 each of the cavities 20 receives an electrical terminal 22. The terminal 22 includes a lance portion 24 latchably received in one of a plurality of recesses 26 communicating with the top and bottom rows of cavities and the side surfaces 8 and 10 respectively of the housing 2. The terminal 22 includes a rectangular socket 27 for reception of a mating pin, and a wire barrel 28 shown crimped to the core 30 of an insulated electrical conductor wire 6, and another barrel 32 shown crimped to the electrical insulation 34 covering the core 30.

The strain relief portion 4 comprises first and second mutually spaced flexible arms referenced generally 36 and 38 each of 90

which arms comprises a pair of spaced relatively thin flexible beams 40 integrally joined together at their free ends by a lateral web portion 42. The beams 40 extend integrally from the rear housing face 18 in a direction generally away from the mating face 16. The pair of beams 40 which comprise the arm 36 are joined to the face 18 at its junction with the side surface 8, and the other pair of beams is joined to the face 18 at its junction with the side surface 10.

Each arm 36 or 38 is provided near its free end with two holes 43 spaced laterally of each other in the longitudinal direction of the arms, i.e. a hole 43 is located at the junction of each lateral web portion 42 and each beam 40. The holes 43 in one lateral web portion 42 are respectively aligned with the holes 43 in the other lateral web portion 42 and are designed to receive bolts 44 having cooperating nuts 46.

Each web portion 42 intermediate the two holes 43 is bowed away from the other web portion 42 as shown at 50 about an axis extending generally parallel to the arms 36 and 40. Ribs 52 are provided on the inner concave surface of each bowed portion 50, the ribs extending laterally with respect to the arms 36 and 38.

The connector is shown in Figures 1, 3 and 4 with the two bowed portions 50 of the web portions 42 clamped round the terminated conductor wires 6 which are conveniently gathered into a compact bundle, the ribs 52 biting into the insulation of the wires to increase the grip. In this clamped condition the flexible arms 36 and 38 are seen to be flexed towards each other into mutual engagement at their end portions to form a combined relatively rigid structure.

The strain relief portion 4 thus secures the conductor wires 6 in a neat compact bundle and prevents them from being easily pulled off the terminals to which they are crimped. This is achieved without increasing the thickness or profile of the connector in the direction between the side surfaces 8 and 10 as can be seen particularly from Figure 4 in which the bowed portions 50 are seen to project not beyond the profile defined by the surfaces 8 and 10. Thus, a plurality of connectors could be stacked one on top of the other without interference of the strain relief portions 4.

To assemble the wires 6 to the connector 1, the wires are first crimped to the terminals 22 which are then inserted into the cavities 20 such that the lances 24 are received in the recesses 26 and the wires 6 project rearwardly from the rear surface 18. As indicated in phantom in Figure 2 the arms 36 and 38 are flexibly movable apart to facilitate reception of the wires between them. With the wires gathered into a com-

compact bundle, the arms 36 and 38 are fastened together by means of the bolts 44 and nuts 46 to clamp the wires 6 as indicated above.

The invention has been described in relation to individual wires but it should be noted that the invention is capable of being applied to different configurations or types of wire, for example, the type in which individual wires are encapsulated within a common sleeve of insulating material.

WHAT WE CLAIM IS:—

1. An electrical connector housing of insulating material having a plurality of through cavities for receiving respective electrical terminals, the cavities extending between a mating face of the housing and a rear face of the housing, two mutually spaced flexible arms integral with the housing and extending from the rear housing face in a direction generally away from the mating housing face, and means for joining together the free end portions of the arms at two locations spaced laterally of each other with respect to the longitudinal direction of the arms whereby terminated wires may be clamped between the two arms.
2. An electrical connector housing as claimed in claim 1, in which each arm comprises a pair of generally parallel beams integrally connected at their free ends by a lateral web portion.
3. An electrical connector housing as claimed in claim 1 or claim 2, in which the free end portion of each arm is provided intermediate the two laterally spaced locations with a plurality of ribs projecting towards the other free end portion.
4. An electrical connector housing as claimed in any preceding claim, in which the free end portion of each arm is, intermediate the two laterally spaced locations, bowed away from the other free end portion about an axis extending generally parallel to the arms.
5. An electrical connector housing as claimed in any preceding claim, in which the housing is rectangular and the flexible arms are joined to the rear housing face at the junctions of the rear housing face with first and second side faces, respectively, of the housing.
6. An electrical connector substantially as described with reference to the accompanying drawings.
7. An electrical connector comprising a housing as claimed in any preceding claim,

which arms comprises a pair of spaced relatively thin flexible beams 40 integrally joined together at their free ends by a lateral web portion 42. The beams 40 extend integrally from the rear housing face 18 in a direction generally away from the mating face 16. The pair of beams 40 which comprise the arm 36 are joined to the face 18 at its junction with the side surface 8, and the other pair of beams is joined to the face 18 at its junction with the side surface 10.

Each arm 36 or 38 is provided near its free end with two holes 43 spaced laterally of each other in the longitudinal direction of the arms, i.e. a hole 43 is located at the junction of each lateral web portion 42 and each beam 40. The holes 43 in one lateral web portion 42 are respectively aligned with the holes 43 in the other lateral web portion 42 and are designed to receive bolts 44 having cooperating nuts 46.

Each web portion 42 intermediate the two holes 43 is bowed away from the other web portion 42 as shown at 50 about an axis extending generally parallel to the arms 36 and 40. Ribs 52 are provided on the inner concave surface of each bowed portion 50, the ribs extending laterally with respect to the arms 36 and 38.

The connector is shown in Figures 1, 3 and 4 with the two bowed portions 50 of the web portions 42 clamped round the terminated conductor wires 6 which are conveniently gathered into a compact bundle, the ribs 52 biting into the insulation of the wires to increase the grip. In this clamped condition the flexible arms 36 and 38 are seen to be flexed towards each other into mutual engagement at their end portions to form a combined relatively rigid structure.

The strain relief portion 4 thus secures the conductor wires 6 in a neat compact bundle and prevents them from being easily pulled off the terminals to which they are crimped. This is achieved without increasing the thickness or profile of the connector in the direction between the side surfaces 8 and 10 as can be seen particularly from Figure 4 in which the bowed portions 50 are seen to project not beyond the profile defined by the surfaces 8 and 10. Thus, a plurality of connectors could be stacked one on top of the other without interference of the strain relief portions 4.

To assemble the wires 6 to the connector 1, the wires are first crimped to the terminals 22 which are then inserted into the cavities 20 such that the lances 24 are received in the recesses 26 and the wires 6 project rearwardly from the rear surface 18. As indicated in phantom in Figure 2 the arms 36 and 38 are flexibly movable apart to facilitate reception of the wires between them. With the wires gathered into a com-

pact bundle, the arms 36 and 38 are fastened together by means of the bolts 44 and nuts 46 to clamp the wires 6 as indicated above.

The invention has been described in relation to individual wires but it should be noted that the invention is capable of being applied to different configurations or types of wire, for example, the type in which individual wires are encapsulated within a common sleeve of insulating material.

WHAT WE CLAIM IS:—

1. An electrical connector housing of insulating material having a plurality of through cavities for receiving respective electrical terminals, the cavities extending between a mating face of the housing and a rear face of the housing, two mutually spaced flexible arms integral with the housing and extending from the rear housing face in a direction generally away from the mating housing face, and means for joining together the free end portions of the arms at two locations spaced laterally of each other with respect to the longitudinal direction of the arms whereby terminated wires may be clamped between the two arms.

2. An electrical connector housing as claimed in claim 1, in which each arm comprises a pair of generally parallel beams integrally connected at their free ends by a lateral web portion.

3. An electrical connector housing as claimed in claim 1 or claim 2, in which the free end portion of each arm is provided intermediate the two laterally spaced locations with a plurality of ribs projecting towards the other free end portion.

4. An electrical connector housing as claimed in any preceding claim, in which the free end portion of each arm is, intermediate the two laterally spaced locations, bowed away from the other free end portion about an axis extending generally parallel to the arms.

5. An electrical connector housing as claimed in any preceding claim, in which the housing is rectangular and the flexible arms are joined to the rear housing face at the junctions of the rear housing face with first and second side faces, respectively, of the housing.

6. An electrical connector substantially as described with reference to the accompanying drawings.

7. An electrical connector comprising a housing as claimed in any preceding claim,



(11)

in which the cavities receive respective electrical terminals respectively terminating electrical wires which project from the rear face of the housing and are clamped between the two flexible arms.

For the Applicants:

R. G. STUART-PRINCE,

Chartered Patent Agent.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1976.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

