

ELECTRICAL CONNECTOR

Detailed Description of Invention

Field of Invention

This invention relates to an electrical connector, especially to an electrical connector with a female type contact to be mated with a pin type contact of a mating connector.

Prior Art

An example of this type conventional electrical connector is disclosed in JP-U-57-76380. The electrical connector disclosed therein is shown in Fig. 7 (a), (b). Shown in Fig. 7 (a) is a longitudinal cross section view of a cavity 160 for accommodating a contact, while a cross section view along the line A'-A' is shown in Fig. 7 (b). A contact 150 to be received in the cavity 160 in a housing 140 of an electrical connector 100 comprises a lead connecting portion 151 to be terminated onto an end of a wire W and a female contact portion 152 to be engaged with a mating contact (not shown). The cavity 160 includes a first section 161 for accommodating the lead connecting portion 151 and a second section 162 for accommodating the female contact portion 152. The cavity 160 includes opposed inner side surfaces 163 extending between the first section 161 and the second section 162. In addition, the cavity 160 communicates with a passage 180 with a shoulder 170. The shoulder 170 is to be engaged with a lance 155 of the contact 150 so as to secure the contact 150 in the cavity 160.

Problem to Be Solved by the Invention

However, unfortunately, the contact 150 is danger of being inserted into the cavity 160 in reversed orientation, since the cavity 160 has a simple rectangular cross section continuously extending from the first section 161 to the second section 162.

Therefore, it is an object of the present invention to provide an electrical connector having a key structure for preventing reversed insertion of the contact. Furthermore, it is another object of the present invention to provide a relatively simple electrical connector including above structure without increasing the size of the conventional cavity or contact.

Means to Solve the Problem

The present invention is directed to an electrical connector comprising a female type contact having a lead connecting portion to be connected with a wire and a female contact portion for receiving a mating male contact, the female contact portion including a relatively wide base and a relatively narrow pin receiving portion formed by resilient arms extending from the base, mutually arranged in the height, and a housing with a cavity including an opening portion for receiving the female contact portion, characterized in that the opening portion of the cavity has a projected portion therein to form a narrow space corresponding to the pin receiving portion of the female contact portion, whereby a contact receiving key is formed to determine the receiving orientation of the female contact.

Preferably, the contact cavity is formed to include a first section for accommodating the lead connecting portion and a second section for accommodating the female contact portion, and the projected portion being formed to extend along the length of the first section and terminating at the border between the first section and the second section to define a shoulder.

Preferably, the projected portion is formed to locate at an off-set position so as not to interfere with the lead connecting portion when the contact is received in the cavity.

Embodiment of the Invention

Now, a preferred embodiment of the electrical connector according to the present invention will be described in detail with reference to the accompanying drawings.

Fig. 1 is a perspective broken view of the electrical connector of the present invention together with a mating connector.

As shown in Fig. 1, the electrical connector 10 comprises a plurality of female contacts 50 and a housing 20 for accommodating the contacts 50, and is adapted to mate with a mating connector 110 for electrical interconnection. The mating connector 110 is a pin-header type connector with a plurality of pin terminals 120 retained in the housing 130. The female contact 50 comprises a lead connecting portion 51 to be crimped and connected to an end of a wire W, and a female contact portion 12 to be engaged with a pin terminal 120 of the mating connector 110. The female contacts 50 terminated to the ends of the wires W are moved forwardly as shown by the arrow A in Fig. 1 to be received in a cavity of the housing 20.

Fig. 2 is a bottom view of the housing of the electrical connector. Fig. 3 shows a configuration of the cavity for receiving the female contact, wherein (a) is a longitudinal cross section view, (b) is an enlarged cross section view along the line B-B in (a), and (c) is an enlarged rear view seen from the direction of the arrow F in (a).

As shown in Fig. 3 (a), (b), the cavity 21 for accommodating the female contacts 50 includes an opening portion 22 at one side through which the female contacts 50 can be passed inwardly, and a pin receiving holes 23 for receiving mating pin terminals 120. A projection 25 is formed beneath each pin receiving hole 23 to limit the movement of the front end of the female contact 50 in the cavity 21. The projection 25 also functions to guide the pin terminal 120 when the pin receiving hole 23 receives the pin terminal 120.

Shown in Fig. 2 and Fig. 3 (a), (b) is a substantially H-shaped passage 26 communicating with a cavity 21 at the bottom side thereof, which defines a housing lance 27. The housing lance 27 is configured to be narrowed at the front end thereof. A channel 29, which is defined by opposed walls 28, is formed to extend in the length at the center of the housing lance 27 on its inner surface. The function of the channel 29 will be described hereinafter.

The cavity 21 comprises a first portion 30a for accommodating the lead connecting portion 51 of the female contact 50, and a second portion 30b for accommodating the female contact portion 52. The opposed inner walls of the cavity 21 are configured to include a flat surface 31a extending between a first section 30a and a second section 30b, and a projected portion 31b that is formed only in the first section 30a and terminates at the border between the first section 30a and the second section 30b to define a shoulder 32. It is to be understood that the substantially H-shaped passage 26 makes it possible to form the shoulder 32 terminating the projected portion 31b in the molding process. Furthermore, it is notable that the projected portion 31b is located at a relatively upper position inside the cavity 21.

Shown in Figs. 4 and 5 is a process of inserting a female contact. Fig. 4 shows an initial state of inserting a contact, wherein (a) is a longitudinal cross section view and (b) is a cross section view along the line C-C in (a), and Fig. 5 shows an intermediate progressing state of inserting a contact, wherein (a) is a longitudinal cross section view, and (b) is a cross section view along the line D-D in (a).

As shown in Fig. 4 (a), the female contact 50 is received from the opening portion 22 in the first section 30a of the female contact 50. Fig. 4 (a), (b) show the female contact portion 52 of the female contact 50 having a base 54 and opposed arms 55 extending from both sides of the base 54. Each of the opposed arms 55 includes a lower slanted portion 55a and an upper contact portion 55b forming a relatively narrow pin receiving portion 56. The base 54 has a contact lance 53 formed to extend bottomward. As shown in the Fig. 4, the contact lance 53 of the female contact 50 is disposed backside of the housing lance 27 without being flexed in this position.

As shown in Fig. 4 (b), the cross section view of the female contact portion 52 of the female contact 50 is configured to be substantially complementary to the first section 30a of the cavity 21. Namely, the relatively narrow pin receiving portion 56 of the female contact portion 52 can be received in a narrow space 39a defined by the opposed projected portions 31b, 31b, while the base 54 and the slanted portions 55a, 55a are received in a relatively wide space 39b. As understood by reference to Fig. 4 (b), when the female contact portion 52 of the female contact 50 is attempted to be inserted into the cavity 21 upside-down, the contact 50 cannot be inserted, because the slanted portions 55a or base 54 abuts against the projected portion 31b to prevent insertion of the reversed contact 50. Accordingly, it is apparent that above structure functions as an effective contact receiving key to prevent the contact from being inserted in incorrect orientation.

When the female contact 50 reaches the position as shown in Fig. 5, the contact lance 53 is received in the channel 29, and the base 54 is located over upper surfaces 27a, 27a of the opposed walls 28, 28 as best shown in Fig. 5 (b). The female contact 50 shown in Figs. 4 and 5 is lead by the guide means provided by the projected portions 31b, 31b engaged with the contact portion 55b, and the surfaces 27a, 27a engaged with the base 54.

Fig. 6 shows the female contact fully received in the cavity, wherein (a) is a longitudinal cross section view, (b) is a cross section view along the line E-E in (a), and (c) is a cross section view along the line F-F in (a).

The female contact 50 is slid from the position shown in Fig. 5 to that shown in Fig. 6. The contact lance 53 passes through the channel 29 of the housing lance 27, and rides over the end portion 27b to reach the passage 26, thereby preventing the female contact 50 from slipping out rearwardly by limiting the movement of the contact

lance 53 by a stopper surface 27c. When the contact lance 53 rides over the end portion 27b, the housing lance 27 is flexed a little outwardly. When the female contact 50 is fully inserted into the cavity 21, a portion of the base 54 of the female contact 50 is located under the projection 25 and above the rigid wall 82 so that the slanted portion 55a of the female contact 50 substantially engages with the projection 25, thereby limiting the movement of the female contact portion 52.

As shown in Fig. 6 (b) and (c), a space 81 is formed between the pin receiving portion 56 and the flat surface 31a in the second section 30b of the cavity 21 which accommodates the female contact portion 52. When the mating pin terminal 120 is received in the pin receiving portion 56 of the female contact portion 52, this space 81 allows the contact portion 52 to flex outwardly so that the contact portion 52 resiliently contacts with the pin terminal 120. As understood by referring to Fig. 6 (a), (b), if the mating pin is received in the female contact portion to flex the contact portion 55b outwardly, the engagement of the rear end 55d of the contact portion 55b with the shoulder 32 blocks the female contact 50 so as not to move it rearwardly when the female contact 52 is pulled backward, though the contact lance 53 also functions to limit the movement.

Although preferred embodiment of the electrical connector according to the present invention has been described hereinabove, it should be understood that various modifications may be made by an artisan.

Advantage of Invention

As apparent from the above description, the electrical connector according to the present invention provide compact key to determine proper inserting orientation of the female contacts into contact cavities in the housing because each contact cavity is formed with the projected portions at the entrance thereof so that the entrance corresponds in shape of the narrower pin receiving portion of the female contacts. The key also acts as a contact insertion guide.

Brief Description of Drawings

(Fig. 1) An exploded perspective view of the electrical connector according to the present invention together with a mating connector.

(Fig. 2) A bottom view of the housing of the electrical connector in Fig. 1.

(Fig. 3) A configuration of the cavity for receiving the female contact, wherein (a) is a longitudinal cross section view, (b) is an enlarged cross section view along the line B-B in (a), and (c) is an enlarged rear view seen from the direction of the arrow F in (a).

(Fig. 4) An initial state of inserting a contact, wherein (a) is a longitudinal cross section view and (b) is a cross section view along the line C-C in (a).

(Fig. 5) An intermediate progressing state of inserting a contact, wherein (a) is a longitudinal cross section view, and (b) is a cross section view along the line D-D in (a).

(Fig. 6) The female contact fully received in the cavity, wherein (a) is a longitudinal cross section, (b) is a cross section view along the line E-E in (a), and (c) is a cross section view along line F-F in (a).

(Fig. 7) A prior art of electrical connector, wherein (a) is a longitudinal cross section view of a cavity for accommodating a contact and (b) is a cross section view along the line A'-A' in (a).

Description of Reference Numerals

10	electrical connector
20	housing
21	cavity
22	opening portion (entrance)
31	projecting portion
50	female contact
51	lead connecting portion
52	female contact portion
54	base
55	resilient arm
56	pin receiving portion

Claim for Patent:

1. An electrical connector having a housing formed with one or more contact cavity and a female type contact to be inserted into each contact cavity, said female type contact having a contact section in the form of a pair of resilient arms extending upwardly from a relatively wider base portion to receive a mating contact at a relatively narrower upper portion, characterized in that:

projected portions are formed on both side walls of said each contact cavity at the upper entrance thereof with the space between said opposed projected portions being narrower than said base portion of said female type contact.

2. An electrical connector of said claim 1, wherein said projected portions are extending from the entrance toward the other end of said contact cavity to a certain length.

3. An electrical connector of claim 1 or 2, wherein said female type contact has a connecting section offset with respect to said contact section for termination to a wire.

4. An electrical connector of claim 1, 2 or 3, wherein said housing is formed with a projection to be received in said contact section of said female type contact inserted into said contact cavity.

5. An electrical connector of claim 1, 2, 3 or 4, wherein a resilient housing lance is formed in the bottom wall of said each contact cavity to engage with a contact lance at said base portion of said female type contact.

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