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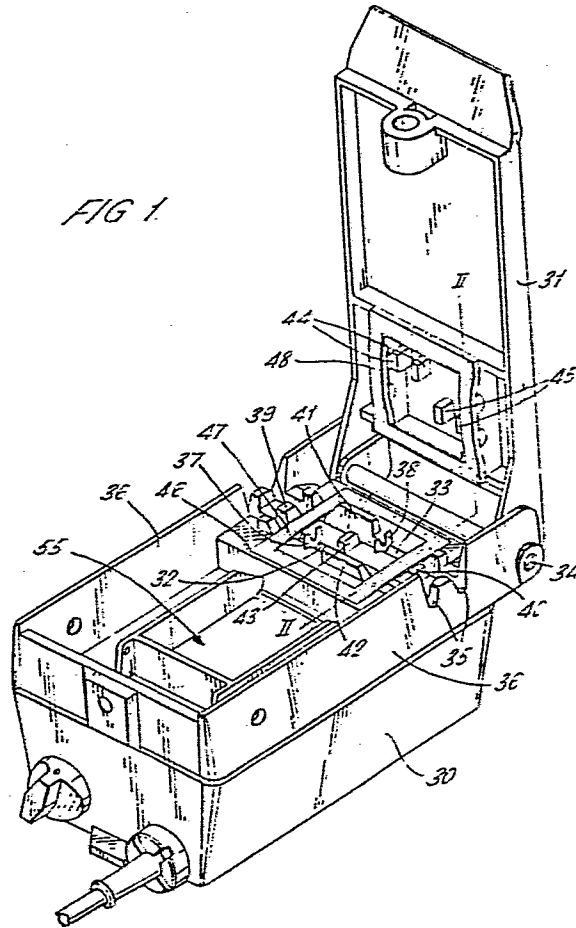
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(54) **Electrical highway cable connector.**

(57) A connector which can make electrical connection to the wires in a highway cable without cutting the cable is formed with two hinged members (30, 31) which can be closed together to make the connection. On closing the two members together with wires of the cable are urged into respective V-shaped members (37, 38) which penetrate the insulation of the cable to contact the wire cores. The two members (30, 31) carry seals (47, 48) which on closing the two members together co-operate to provide a moisture tight seal around the connection to the wires of the cable.

FIG 1



The present invention relates to an electrical highway cable connector for making electrical connection to a conductor in a length of insulated highway cable, preferably at a point intermediate the ends of the length of highway cable.

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In GB-A-1514423 there is disclosed an electrical connector for making electrical connection to conductors in a length of insulated cable, comprising a pair of hingedly connected members which are moveable relative to one another between open and closed positions, electrically conductive cutting or penetrating means comprising at least two V-shaped members arranged to receive respective insulated conductors of a multi-conductor cable, mounted on one of said members, said members being formed to receive the cable with the members, in the open position, to present the cable to said cutting or penetrating means and to press the cable against said cutting or penetrating means when the members are moved to the closed position whereby on closing the members said means cuts or penetrates through the insulation of the cable to make contact with the conductors, the other of said members having an abutment means arranged to bear on the conductors and press the conductors into the V-shaped members on closing the members, whereby the insulation of the conductors is displaced by the V-shaped members to make electrical contact between the V-shaped members and the conductors.

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According to this invention such a connector is characterised in that resiliently deformable seals are mounted on each of the members so as to co-operate with one another and, on closing the

members, make a moisture tight seal between the members and around the conductors of the cable to prevent ingress of moisture to the connections between the V-shaped members and the conductors, the members being formed to locate the seals mounted thereon and to apply additional squeezing pressure on the seals, on closing the connector, immediately adjacent the conductors of the cable.

The connector of this invention has the advantage that it provides effective sealing completely about the connections between the conductors and the V-shaped members, thus serving to maintain the integrity of the connections.

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

Figure 1 is a perspective view of a highway cable connector embodying the invention; and

Figures 2 and 3 are detailed cross-sectional views of part of the connector of Figure 1.

The connector to be described is for making electrical connection to the wires of a twisted pair highway cable and comprises a pair of hinged members 30 and 31, the member 30 being formed with two transverse grooves 32 and 33 substantially parallel to the axis of the hinge 34 between the members 30 and 31. The grooves 32 and 33 are sized to receive the individual wires of a twisted pair cable. It will be appreciated that the twisted pair is untwisted for a short length to enable the wires to be located in respective grooves 32 and 33 and extend out either side of the member 30 through slots 35 raised side flanges 36 formed upstanding from the member 30.

Metallic V-shaped members 37 and 38 are positioned one aligned with each of grooves 32 and 33 to receive a respective wire of the highway cable. The V-shaped members 37 and 38 are spaced apart along the grooves 32 and 33 as illustrated in the drawing. The member 30 is formed in the region of the grooves 32 and 33 and the V-shaped members 37 and 38 with locating blocks 39 to 43. The member 31 of the connector is formed on the

underside as shown in the drawing with two pairs of pressure blocks 44 and 45 positioned to correspond with respective V-shaped members 37 and 38, so that on pivoting the member 31 to close the connector, the pairs of blocks 44 and 45 engage
5 respective wires of the cable on both sides of the V-shaped members to force the wires down into the V's of the members. The V-shaped members 37 and 38 are formed with opposed inwardly directed edges which displace the insulation cover of the wires as the wires are pressed down towards the bases of the V's. The
10 base of the V of each member is sized to be just smaller than the diameter of the conductor in each wire of the highway cable, so that when each wire is fully pressed down into the respective V-shaped member, the insulating cover is completely displaced and connection is made by the V-shaped member to the conductor
15 of the wire. In practice, the opposed inwardly directed edges of the V's of the members 37 and 38 need not be sharp in the sense of being razor edged. Indeed excessively sharp members would tend to cut right through the metal conductors of the wires. Thus, the inwardly directed edges of the V's may have
20 a substantially flat profile, almost parallel or slightly angled relative to the wire engaged by the V-shaped member. The profile of the edge may be similar to that of the edge of one blade of a pair of scissors.

It is desirable to form a seal completely around the region
25 where the insulation of the wires of the highway cable is being cut into by the V-shaped members 37 and 38. To this end, a shallow rectangular cross-section groove 46 is formed completely encompassing the V-shaped member 37 and 38. The groove is formed as a square in the illustrated example. A square shaped seal
30 member 47 is secured in the groove 46. The seal 47 is conveniently of a spongy material and is arranged to have a natural, undistorted thickness so that the seal 47 extends just above the level of the groove 46. The seal 47 co-operates with a corresponding square seal member 48 located on the member 31. Thus, when the member 31
35 is rotated to close the connector, the seals 47 and 48 engage each

and are compressed to make moisture proof seals completely around the connection region and in particular around the wires of the highway cable located in the grooves 32 and 33.

5 Figures 4 and 5 illustrate the sealing arrangement in more detail. As can be seen, the material of the members 30 and 31 immediately under the spongy seal members 47 and 48 is profiled to enhance the sealing effect and to accommodate material of the seals 47 and 48 displaced by the presence of the wires 49 and 50. Thus, enlarged portions 51 and 52 are formed to accommodate
10 seal material displaced by the wires 49 and 50 and raised portions 53 and 54 are formed immediately adjacent the enlarged portions 51 to ensure extra compression of the seal material around the wires.

15 In the connector shown in the drawings provision is made in a housing region 55 which is closed by the member 31, to accommodate, for example, patches of insulating material for use in repairing the damaged insulation of the highway cable when the connector is disconnected and removed from the highway cable. The housing area 55 may also accommodate spare fuses for
20 use in the connector.

CLAIMS:

1. An electrical highway cable connector for making electrical connection to conductors in a length of insulated highway cable, comprising a pair of hingedly connected members (30, 31) which are moveable relative to one another between
5 open and closed positions, electrically conductive cutting or penetrating means (37, 38) comprising at least two V-shaped members (37, 38) arranged to receive respective insulated conductors of a multiconductor cable, mounted on one (30) of said members, said members (30, 31) being formed to receive the
10 cable with the members (30, 31) in the open position, to present the cable to said cutting or penetrating means (37, 38) and to press the cable against said cutting or penetrating means (37, 38) when the members (30, 31) are moved to the closed position whereby on closing the members (30, 31) said means (37, 38) cuts or
15 penetrates through the insulation of the cable to make contact with the conductors, the other (31) of said members having an abutment (44, 45) means arranged to bear on the conductors and press the conductors into the V-shaped members (37, 38) on closing the members (30, 31) whereby the insulation of the
20 conductors is displaced by the V-shaped members (37, 38) to make electrical contact between the V-shaped members (37, 38) and the conductors, characterised in that resiliently deformable seals (47, 48) are mounted on each of the members (30, 31) so as to co-operate with one another and, on closing the members (30, 31),
25 make a moisture tight seal between the members (30, 31) and around the conductors of the cable to prevent ingress of moisture to the connections between the V-shaped members (37, 38) and the conductors, the members (30, 31) being formed to locate the seals mounted thereon and to apply additional squeezing pressure
30 (53) on the seals (47, 48), on closing the connector, immediately adjacent the conductors of the cable.

2. A connector as claimed in Claim 1, characterised in that said seals (47, 48) are located in grooves (46) in each of
35 the members (30, 31) each seal (47, 48) having an undistorted

thickness such that the seal (47, 48) extends out of the groove (46).

3. A connector as claimed in Claim 2, characterised in that
5 each of the said grooves (46) is formed with enlarged portions (51, 52 to accommodate seal material displaced by the conductors of the cable.

4. A connector as claimed in Claim 1, Claim 2, or Claim 3,
10 characterised in that said additional squeezing pressure is provided by raised portions (53) on each of the members (30, 31).

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FIG. 1

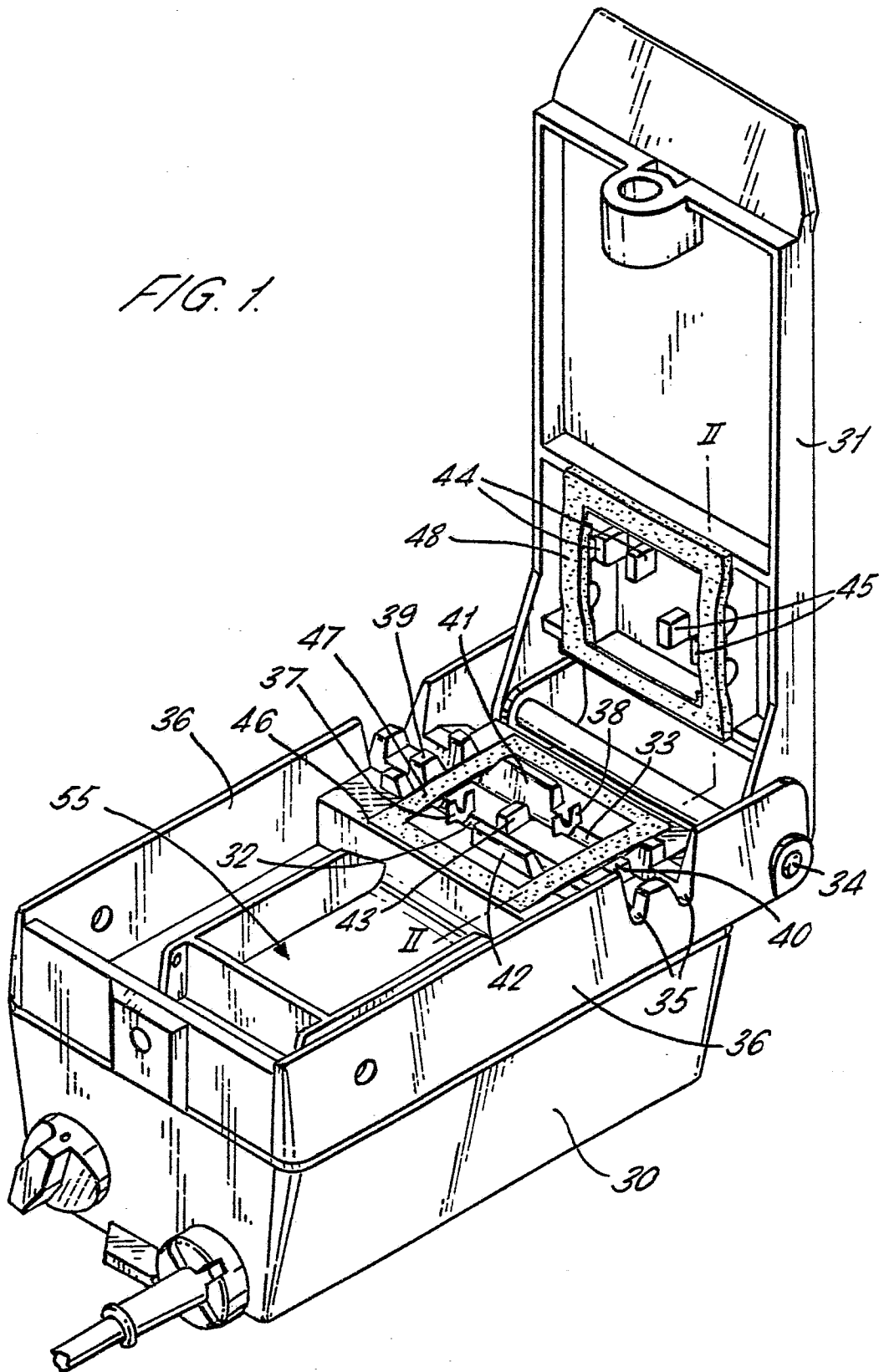


FIG. 2.

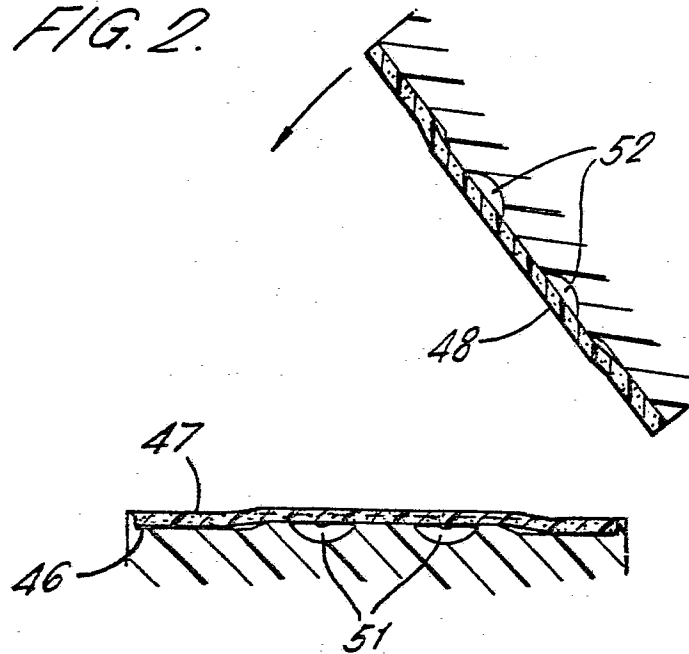
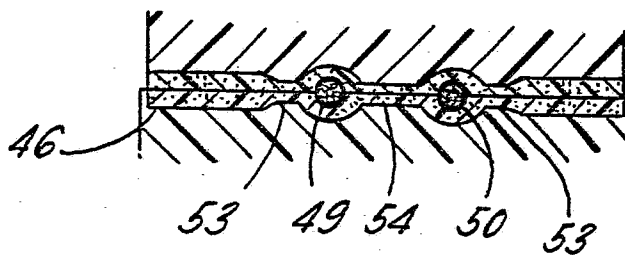


FIG. 3.





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
Y	GB-A- 766 017 (ACADEMY ELECTRICAL PRODUCTS CORP.) * Page 4; figures *	1	H 01 R 4/24
Y	US-A-3 576 937 (ITT) * Column 2, line 64 - column 3, line 11; figures *	1	
A	GB-A-2 061 029 (THOMAS & BETTS CORP.) * Abstract; figures *	1	
A	US-A-3 324 421 (Y. FUJIMOTO) * Column 2, line 37 - column 3, line 60; figures *	1	
A	US-A-4 045 112 (GENERAL MOTORS CORP.) * Column 3, lines 55-63; figures *	1	TECHNICAL FIELDS SEARCHED (Int. Cl. 4) H 01 R
A	DE-A-2 256 657 (BROWN, BOVERI & CIE AG) * Pages 7-9; figures *	1	
A	US-A-3 866 297 (L.D. ALDRIDGE) * Column 5, lines 28-38; figures *	1	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27-09-1985	Examiner RAMBOER P.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



DOCUMENTS CONSIDERED TO BE RELEVANT			Page 2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
D,A	DE-A-2 701 428 (AMP) * Page 7, paragraph 2; page 11; figures * & GB - A - 1 514 423 -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27-09-1985	Examiner RAMBOER P.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	