

Description

TECHNICAL FIELD

The present invention relates to an electric connector of pressure-contact type for use in electric connection between printed boards and electric wires such as a flat cable or the like and, more particularly, to contacts mounted in a female connector member. Such connectors are known from e.g. EP-A-0 212 356.

BACKGROUND ART

The conventional contacts mounted in a female connector member of an electric connector include such of single-point contact type and of double-point contact type. Each of the contacts of single-point contact type has a single curved contact piece which is adapted to be brought into contact with a corresponding male terminal of a male connector member. Each of the contacts of double-point contact type has two curved contact pieces confronting each other, in which a corresponding male terminal of a male connector member is clamped between the two contact pieces, to achieve electric connection. In general, these contacts are formed by stamping of an electrically conductive spring strip.

The above-mentioned contacts of single-point contact type are unsteady in electric contact as compared with the contacts of double-point contact type. Therefore, the electrically conductive spring strip which is material for the contacts of single-point contact type is made thick to increase their resiliency in an attempt to achieve stability in electric contact. However, this results in an increase in a wall thickness of the female connector member having accommodated therein the contacts, so that the entire electric connector increases in thickness. This is an obstacle to an attempt to make compact office-automation equipments having mounted therein printed boards superposed one upon another.

The contacts of double-point contact type is superior in stability of electric contact as compared with the contacts of single-point contact type. However, a large blank layout is necessary for the contacts of double-point contact type, because the electrically conductive spring strip is bent into a C-shape. Thus, the contacts of double-pointed contact type are wasteful.

DISCLOSURE OF THE INVENTION

According to the invention, there is provided an electric connector in which a female connector member has mounted therein contacts each comprising a body portion having wire contact pieces, a stepped portion extending substantially in parallel to said body

portion, a first curved contact piece extending from said stepped portion toward said body portion and a second contact piece extending from said body portion toward said first contact piece.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1A is a plan view showing contacts to be mounted in a female connector member of an electric connector according to the invention, the contacts being connected to each other in the form of a chain;

Fig. 1B is a side elevational view of the contacts shown in Fig. 1A;

Fig. 2 is a plan view of the contacts shown in Fig. 1A, which have been blanked from a blank, but which are prior to being subjected to bending and shearing;

Fig. 3A is a partially broken-away plan view of the contacts shown in Fig. 1A, which are mounted in a body of the female connector member;

Fig. 3B is a cross-sectional side view of the female connector member illustrated in Fig. 3A;

Fig. 4 is a perspective view of the female connector member shown in Figs. 3A and 3B, which female connector member having attached thereto a flat cable is being fitted on a male connector member;

Fig. 5 is a cross-sectional view showing the female and male connector members which mate with each other;

Fig. 6A is a partially broken-away plan view of a female connector member having mounted therein contacts according to the prior art;

Fig. 6B is a cross-sectional side view of the female connector member shown in Fig. 6A;

Fig. 7 is a cross-sectional view showing the female connector member shown in Fig. 6A and a male connector member, which mate with each other; and

Fig. 8 is a side elevational view of a printed board having mounted thereon the electric connector according to the invention and the electric connector of the prior art.

Referring to Figs. 1A, 1B and 2, there is shown contacts 1 to be mounted in a female connector member of an electric connector according to an embodiment of the invention. An electrically conductive spring strip is stamped into a semi-stamped article A in the form of a chain (see Fig. 2), to form the contacts 1.

After shearing along lines a-a, bending is applied to the semi-stamped article A in the form of a chain, to form a bent portion 2 and first and second contact pieces 3 and 4 of each of the contacts 1. The first and second contact pieces 3 and 4 of each contact 1 are adapted to be in contact with a corresponding male terminal of a male connector member. Prior to being

mounted in the female connector member, the contacts 1 are connected to a carrier 7 of the semi-stamped article A through respective connecting portions 10, as shown in Fig. 1A. Each contact 1 has a stepped portion 1a extending longitudinally from the bent portion 2 and formed with two engaging projections 5, and a body 1b provided with a pair of contact pieces 6 for electric wires. When the contacts are mounted in the female connector member, the engaging projections 5 are brought into engagement with an inner wall surface of the female connector member to prevent the contacts from shifting within the female connector member. The pair of wire contact pieces 6 of each contact 1 define therebetween a slot 6a into which a corresponding one of wires is adapted to be inserted. The carrier 7 is formed with pilot bores 8 and recesses 9 which are utilized in a plating step and a step of assembling the contacts with the female connector member.

Referring to Figs. 3A and 3B, a plurality of contacts 1 are illustrated which are mounted in two rows in the female connector member 11. The contacts 1 in each row are arranged at a pitch of, for example, 2.54 mm. Male terminals 20a of the male connector member 17 as shown in Fig. 4 are arranged in two rows correspondingly to the contacts 1 in the female connector member 11. A pitch between each pair of adjacent contacts in each row is 2.54 mm, and the spacing between the two rows is, for example, 1.905 mm. Fig. 3B shows the male terminals 20a of the male connector member 17, each of which male terminals is in two-point contact with the first and second contact pieces 3 and 4 of a corresponding one of the contacts 1 of the female connector member 11.

Referring to Fig. 4, a flat cable 22 has a plurality of wires which are inserted respectively into the slots 6a between the wire contact pieces 6a of the contacts 1 within the female connector member, to bring the wires into metal-to-metal contact with the wire contact pieces 6a. Then, the flat cable 22 is fixed to the female connector member 11 by a cover 15 and a cable retainer 16 thereof. Subsequently, the female connector member 11 is fitted on the male connector member 17. Each of the male terminals 20a of the male connector member is brought into two-point contact with the first and second contact pieces 3 and 4 of a corresponding one of the contacts 1 in the female connector member, as shown in Fig. 3B. Fig. 5 illustrates, partially in cross-section, the female and male connector members 11 and 17 in fitted relation to each other, with the contacts and the male terminals not shown for clarification. A projection 13 and a recess 14 provided respectively at the opposite ends of the female connector member 11 mate respectively with a recess 18 and a projection 19 provided respectively at the opposite ends of the male connector member 17, to bring the polarities of the respective connector members into coincidence with each other.

Referring to Figs. 6A and 6B, there is illustrated a female connector member 31 according to the prior art, in which contacts 21 are mounted. Each contact 21 is made of an electrically conductive spring strip having a large thickness, and has only one contact piece 23. The contacts 21 are different from the contacts 1 of the invention in that each contact 21 has no bent portion. As shown in Fig. 6B, each male terminal 33 of a male connector member 34 is, on one side thereof, in single-point contact with a corresponding one of the contact pieces 23 of the female connector member, and is, on the other side, supported by a wall 32 of the female connector member. It is noted that the wall 32 of the female connector member 31 is made thick by the reason that the contacts of the female connector member are made of an electrically conductive spring strip having a large thickness, and the wall 32 has to support the male terminals 33 urged by the contact pieces 23 having strong resiliency. Referring to Fig. 7, there is illustrated, partially in cross-section, the male and female connector members 34 and 31 in fitted relation to each other, with the contacts and the male terminals not shown for clarification. A recess 34a at the middle of the male connector member 34 mates with a projection at the middle of the female connector member, to bring the polarities of the respective male and female connector members into coincidence with each other. It will be seen, however, that the connector shown in Fig. 7 has its entire thickness greater than that of the fitted connector members of the invention shown in Fig. 5.

Referring to Fig. 8, there is illustrated the electric connector 11, 17 according to the invention and the electric connector 31, 34 of the prior art, which connectors are mounted to a printed board P. It will be seen that the electric connector according to the invention is extremely compact in size.

The invention has the following effects:

- (1) Electric contact between the contacts of the female connector member and the male terminals of the male connector member is stabilized;
- (2) A small blank profile is sufficient for the contacts of the female connector member; and
- (3) The entire electric connector is small in thickness.

Claims

1. An electric connector comprising a female connector member (11) and a male connector member (17), said female connector member (11) has mounted therein contacts (1) each comprising a body portion (1b) having contact pieces (6) for the connection of wires, a stepped portion (1c) extending substantially in parallel to said body portion (1b), characterised in that a first curved contact piece (3) extends from said stepped portion



mounted in the female connector member, the contacts 1 are connected to a carrier 7 of the semi-stamped article A through respective connecting portions 10, as shown in Fig. 1A. Each contact 1 has a stepped portion 1a extending longitudinally from the bent portion 2 and formed with two engaging projections 5, and a body 1b provided with a pair of contact pieces 6 for electric wires. When the contacts are mounted in the female connector member, the engaging projections 5 are brought into engagement with an inner wall surface of the female connector member to prevent the contacts from shifting within the female connector member. The pair of wire contact pieces 6 of each contact 1 define therebetween a slot 6a into which a corresponding one of wires is adapted to be inserted. The carrier 7 is formed with pilot bores 8 and recesses 9 which are utilized in a plating step and a step of assembling the contacts with the female connector member.

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(1a) toward said body portion (1b) and a second contact piece (4) extends from said body portion (1b) toward said first contact piece (3).

2. An electric connector as set forth in claim 1, characterized in that said female connector member (11) is provided at its opposite ends respectively with a recess (13) and a projection (14), and said male connector member (17) is provided at its opposite ends respectively with a projection (19) and a recess (18) which are adapted to mate respectively with said recess (13) and said projection (14) of said female connector member (11).

dite partie de corps (1b) vers ladite première pièce de contact (3).

2. Connecteur électrique selon la revendication 1, caractérisé en ce que ledit élément connecteur femelle (11) est muni à ses extrémités opposées respectivement d'une cavité (13) et d'une saillie (14), et en ce que ledit élément connecteur mâle (17) est muni à ses extrémités opposées respectivement d'une saillie (19) et d'une cavité (18) qui sont agencées pour correspondre respectivement auxdites cavité (13) et saillie (14) dudit élément connecteur femelle (11).

Patentansprüche

1. Elektrischer Verbinder mit einem weiblichen Verbinderteil (11) und einem männlichen Verbinderteil (17), wobei in dem weiblichen Verbinderteil (11) Kontakte (1) montiert sind, von denen jeder einen Körperteil (1b) mit Kontaktstücken (6) zur Verbindung von Drähten und einen sich im wesentlichen parallel zu dem Körperteil (1b) erstreckenden abgestuften Teil (1a) aufweist, dadurch gekennzeichnet, daß ein erstes gekrümmtes Kontaktstück (3) sich von dem abgestuften Teil (1a) zu dem Körperteil (1b) hin erstreckt und ein zweites Kontaktstück (4) sich von dem Körperteil (1b) zu dem ersten Kontaktstück (3) hin erstreckt.

2. Elektrischer Verbinder nach Anspruch 1, dadurch gekennzeichnet, daß das weibliche Verbinderteil (11) an seinen entgegengesetzten Enden mit einer Vertiefung (13) bzw. einem Vorsprung (14) versehen ist, und daß das männliche Verbinderteil (17) an seinen entgegengesetzten Enden mit einem Vorsprung (19) bzw. einer Vertiefung (18) versehen ist, die jeweils mit der Vertiefung (13) bzw. dem Vorsprung (14) des weiblichen Verbinderteils (11) zusammenpassen.

Revendications

1. Connecteur électrique comportant un élément connecteur femelle (11) et un élément connecteur mâle (17), des contacts (1) étant montés dans l'élément connecteur femelle et comprenant une partie de corps (1b) présentant des pièces de contact (6) pour la connexion des câbles, une partie (1a) en gradin s'étendant sensiblement parallèlement à ladite partie de corps (1b), caractérisé en ce qu'une première pièce de contact courbe (3) s'étend à partir de la partie (1a) en gradin vers ladite partie de corps (1b) et en ce qu'une seconde pièce de contact (4) s'étend à partir de la-