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(54) Shielded cable connector

(57) The connector is produced by forming one end of a ferromagnetic material seamless tube 6 surrounding an insulating block of the connector (the tube being initially of substantially uniform cross-sectional area) such that it is collapsed on to itself and a cable 1 connected to the connector whereby to tightly seal the end of the tube on to the cable to prevent ingress of moulding material subsequently applied to the exterior of the tube. In the case of a cable providing a braid or foil shielding element, this process simultaneously provides an electrical bond between the shell and a portion of the shielding element of the cable exposed by removing a portion of the outer insulation covering of the cable.

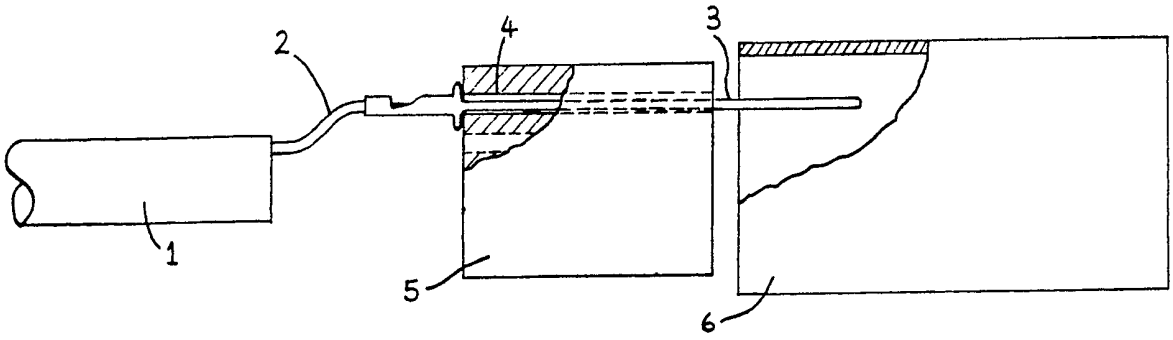

Fig. 1

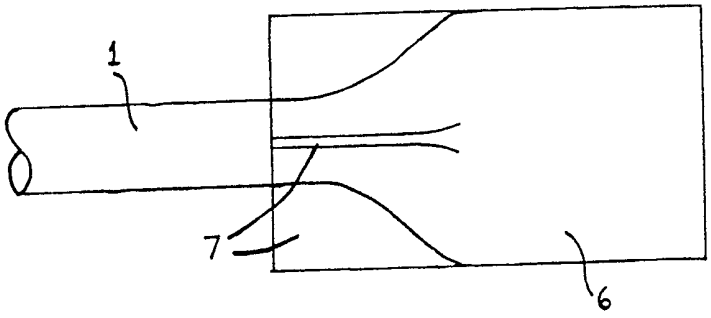

Fig. 2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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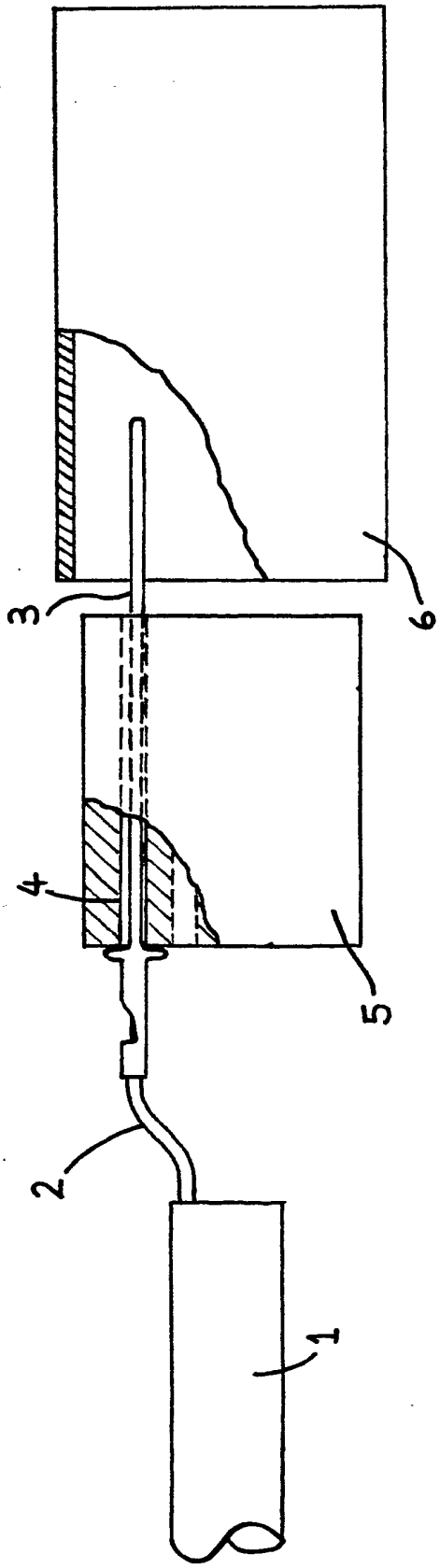

Fig.1

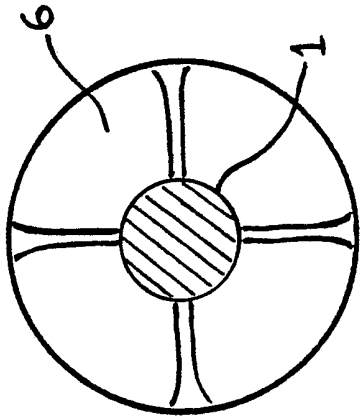

Fig.3

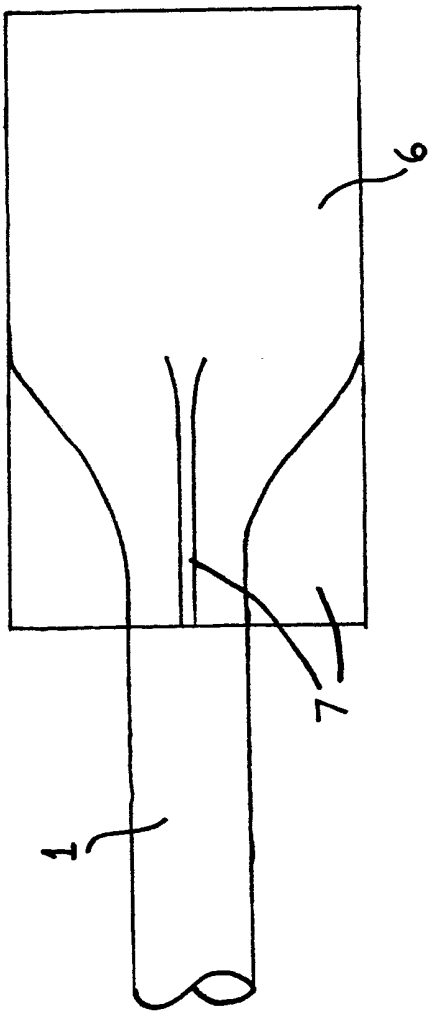

Fig.2

SHIELDED CABLE CONNECTOR

The present invention relates to a shielded cable connector and to a method of producing such a connector.

In many cable connector constructions it is customary to provide a metallic shell which contains a body of insulating material provided with either pins or socket contacts. One such connector is a so-called DIN plug which is of generally cylindrical form.

It is known that the metallic shell has not only mechanical properties but also electrical properties in that the shell, if properly constructed can provide Radio Frequency Interference/Electro-Magnetic Compatibility (RFI/EMC) shielding. This normally implies that the metallic shell should be of a ferromagnetic material and be continuous around the circumference of the plug. However, in order to keep costs to a minimum it has become customary to form the metallic shell, particularly for mini-DIN plugs, by rolling a flat blank which thus forms a seamed shell. Where RFI/EMC shielding is important this seam has heretofore been soldered to provide effective electrical continuity across the seam.

A further problem occurs in the production of connectors. It is customary to over-mould the metallic shell with a plastics material such as PVC after the connector has been attached to the end of a cable. This usually results in molding material entering into

the spaces between the contacts in the body of insulating material. This ingress of molding material is often unacceptable as it alters the theoretical insulating characteristics between contacts.

The present invention provides a connector having a metallic shell which not only provides proper RFI/EMC shielding but also is constructed in such a way as to prevent ingress of moulding material into the spaces between contacts of the connector. This is achieved by forming one end of a tube of ferromagnetic material such that it is collapsed on to itself and a cable connected to the connector whereby to seal the end of the tube on to the cable to prevent ingress of moulding material subsequently applied to the exterior of the shell.

Preferably the end of the tube is crimped to reduce the diameter of the bore of the tube in the crimped region to that of the cable.

An additional advantage of the above construction is that the crimped end of the tube also acts as a strain relief cable clamp.

Further features and advantages of the present invention will become apparent from the following description of an embodiment thereof given by way of example when taken in conjunction with the accompanying drawings, in which:-

Fig. 1 shows an exploded side view of a connector and cable arrangement prior to assembly with parts broken away for clarity;

Fig. 2 shows a side view of an assembled connector and cable; and

Fig. 3 shows an end view of the assembly shown in Fig. 2.

A preferred embodiment of the present invention will be described in relation to the construction of a DIN plug and more particularly a mini-DIN plug

which is one of smaller diameter than the customary DIN plug.

Referring now to Figure 1, this shows the basic constructional elements of a shielded cable connector attached to a cable. The cable 1 comprises a number of wires 2 only one of which is shown in Figure 1. The end of the wire 2 is attached to a connector pin 3 in any convenient manner such as crimping or soldering. The pin 3 is inserted into a hole 4 in a cylindrical block 5 of insulating material. A sleeve 6 of ferromagnetic material is then slipped over the exterior of the insulating block 5 and constitutes the usual metal shell of the DIN plug. The assembly is then over-moulded with an insulating material such as PVC.

Thus far the method of construction is conventional but the construction according to the present invention differs to previous construction in so far as the sleeve 6 is formed from a seamless tube of ferromagnetic material usually soft steel of low carbon content. Further, the present invention proposes to deform the end of the sleeve 6 in the region of the cable 1 in order to reduce the bore of the sleeve from a diameter approximately equal to the outside diameter of the block 5 to a diameter of the order of the diameter of the cable 1. This is done by crimping the end of the sleeve 6 in the region of the cable 1 to form the shell as shown in Figures 2 and 3. In order to achieve the formation of the sleeve as shown in Figures 2 and 3, the assembled connector is inserted into a multiple segment tool e.g. a four segment tool, the radii and curvature of each of the segments having been carefully designed to crimp the end of the metal sleeve into a number of fins, in this case four, and produce a resultant bore for the sleeve which is slightly smaller than the nominal outside diameter of the cable

1. The design of the segments is such that the fins formed by the crimping are tightly closed and the formation of the reduced diameter bore is also carefully controlled so that the cable is tightly clamped by the crimped end section.

The design of the tool segments such as to tightly close the fins formed by the crimping operation but without splitting the shell material and to close down the end of the sleeve 6 tightly on to the surface of the cable 1 so as to prevent ingress of moulding material which is added to the outside of the shell and cable assembly. A consequent advantage of the closing down of the end of the sleeve 6 on to the cable is that the crimping operation automatically produces a strain relief cable clamp.

It will be appreciated that the sleeve 6 can be formed with the usual indentations and or slots which are customarily provided in these sleeves of DIN plugs by a pre-formation of the sleeve before assembling.

The number and/or disposition of the contacts and bores can be altered to suit any desired specification.

CLAIMS:

1. A cable connector construction comprising a body of insulating material provided with a plurality of bores each receiving an electrical contact attached to an end of an insulated electrical conductor, and a seamless tube of ferromagnetic material which receives the body within its bore with the electrical conductors extending from one end of the tube, said one end of the tube being collapsed on to itself and the insulation of the conductors whereby to seal said one end of the tube.

2. A cable connector construction according to claim 1, and comprising a layer of insulating material on the outside of the tube and conductors in the area of said one end of the tube.

3. A cable connector construction according to claim 1 or 2, wherein said one end is collapsed to form a plurality of fins.

4. A method of constructing a shielded cable connector comprising attaching an electrical contact to a free end of each of a plurality of insulated electrical conductors, inserting the electrical contacts in respective bores through a body of insulating material, inserting the body into the bore of a seamless tube of ferromagnetic material with the electrical conductors extending from one end of the tube, and collapsing said one end of the tube on to itself and the insulation of the conductors whereby to seal said one end of the tube.

5. A method according to claim 4, wherein the collapsing of the tube is achieved by crimping the end of the tube.

6. A cable connector construction substantially as hereinbefore described with reference to the accompanying drawing.

7. A method of constructing a shielded able connector substantially as hereinbefore described with reference to the accompanying drawing.

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