ABSTRACT

An electrical connector construction comprises a pair of body members formed of insulating material and adapted to be joined together end-to-end, each of the bodies having a plurality of rows of parallel openings adapted for the accommodation of interfitting electrical terminals. Each terminal has between its ends a zone of reduced cross section. The wall of each opening of each body member is constituted in part by a resilient, deflectable arm having a projection thereon which extends inwardly of its associated opening so as to be accommodated in a reduced cross section zone of the associated terminal, thereby providing a releasable latch by means of which each terminal removably may be secured in its associated opening. Each body member has a recess for the accommodation of a locking block which prevents movement of the latch projections outwardly of their associated openings, thereby providing a positive lock for each terminal.

12 Claims, 11 Drawing Figures
ELECTRICAL CONNECTOR CONSTRUCTION

The invention disclosed herein relates to electrical connectors of the kind especially adapted to facilitate the assembly of pin and socket terminals, and more particularly the invention relates to an electrical connector having self-contained latching means for temporarily latching the terminals in a supporting block and including locking means for positively locking the terminals in the supporting block.

It is conventional practice to support pin and socket terminals in a pair of connector bodies in such manner that joining of the bodies in end-to-end relation effects automatic insertion of the pin terminals into the socket terminals. If the terminals are to fit together easily, thereby minimizing the possibility of damaging the terminals, the supporting members, or both, then the terminals must be supported in their respective body members in such manner as to be substantially perfectly aligned. Some of the connector assemblies currently in use support large numbers of terminals to each of which is connected a conductive wire. Such terminals normally are inserted in the associated connector body individually, or in small groups. Following the insertion of all of the terminals in a connector body, it is common to introduce a locking member to the connector body so as to lock all of the terminals in place. In practice, however, it frequently occurs that one or more of the terminals introduced to a connector body is either improperly positioned initially or shifts its position during the insertion of additional terminals. Thus, one or more terminals may be located in improper positions too close to one end or the other of the connector. In such a case, the introduction of the locking member to the connector body may result in breakage of the body or deformation of the terminal, or both. In either event, such a connector body will not fit properly its companion connector body and, in many cases, an improper electrical connection is made with consequent electrical malfunction.

An object of this invention is to provide an electrical connector construction having self-contained means for enabling terminals to be introduced properly to a connector body so as to eliminate improper positioning of terminals within the body.

Another object of the invention is to provide a connector construction wherein terminals introduced to a connector body are temporarily and releasably latched in proper positions relatively to the body.

A further object of the invention is to provide a connector construction of the character described and wherein the terminals which have been introduced to the body may be locked in proper position.

Another object of the invention is to provide a terminal connector construction of the kind referred to and which is adapted for use in conjunction with both pin and socket terminals.

Other objects and advantages of the invention will be pointed out specifically or will become apparent from the following description when it is considered in conjunction with the appended claims and the accompanying drawings in which:

FIG. 1 is a longitudinal sectional view of a connector constructed in accordance with the invention and adapted for use with a pin-type terminal, the section being taken on the line 1—1 of FIG. 5;

FIG. 2 is a view similar to FIG. 1, but illustrating a connector adapted for use with a socket-type terminal, the section being taken on the line 2—2 of FIG. 4;

FIG. 3 is an elevational view of the connector shown in FIG. 1 as viewed from the right-hand end of FIG. 1;

FIG. 4 is an elevational view of the connector shown in FIG. 2 and viewed from the left-hand end of FIG. 2;

FIG. 5 is an elevational view of the opposite end of the connector shown in FIG. 1;

FIG. 6 is an elevational view of the opposite end of the connector shown in FIG. 2;

FIG. 7 is a longitudinal sectional view illustrating the connectors of FIGS. 1 and 2 in assembled relation;

FIG. 8 is a top plan view of a locking device adapted for use with the connector shown in FIG. 1;

FIG. 9 is a side elevational view of the locking device shown in FIG. 8;

FIG. 10 is a top elevational view of a locking device adapted for use with the connector shown in FIG. 2; and

FIG. 11 is a side elevational view of the locking device shown in FIG. 10.

An electrical connector assembly constructed in accordance with the invention comprises a pair of molded connectors 1 and 2 formed of a resilient, electrically insulating material such as nylon or the like and adapted to be assembled with one another in end-to-end relation. The connector 1 comprises a body 3 having a skirt 4 at its forward end which surrounds a chamber 5 and the connector 2 comprises a body 6 having a forward end portion 7 of such size as to fit snugly within the chamber 5. The body 6 has a pair of upstanding ribs 8 adapted to be accommodated in aligning grooves 9 provided in the skirt 4 for the reception of the ribs 8 so as to preclude improper joining of the connectors. The skirt 4 is provided with a pair of flexible fingers 10 terminating in bars 11 which may fit into notches (not shown) on the body part 7 so as releasably to lock the connectors 1 and 2 in assembled relation. Alternatively, the bodies may be locked in assembled relation in any conventional manner.

The body 3 of the connector 1 has a first row of parallel openings 12 extending from the rear end thereof, each of the openings 12 communicating with the chamber 5 via an opening or passage 13. The body 3 has a second row of parallel openings 14, the openings 14 being identical to the openings 12 and being parallel to each other and to the openings 12. Each of the openings 14 communicates with the chamber 5 through an opening or passage 15 like the passages 13.

Adjacent each side of each passage 12 the body 3 is slit as at 16 so as to form a resilient, deflectable arm 17 constituting part of the wall of each passage 13. Between its ends each arm is provided with a projection 18 which extends inwardly of the associated passage 13. The fore and aft surfaces of each projection 18 are inclined, the rear surface 19 being more inclined than the forward surface. An arm 20 formed by slits 16 and identical in all respects to the arms 17 is provided in each of the passages 15 associated with the openings 14 and each arm 20 has a projection 21 which extends into the associated passage.

The rows of openings 12 and 14 are separated from one another by a recess or slot 22 which spans the rows
of openings. The opposite sides of the slot are constituted in part by the arms 17 and 20 which are common to the respective passages 13 and 15. The slot is adapted to receive a locking block 23 which is of such size as to fit snugly within the slot. The block 23 has a groove 24 for the accommodation of an aligning rib 25 so as to prevent improper placement of the block 23 in the slot 22. At one side of the block 23 is a latching tang 26 which is adapted to be fitted into a locating notch (not shown) formed in the body member 3, the block having a slot 27 adjacent the tang 26 so as to permit the latter to deflect inwardly during movement of the block 23 to or from the slot 22.

The rear end of the connector body 6 is provided with a row of parallel openings 28 each of which communicates with an opening 29 in the forward end of the body via a passage or opening 30. A second row of parallel openings 31 identical to the openings 28 is provided at the rear end of the body 6 and such openings communicate with openings 32 at the forward end of the body 6 via passages or openings identical to the passages 30.

Adjacent opposite sides of the openings 29 and 30 the body 6 is slat as at 33 to provide a resilient, deflectable arm 34 constituting a part of the wall of each opening 29 and 30. The body 6 is similarly slat adjacent opposite sides of each opening 32 and 30 so as to form similar deflectable arms 36. Each arm 34 has a projection 37 between its ends which extends inwardly of the associated passage 30, the fore and aft surfaces of the projection being inclined and the aft surface 38 being more inclined than the forward surface. Each of the arms 36 has a similar projection 39 which extends into the associated passage 30.

The rows of openings 29 and 32 are separated by a recess or slot 40 formed in the body part 7, the slot spanning the rows of openings and having its opposite sides constituted in part by the arms 34 and 36. The slot is adapted snugly to receive a locking block 41 having a latching tang 42 extending from one side thereof for reception in a locating notch (not shown) formed in the body part 7. A slot 43 formed in the block 41 adjacent the tang 42 permits deflection of the latter as the block is moved into and from the slot 40. The block 41 also has a groove 44 for the reception of a guide rib 45 to preclude improper assembly of the block with the body 6.

The connector 1 is adapted to receive and support a plurality of pin-type terminals 46, each of which is identical and comprises an electrically conductive nosepiece 47 having a recess or neck 48 of reduced cross section between its ends. At the forward end of the neck is a shoulder 49 which is more abrupt than that at its rearward end, and the rearward end of the neck is joined to a fitting 50 which is fastened to an insulated, conductive wire 51.

Adapted to be accommodated in and supported by the connector 2 is a plurality of socket-type terminals 52 each of which has a tubular body 53 of such size as to accommodate snugly the nosepiece 47 of a terminal 46. At a zone between its ends the terminal 52 has a recess or neck 54 of reduced cross section, the shoulder 55 at the forward end of the neck being rather abrupt. The rear end of the neck 54 is joined to a fitting 56 which is fastened to an insulated, conductive wire 57.

To assemble the terminals 46 with the connector 1 the locking block 23 is removed from the slot 22 and each terminal is inserted, nosepiece 47 first, into the body 3 via an opening 12. As the nosepiece 47 enters a passage 13, it will engage the rear surface 19 of the associated projection 18 and deflect the arm 17 into the slot 22 so as to enable the projection 18 to move outwardly of the passage 13. As the terminal 47 continues to move through the passage 13, the neck 48 will reach the projection 18 whereupon the inherent resilience of the arm 17 will restore the latter, with a snap action which may be felt, to its normal, unstressed condition in which the projection 18 is accommodated in the neck 48.

Should the operator attempt to push the terminal 46 a greater distance into the body 3, the fitting 50 will engage the projection 18 so as to resist such movement of the terminal. Due to the abruptness of the rear end of the wall 49 of the nosepiece 7, considerable resistance to removal of the terminal from the body 3 will be encountered, but due to the resilience of the arm 17, the terminal may be removed from the body if desired. However, the accommodation of the projection 18 in the neck 48 will prevent inadvertent movement of the terminal 46 in either direction.

Following the insertion of all of the terminals 46 in the connector 1, the locking block 23 may be fitted into its slot 22. Movement of the arms 17 into the slot 22 thus is precluded, thereby preventing movement of the projections 18 outwardly of the associated passages 13. Each of the terminals thus is supported in the connector 1 in a predetermined, proper position and is locked against movement in either direction from such position.

The assembly of the terminals 52 with the connector 2 is the same as has been described in connection with the terminals 46. When the terminals 52 are in assembly relation with the connector, the projections 38 are accommodated in the recesses 54 so as to restrain movement of the terminals in either direction. When the locking block 41 is assembled with the body 6, movement of the arms 34 in such direction as to effect movement of the projections 38 outwardly of the passages 30 is precluded, thereby enabling the projections 38 to provide a positive lock for each of the terminals 52.

When the terminals have been assembled with their respective connectors 1 and 2, the latter may be joined to one another in end-to-end relation by inserting the forward end 7 of the body 6 into the chamber 5 of the body 3. The latching bars 11 will engage the cooperating notches on the body 6 so as to prevent inadvertent separation of the connectors. The construction and arrangement of the parts are such that the terminals 52 are supported by the connector 2 in such position as to be in alignment with the terminals 46, thereby assuring insertion of the terminals 46 into the terminals 52 upon assembly of the connectors.

The disclosed embodiment is representative of a presently preferred form of the invention, but is intended to be illustrative rather than definitive thereof. The invention is defined in the claims.

We claim:

1. An electrical connector construction for supporting a terminal having between its ends a recess, said construction comprising a body having an opening
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therein for the accommodation of said terminal, one side of said opening being constituted by a resilient arm having a projection thereon extending inwardly of said opening a distance to be received in said recess of said terminal when the latter is accommodated in said opening, and locking means carried by said body in a position to prevent movement of said projection in a direction outwardly of said opening.

2. The construction set forth in claim 1 wherein the resilience of said arm is such as to enable said arm to be deflected outwardly of said opening by said terminal in response to introduction of the latter to said opening.

3. The construction set forth in claim 1 wherein said locking means comprises a block fitted into a slot formed in said body, said arm constituting a common wall between said slot and said opening.

4. The construction set forth in claim 3 including releasable latch means for releasably retaining said block in said slot.

5. The construction set forth in claim 1 wherein said body has a plurality of said openings therein in a row parallel to one another and a corresponding plurality of said arms.

6. The construction set forth in claim 5 wherein said locking means is carried by said body in a position to prevent movement of any projection on said arms in a direction outwardly of its respective opening.

7. The construction set forth in claim 6 wherein said locking means comprises a block spanning said row of openings and fitted into a slot formed in said body.

8. The construction set forth in claim 7 wherein said body has a second row of parallel openings therein spaced from the first mentioned row by said slot.

9. The construction set forth in claim 8 wherein each of the openings of said second row has one side thereof constituted by a resilient arm having a projection extending inwardly of its associated opening and wherein said block spans said second row of openings and prevents movement of the projections of the associated arms outwardly of said second row of openings.

10. An electrical connector assembly for supporting at least one pair of joined, coaxial terminals each of which has a recess between its ends, said assembly comprising first and second body members each of which has a coaxial opening for the accommodation of one of said terminals, each of said openings being defined in part by a deflectable arm having a projection extending into its associated opening and being located in a position to be received in said recess of the associated terminal when the latter is accommodated in its opening; means for maintaining said body members in assembled relation with their respective openings in alignment; and lock means carried by each of said body members for preventing movement of the associated projection outwardly of its opening.

11. The assembly set forth in claim 10 wherein said lock means comprises a block removably fitted into a slot in the associated body member and bearing against said deflectable arm.

12. An electrical connector construction comprising a body member having a pair of spaced apart, parallel rows of openings therein and a slot between and spanning said rows, the sides of said slot confronting said rows of openings having deflectable arms constituting a common wall between said slot and the openings of said rows, each of said arms having a projection extending inwardly of its associated opening; and lock means removably fitted into said slot for engagement by each of said arms to prevent movement of any of said projections outwardly of its associated opening.

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