

PATENT SPECIFICATION (11)

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 B3A 49D2 49D5 49U
 (72) Inventor JOHN DOUGLAS DAVIS



(54) ELECTRICAL CONDUCTOR TERMINATING APPARATUS

(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 apparatus for connecting electrical conductors to the contacts of an electrical connector.

More particularly the invention relates to apparatus for connecting electrical conductors to the contacts of an electrical connector of the type described and claimed in British Patent Specification No. 1,361,114 (8029).

In the above mentioned specification there is described an electrical connector comprising an insulating housing in which are secured two rows of terminals having contact portions projecting in the same direction from a first face of the housing and wire connecting portions projecting in the opposite direction to the contact portions from a second face of the housing opposite to the first face, an insulating wall projecting from the second face of the housing and between the two rows of wire connecting portions, each wire connecting portion comprising a plate upstanding from a side of the insulating wall and having a wire receiving slot opening into the edge of the plate remote from the insulating wall, edges of the slot being adapted to penetrate the insulating sheath of a wire when forced transversely of its axis through the slot opening into the slot to establish electrical contact with the conductive core of the wire, each row or plates upstanding from an opposite side of the insulating wall and the contact portions of the terminals constituting contact elements of a multiple contact element plug or socket member.

Such connectors find particular application in the field of telephones, where large numbers of pairs of wires have to be terminated.

There is thus a need for a relatively cheap and simple apparatus which can be used to connect an individual wire to each of the contacts of a connector as described above, all of the wire being simultaneously connected.

According to this invention there is provided apparatus for simultaneously inserting each conductor of two groups of electrical conductors into a slot in an individual electrical contact of an electrical connector comprising a housing carrying two parallel rows of electrical contacts, the conductors of each group being inserted into the slots of an individual one of the rows of the contacts, the contacts being carried by the housing with the slots of all the contacts lying in substantially the same plane but with the slots of one row of contacts being directed in the opposite direction to the slots of the contacts of the other row, the apparatus comprising a connector receiving member having two comb members arranged to receive the connector therebetween and providing a plurality of pairs of aligned slots, one slot of each pair on each side of a connector received in the connector receiving member, the slots in the comb members being arranged each to receive a conductor from each of the two groups of conductors, and align each of the conductors with the slot in an associated contact of the connector; and first and second inserter members located on opposite sides of the connector receiving member and arranged for relative rectilinear movement towards the connector receiving member each to urge the conductors of an individual one of the groups of conductors into the slots in the contacts of the associated row of contacts.

The apparatus of the invention has the advantage that, unlike known apparatus for the same use, it requires only two comb members for the simultaneous insertion of all of the conductors, each slot of each of the comb members receiving a conductor from each of the two groups of conductors, with the contacts of the connector positioned between the two groups of conductors.

An embodiment of apparatus according

to the invention will now be described by way of example with reference to the drawings, in which:—

Figure 1 is a sectioned perspective view of a connector for use with the apparatus;

Figure 2 is a perspective view of the apparatus with a connector and conductors loaded therein prior to connection of the conductors to the contacts of the connector;

Figure 3 is an exploded perspective view of the apparatus; and

Figure 4 is a diagrammatic sectional view of the apparatus on the line IV—IV of Figure 2 but with the cycle of operation of the apparatus started.

Referring to Figure 1, the connector 1 comprises a housing 2 of electrically insulating material having two rows of through passage-ways 3 each to receive an electrical contact 4. Each contact 4 has a contact portion 5 which is positioned in a slot 6 in the housing 2 whereby conductors on both sides of an edge portion of a printed circuit board (not shown) inserted in the slot 6 can make contact with the contact portions 5 of the contacts 4. Each contact 4 also has a connecting portion 7 for connection to an electrical conductor 8, the connecting portion 7 comprising a pair of spaced parallel plates each having a slot 9 therein. The two rows of contacts 4 are arranged on opposite sides of a central projecting wall 10 of the housing 2, with the slots 9 of the contacts 4 lying in two parallel planes with the slots 9 of one row of contacts 4 being directed in the opposite direction to the slots 9 of the contacts 4 of the other row, i.e. the slots 9 of the contacts 4 are all directed away from the wall 10 of the housing.

The housing 2 has a flange 11 at each end (only one shown), each flange 11 carrying an apertured boss 12 which can receive a bolt to secure the connector to another component.

Referring now to Figures 2 to 4 also, the apparatus according to the invention comprises a connector receiving and positioning member 13 having two comb members 14 secured thereto by means of bolts 15. The comb members 14 provide a plurality of pairs of aligned slots 16, one on each side of a connector 1 received in the member 13, the slots 16 being arranged to receive conductors as the conductor 8 (Figure 1) and align each conductor 8 with an associated pair of slots 9 in a contact 4 of the connector 1.

The apparatus also comprises first and second inserter members 17 and 18 located on opposite sides of the member 13. Each of the inserter members 17 and 18 comprises a support member 19 and an insertion tool 20 received to the support member 19 by means of bolts 21. The insertion tool 20 includes a toothed member 22 the teeth of

which serve to urge the conductors 8 into the slots 9 of the contacts 4 of a connector 1 as will be described later.

The support member 19 of the lower (as seen in Figure 3) inserter member 17 has outwardly projecting flanges 23 whereby the member 17 has a relatively large lower surface area for mounting the apparatus on the platen of, for example, an arbor bench press (not shown).

The members 18, 13 and 17 are mounted on a pair of rods 24 and 25 which are secured in holes 26 in the member 17 and which are a sliding fit through bushes 27 carried on the ends of the members 13 and 18. Compression springs 28 are arranged on the rods 24 and 25 between the members 13 and 17, and between the members 18 and 13, and thus the members 18 and 13 are moveable along the rods 24 and 25 towards the member 17 against the action of the springs 28.

As clearly shown in Figure 3, the rod 24 is longer than the rod 25, and thus with the member 18 in its upper position, as shown in Figure 2, the member 18 can be swung about the rod 24 away from the rod 25 thereby to give clear access to the connector receiving and positioning member 13. If desired a collar (not shown) can be fixed to the free end of the rod 24 to prevent removal of the member 18 therefrom.

The above described apparatus is used as follows.

The apparatus is first loaded by swinging the member 18 about the rod 24, as mentioned above, to expose the member 13. A conductor 8 is then laid across each jaw of aligned slots 16 in the comb members 14 and positioned in the bottoms of the slots 16 as shown in Figure 2, these conductors forming a first group of conductors. As shown in Figure 2 the conductors 8 can be the conductors of a multiconductor cable 31.

A connector 1 as shown in Figure 1 is then positioned on the member 13 with the flanges 11 of the housing 2 of the connector 1 received in recesses 29 in the member 13. When so mounted the slots 9 in the contacts 4 of the connector 1 are aligned with the slots 16 in the comb members 14, and thus with the conductors 8 received therein.

The conductors 8 of a record group of conductors are then introduced into the slots 16 in the comb members 14, as shown in Figure 2, thereby to become aligned with the slots 9 in the contacts 4 of the connector 1. The member 18 is then returned to the position shown in Figure 2 with the rod 25 at least partly received in the boss 27 on the right-hand (as seen in Figure 2) end of the member 18.

As can be seen in Figures 2 and 4, with

the apparatus so loaded the wall 10 of the housing 2 of the connector 1 projects over a slot 30 formed between the member 13 and the left-hand (as seen in the drawings) comb member 14, and thus the connecting portions 7 of the contacts 4, which are positioned on the wall 10, are accessible from above and below through the slot 30.

The loaded apparatus is then positioned with the lower surface of the member 17, 23 on the platen of a press (not shown) and with the ram of the press aligned with the centre of the member 18.

The press is then operated to urge the member 18 and with it the member 13, towards the member 17, during which movement, as shown in Figure 4, the insertion tools 20 carried by the members 17 and 18 engage the conductors 8 and urge them into the slots 9 in the individually associated contacts 4. The tool 20 on the member 17 inserts the first group of conductors 8 into the slots 9 of the lower (as seen in the drawings) row of contacts 4, and the tool 20 on the member 18 inserts the second group of conductors 8 into the slots 9 of the upper row of contacts 4. As can be clearly seen in Figure 4, the insertion tool 20 carried by the member 17 engages the conductor 8 through the slot 30 between the member 13 and the left-hand comb member 14.

As the conductors 8 are forced into the slots 9 the edges of the slots 9 penetrate the insulation of the conductors 8 and contact the conductive core thereof, in known manner.

When the press ram has completed its downward movement and returns to its upper position, the springs 28 urge the members 13 and 18 away from the member 17, and the member 18 can then be swung about the rod 24, clear of the rod 25, to permit removal of the connector 1 with the conductors 8 connected thereto, from the apparatus.

It will be appreciated that the above described apparatus can be used to connect a connector 1 at any position along the conductors 8 since the apparatus does not effect any cutting of the conductors 8.

However, the apparatus can readily be modified to effect connection of a connector to the ends of conductors 8 with concomitant trimming of the ends of the conductors 8. To this end the connector 1 is mounted on the member 13 together with a shearing member (not shown) which embraces the connector with a pair of shearing edges which extend, one on each side of the wall 10 of the housing 2, between the connecting portion 7 of each contact 4 and the main body of the housing 2. The shearing edges are positioned such that the inner edges of the insertion tools 20 pass adjacent thereto, and these edges of the insertion

tools 20 are made square rather than sloping as shown in Figure 4, such that the conductors 8 are cut between these edges of the insertion tools 20 and the edges of the shearing member as the conductors 8 are urged into the slots 9 of the contacts 4. Thereafter the shearing member will be removed from the apparatus with the connector and conductors, and then be removed from the connector. The connector is thus connected to the terminal ends of the conductors.

WHAT WE CLAIM IS:—

1. Apparatus for simultaneously inserting each conductor of two groups of electrical conductors into a slot in an individual electrical contact of an electrical connector comprising a housing carrying two parallel rows of electrical contacts, the conductors of each group being inserted into the slots of an individual one of the rows of the contacts, the contacts being carried by the housing with the slots of all the contacts lying in substantially the same plane but with the slots of one row of contacts being directed in the opposite direction to the slots of the contacts of the other row, the apparatus comprising a connector receiving member having two comb members arranged to receive the connector therebetween and providing a plurality of pairs of aligned slots, one slot of each pair on each side of a connector received in the connector receiving member, the slots in the comb members being arranged each to receive a conductor from each of the two groups of conductors, and align each of the conductors with the slot in an associated contact of the connector; and first and second inserter members located on opposite sides of the connector receiving member and arranged for relative rectilinear movement towards the connector receiving member each to urge the conductors of an individual one of the groups of conductors into the slots in the contacts of the associated row of contacts.

2. Apparatus as claimed in Claim 1, in which the connector receiving member and the first and second inserter members are mounted on two rods which determine the direction of the relative rectilinear movement of the members.

3. Apparatus as claimed in Claim 2, in which the rods are secured to the first inserter member, and the connector receiving member and second inserter member are arranged for movement along the rods towards the first inserter member.

4. Apparatus as claimed in Claim 3, including compression springs arranged on each of the rods between the first inserter member and the connector receiving member, and between the connector receiving member and the second inserter member.

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the apparatus so loaded the wall 10 of the housing 2 of the connector 1 projects over a slot 30 formed between the member 13 and the left-hand (as seen in the drawings) comb member 14, and thus the connecting portions 7 of the contacts 4, which are positioned on the wall 10, are accessible from above and below through the slot 30.

The loaded apparatus is then positioned with the lower surface of the member 17, 23 on the platen of a press (not shown) and with the ram of the press aligned with the centre of the member 18.

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As the conductors 8 are forced into the slots 9 the edges of the slots 9 penetrate the insulation of the conductors 8 and contact the conductive core thereof, in known manner.

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It will be appreciated that the above described apparatus can be used to connect a connector 1 at any position along the conductors 8 since the apparatus does not effect any cutting of the conductors 8.

However, the apparatus can readily be modified to effect connection of a connector to the ends of conductors 8 with concomitant trimming of the ends of the conductors 8. To this end the connector 1 is mounted on the member 13 together with a shearing member (not shown) which embraces the connector with a pair of shearing edges which extend, one on each side of the wall 10 of the housing 2, between the connecting portion 7 of each contact 4 and the main body of the housing 2. The shearing edges are positioned such that the inner edges of the insertion tools 20 pass adjacent thereto, and these edges of the insertion

tools 20 are made square rather than sloping as shown in Figure 4, such that the conductors 8 are cut between these edges of the insertion tools 20 and the edges of the shearing member as the conductors 8 are urged into the slots 9 of the contacts 4. Thereafter the shearing member will be removed from the apparatus with the connector and conductors, and then be removed from the connector. The connector is thus connected to the terminal ends of the conductors.

WHAT WE CLAIM IS:—

1. Apparatus for simultaneously inserting each conductor of two groups of electrical conductors into a slot in an individual electrical contact of an electrical connector comprising a housing carrying two parallel rows of electrical contacts, the conductors of each group being inserted into the slots of an individual one of the rows of the contacts, the contacts being carried by the housing with the slots of all the contacts lying in substantially the same plane but with the slots of one row of contacts being directed in the opposite direction to the slots of the contacts of the other row, the apparatus comprising a connector receiving member having two comb members arranged to receive the connector therebetween and providing a plurality of pairs of aligned slots, one slot of each pair on each side of a connector received in the connector receiving member, the slots in the comb members being arranged each to receive a conductor from each of the two groups of conductors, and align each of the conductors with the slot in an associated contact of the connector; and first and second inserter members located on opposite sides of the connector receiving member and arranged for relative rectilinear movement towards the connector receiving member each to urge the conductors of an individual one of the groups of conductors into the slots in the contacts of the associated row of contacts.

2. Apparatus as claimed in Claim 1, in which the connector receiving member and the first and second inserter members are mounted on two rods which determine the direction of the relative rectilinear movement of the members.

3. Apparatus as claimed in Claim 2, in which the rods are secured to the first inserter member, and the connector receiving member and second inserter member are arranged for movement along the rods towards the first inserter member.

4. Apparatus as claimed in Claim 3, including compression springs arranged on each of the rods between the first inserter member and the connector receiving member, and between the connector receiving member and the second inserter member.



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5. Apparatus as claimed in Claim 2, Claim 3 or Claim 4, in which one of the rods is longer than the other rod whereby the second inserter member can be swung about the one rod clear of the other rod to give access to the connector receiving member.
6. Apparatus as claimed in any preceding claim, in which the connector receiving member has a slot therein through which the first inserter member has access to a row of the contacts of a connector mounted on the connector receiving member.
7. Apparatus as claimed in any preceding claim, in which the first inserter member is adapted for mounting on the platen of a bench press with the second inserter member positioned for engagement by the ram of the bench press.
8. Apparatus substantially as hereinbefore described with reference to the drawings.

For the Applicants:
R. G. STUART-PRINCE,
Chartered Patent Agent.

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