

ELECTRICAL CONNECTOR HOUSING HAVING
CONDUCTOR-RETENTION MEANS

1 The present invention relates to an electrical
connector and more particularly to an electrical connector
housing having conductor-retention means for retaining
electrical conductors terminated to electrical contacts in
5 position within the housing.

A prior art connector is shown in Figure 4, which
retains in insulated housing 5 electrical contacts 1
having aligned slots 2. Housing 5 has contact-receiving
openings 6 which are arranged laterally one next to
10 another for receiving and retaining contacts 1 therein.
As one end of an insulated electrical conductor 4 is
forcefully moved downwardly in a direction perpendicular
to the axis of the conductor and forced into slots 2 of
each contact 1, the edges of slots 2 will cut into
15 insulation 4b and electrically engage conductor core 4a to
form an electrical connection therewith. Each
contact-receiving opening 6 is provided with a groove 7
for guiding conductor 4 during its movement into the
housing and for retaining a portion of conductor 4
20 adjacent contact 1. A pair of resilient retaining arms 8
is located at the entrance of each opening of groove 7.
These arms are resiliently deformed to allow a portion of
conductor 4 to move into groove 7 when the electrical
conductor is forced into slots 2 of contact 1 within
25 opening 6 thereby retaining the conductor in groove 7 as
shown in Figure 5. Figure 6 illustrates the condition of
the conductor thus seated in slots 2, which shows that the
slot edges of slots 2 cut into the insulation 4b of
conductor 4 to form electrical connection with the
30 conductor core 4a terminated in slots 2.

In prior art connectors described above, a gap may be easily formed between retention arms 8 and conductor 4 in retention groove 7. Then, although retention arms 8 serve to retain the electric conductor in groove 7 against an upwardly-directed force, they cannot operate to apply a retaining force on the conductor when a longitudinal external force is applied to the conductor which will affect the termination of conductor 4 in slots 2 of contact 1.

These connectors are usually soldered to a printed circuit board 9 and the like, as shown in Figure 5, by soldering legs 3 of contacts 1 extending beneath the housing 5 with solder 9b. The heat generated in such soldering operation is conducted to insulated conductor 4 thereby causing the insulation to shrink in a direction away from the termination section of contact 1. This shrinkage may cause the conductor core 4a to be exposed at the termination, which in turn becomes a further source of connection failure due to corrosion occurring between the conductor core and the contact.

It is an object of the present invention to alleviate the problem that a conventional connector is liable to cause when a poor electrical connection takes place between an insulated electrical conductor and an electrical contact.

The present invention consists in an electrical connector comprising a dielectric housing having a contact-receiving opening in which an electrical contact is positioned, said housing being provided with a conductor-retention groove opening outwardly for receiving an insulated electrical conductor therein, a termination section of said contact opening outwardly so that the insulated electrical conductor can be terminated within the termination section conductor-retention arms located at an open end of the conductor-retention groove for retaining

the insulated conductor in said conductor-retention groove after it has been positioned therein, projections at inner ends of the conductor-retention arms for engaging and locally deforming the insulation of the insulated conductor, and another projection located at the bottom of the conductor-retention groove for clamping engagement with the insulation of the insulated electrical conductor at a position generally opposite the projections on the conductor-retention arms.

By constructing the electrical connector as above the portion of the conductor adjacent to the termination section of the electrical contact may be forced into the conductor-retention groove as the conductor is engaged with the termination section, and the conductor so forced into the conductor-retention groove is clamped firmly by the first projections on the retention arms. The first projections force the conductor onto the second projection so that the first and second projections tightly clamp the conductor in position in the conductor-retention groove, thereby providing an axial strain relief on the conductor.

The clamping forces exerted by the projections on the conductor also control the amount of shrinkage of the insulation away from the terminating section when the contact is soldered onto a circuit board so that a sealed connection is maintained between the conductor and the contact.

In order that the present invention may be more readily understood, reference will now be described, by way of example, to the accompanying drawings, in which:-

FIGURE 1 is a perspective view of an electrical connector according to the present invention.

FIGURE 2 is a cross-section taken along the line II-II in Figure 1.

5 FIGURE 3 is a part rear view of the connector shown in Figure 1.

FIGURE 4 is a perspective view of a conventional electrical connector.

10 FIGURE 5 is a cross-section taken along the line V-V in Figure 4.

FIGURE 6 is another cross-section taken on the line VI-VI in Figure 5.

As shown in Figure 1, the electrical connector according to the present invention comprises an insulated housing 10 and a multiplicity of electrical contacts 1 to
15 be secured in housing 10. Incidentally, contact 1 is of conventional construction having a pair of termination sections including aligned slots 2 and legs 3 as shown in Figure 4. Housing 10 has a multiplicity of openings 11 for receiving contacts 1 laterally one next to another
20 with their slots 2 open upwardly. Contacts 1 can be retained in respective openings 11 with their legs 3 extending outwardly from a bottom surface of housing 10 as shown in Figure 2. As an end portion of an insulated electrical conductor 4 is forced in to slots 2 of contact
25 1, the slot edges cut into insulation 4b of conductor 4 and electrically engage conductor core 4a forming an electrical connection therebetween in the same manner as shown in Figure 6.

At one side of each opening 11 of housing 10, a
30 U-shape conductor-retention groove 12 is located for retaining electrical conductor 4 therein after conductor 4 is forced in slots 2 of contact 1. A pair of resilient retention arms 13 are located at the open end of each

conductor-retention groove 12 and they extend inwardly in the same manner as the conventional retention arms 8 (Figure 4). However, a first projection 14 is located on each of retention arms 13 and projections 14 extend
5 downwardly towards the bottom of conductor-retention groove 12. A second projection 15 is located at the bottom of each groove 12 which extends upwardly towards first projections 14.

In connecting an end of electrical conductor 4 to the
10 electrical connector, the end of the conductor is forcefully moved downwardly in a direction perpendicular to its axis until the end of conductor is forced into slots 2 and in the conductor-retention groove 12 as shown in Figures 1-3. It can be seen that the edges of slots 2
15 of contact 1 have cut into the insulation of conductor 4, and that at the same time a portion of conductor 4 is also forced into conductor-retention groove 12 adjacent to contact 1. Although retaining arms 13 will resist the conductor as it is forced down between them, they are then
20 deflected by the conductor and will revert to their initial configuration after the conductor is positioned in groove 12 because these arms are resilient.

It can be seen in Figure 3 that first projections 14 on retention arms 13 and second projection 15 at the
25 bottom of conductor-retention groove 12 firmly engage insulation 4b and clamp conductor 4 in groove 12. Hence, an axial force that may be exerted on conductor 4 in a direction away from the connector will be prevented from being conveyed down to the termination of conductor 4 in
30 slots 2 by the clamping forces of first and the second projections 14, 15, which can eliminate the electric connection failure that may otherwise occur. Thus, the clamping forces act as a strain relief on the conductor thereby protecting the termination. The clamping forces

will also counteract any upwardly-directed forces on the conductor.

Also, in soldering the connector to a printed circuit board and the like, shrinkage of the insulation of conductor 4 away from the termination in slots 2 to expose conductor core 4b does not occur if the soldering heat is conducted from contact 1 to slots 2 due to the fact that the clamping forces generated by first and second projections 14,15, respectively, prevent the shrinkage from taking place thereby maintaining the insulation in place at the termination slots resulting in a sealed termination.

As described above, the present invention discloses an electrical connector free of electrical connection failure by a conductor-retention groove adjacent to each electrical contact in the housing for retaining the portion of the electrical conductor which is forced into the slots of an electrical contact; resilient retention arms at the open end of each retention groove; and first projections on the conductor-retention arms for clamping the portion of the conductor to be received in the groove, thereby to prevent an external force acting on the conductor from being conveyed down to the termination of the conductor in the slots. The clamping by the first projections is also effective to prevent the shrinkage of the insulation of the conductor adjacent the slots and to prevent the resultant exposition of the conductor core caused by the heat generated in soldering the contact legs to a printed circuit board and the like.



CLAIMS

1. An electrical connector comprising a dielectric housing having a contact-receiving opening in which an electrical contact is positioned, said housing being provided with a conductor-retention groove opening outwardly for receiving an insulated electrical conductor therein, a termination section of said contact opening outwardly so that the insulated electrical conductor can be terminated within the termination section conductor-retention arms located at an open end of the conductor-retention groove for retaining the insulated conductor in said conductor-retention groove after it has been positioned therein, projections at inner ends of the conductor-retention arms for engaging and locally deforming the insulation of the insulated conductor, and another projection located at the bottom of the conductor-retention groove for clamping engagement with the insulation of the insulated electrical conductor at a position generally opposite the projections on the conductor-retention arms.

2. An electrical connector as claimed in claim 1, wherein the termination section comprises spaced members having aligned slots in which the insulated electrical conductor is forcefully inserted with edges of the slots cutting through the insulation and making electrical engagement with such edges.

3. An electrical connector as claimed in claim 1 or 2, wherein the conductor-retention arms are resilient.

4. An electrical connector comprising electrical contact means having termination means in the form of slot means for cutting into insulation of insulated electrical conductor means when forced into the slot means with edges of the slot means electrically engaging conductor core means of the electrical conductor means, an insulated housing having opening means for receiving and retaining



said electrical contact means, said housing including conductor-retention groove means opening outwardly for receiving a portion of the electrical conductor means therein, and conductor-retention arm means at an open end of said conductor-retention groove means for retaining said portion of the electrical conductor means therein, said conductor-retention arm means having projection means for clampingly engaging said portion of the insulated electrical conductor means, and said conductor-retention groove means having further projection means at bottom means thereof for clamping engagement with said portion of the insulated conductor means at a position generally opposite from that of the projection means on the conductor-retention arm means.

5. An electrical connector as claimed in claim 4, wherein said opening means opens outwardly in the same direction as the conductor-retention groove means so that the insulated electrical conductor means can be terminated in the termination means while the contact means is disposed in the opening means.

6. An electrical connector constructed substantially as hereinbefore described with reference to Figures 1, 2 and 3 of the accompanying drawings.
