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Connecting a drain wire to an electrical connector shield.

A kit of parts for assembly together about cables (C1,C2) having signal wires (W1,W2) and drain wires (W3) to common the signal wires of one cable to respective signal wires of the other cable and to common the drain wires of the cables; comprises mating housings (2,4) and mating shields (12,14). One housing (4) has terminal pairs (8,10) for commoning the signal wires (W1,W2), one of the shields (14) having terminals (92,94) for commoning the drain wires (W3) to the shields (12,14). The other housing (2) has wire stuffer ribs (20) for driving the respective wires (W1,W2,W3) into the respective terminals (58,60,92,94). The shields (12,14) are latchable together to hold the mated housings (2,4) together.

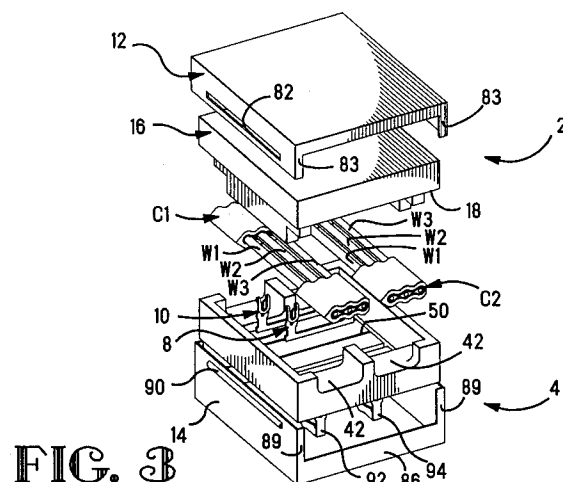


FIG. 3

This invention relates to an electrical connector assembly according to the preamble of claim 1. There is disclosed a kit of parts for assembly about at least one electrical cable having signal wires and a drain wire, to provide an electrical connector having a shield connected to the drain wire, or drain wires. The invention also relates to a one-piece metal shield for such a kit of parts.

There is disclosed in US-A-3 842 392, a kit of parts for assembly together to provide an electrical connector, the kit of parts comprising, a first insulating housing having a base formed with wire stuffer members upstanding therefrom, a second insulating housing having a base formed with terminal receiving openings therein and a signal wire receiving electrical terminal for reception in each terminal receiving opening with a signal wire receiving portion of the terminal projecting from the base of the second housing, the housings being matable, with the terminals received in the terminal receiving openings and signal wires extending across the wire receiving portions of the terminals; to cause the wire stuffer members to stuff the wires into the wire receiving portions of the terminals.

This known kit of parts is not, however, intended to provide a shielded electrical connector, or to be used with cables having drain wires.

The invention provides an electrical connector assembly as defined in claim 1 and a one-piece metal shield as defined in claim 11.

According to an embodiment of the present invention, a kit of parts as defined in the second paragraph of this specification is characterized in that one of the housings has a through, terminal receiving opening formed in the base thereof, the kit of parts further comprising a metal shield for receiving the base of said one housing with a drain wire receiving terminal formed integrally with the shield projecting through said through opening with a drain wire receiving portion of that terminal upstanding from the base of said one housing, the other housing having a further stuffer member for driving a drain wire extending across said drain wire receiving portion, into said drain wire receiving portion as said housings are mated.

The shield can readily be stamped and formed from a single sheet of metal stock so as to include the drain wire receiving terminal. The housings may be held together in mating relationship by cooperation between the shield and a further shield when the parts of the kit of parts have been assembled together. The housings may be provided with interengaging means for locating them as they are mated, in order to ensure that latching means on the shields engage one another when the housings have been fully mated.

The kit of parts may be arranged commonly to connect respective signal wires and respective

drain wires of pair of electrical cables.

An embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:

- 5 Figure 1 is an isometric view of a kit of parts for assembly to a pair of flat cables to provide a shielded electrical cable connector;
- 10 Figure 2 is an enlarged, fragmentary isometric view of a wire connecting portion of each of a plurality of electrical terminals comprised in the kit of parts;
- 15 Figure 3 is an exploded isometric view of the connector;
- 20 Figure 4 is a front view of Figure 3;
- 25 Figure 5 is an enlarged isometric view of the connector; and
- 30 Figure 6 is a similar view to that of Figure 5 but is shown partly in section.

As shown in Figure 1, a kit of parts for assembly to provide a shielded electrical cable connector, comprises an upper insulating housing 2 and a lower insulating housing 4 connected by carrier strips 6, two pairs 8 and 10, respectively, of commoned electrical terminals, an upper metal shield 12 and a lower metal shield 14. The kit of parts is for assembly about a pair of electric cables C1 and C2, signal wires W1 and W2, of which, are to be commoned and drain wires W3 of which are to be grounded to the shields 12 and 14. Each cable has insulating jacket J.

The housings 2 and 4, are moulded in one piece with the carrier strips 6. The upper housing 2 comprises a rectangular base 16, which is square as seen in plan view, and has a flat outer peripheral rim 18 extending thereabout. Within the rim 18, there upstands from the base 16, four parallel, rectangular cross section, elongate, wire stuffer ribs 20, defining between them three terminal wire connecting portion receiving slots, 22, 24 and 26, respectively. The ribs 20 are spanned, at each end thereof, by a planar locating bar 28 upstanding from the base 16 above the ribs 20. Each bar 28 has a central part 30, and at each end thereof, an end part 32 of smaller height and length and the central part 30.

The lower housing 4, which is substantially rectangular, and square as seen in plan view, has opposite side walls 34 and opposite end walls 36. Each end wall 36 has two juxtaposed cable receiving notches 38 and 40, respectively. A flat cable supporting surface 42 extends inwardly of the housing 4 from the base of each notch 38 and 40, between the side walls. The notches of each pair are separated by a central partition 41. The housing 4 has a flat base 44 from which upstand ribs 45 defining between them, two commoning strip receiving blind slots 46 and 48, respectively, and a terminal receiving through slot 50 which is wider

than the slots 46 and 48. Each cable supporting surface 42 merges with an abutment surface 52 adjoining the respective side wall 34, for engagement by a respective end part 32 of a respective one of the locating bars 28. The ends of the ribs 45 are spaced from the respective side walls 34 so as to define in co-operation with each of those side walls, an elongate recess 54 for receiving the central part 30 of a respective bar 28 of the housing 2. Each side wall 34, each end wall 36 and each partition 41 has a flat top for face to face engagement with the rim 18 of the housing 2.

Each terminal pair 8 and 10 comprises a first signal wire receiving terminal 58 and a second signal wire receiving terminal 60 upstanding from opposite ends of a rectilinear commoning strip 62. The terminal pairs 8 and 10 are identical. Each terminal 58 and 60 comprises a leg 64 coplanar with the commoning strip 62 and being surmounted by a wire receiving portion 66. As shown in Figure 2 each wire receiving portion 66 has a wire receiving slot 68 defined by two opposed arms 70 upstanding from the leg 64. There depends from the top of each arm 70, one leg 72 of a U-shaped yoke 74 which extends across the slot 68 and acts as a backing spring.

The upper metal shield 12 has a flat square base 76 opposite end walls 78 and opposite side walls 80 of substantially greater height than the walls 78, each formed with a longitudinal through slot 82. The walls 78 have narrow end portions 83 of the same height as the walls 80. The shield 12 is dimensioned to receive the base 16 of the upper housing 2, between the walls 78 and 80 of the shield 12.

The lower metal shield 14 has a square base 84, opposite end walls 86 and opposite side walls 88 of substantially greater height than the end walls 86. The walls 86 have narrow end portions 89 of the same height as the walls 88. Each side wall 88 has a longitudinally extending, externally projecting rib 90 for snap reception in a respective slot 82 of the shield 12. The shield 14 is dimensioned to receive the lower housing 4, between the walls 86 and 88 of the shield 14. There are stuck out from the base 84, two identical, drain wire receiving electrical terminals 92 and 94 which are precisely aligned with each other in a direction at right angles to the planes of the side walls 88. Each terminal 92 and 94, which is identical with the terminals 58 and 60, has a leg 64 upstanding from the base 84 and being surmounted by a wire receiving portion 66 which is insertable through the slot 50 in the base 44 of the housing 4.

In order to prepare the cables C1 and C2 for termination, an intermediate portion of each cable is stripped of its jacket J so as to bare an equal length of each of the signal wires W1 and the drain

wire W3 of the cable.

Before assembling the parts described above to the cables C1 and C2, the strips 6 connecting the housings 2 and 4 are severed at positions adjacent thereto. The commoning strip 62 of the terminal pair 10 is inserted into the slot 46 of the housing 4 and the commoning strip 62 of the terminal pair 8 is inserted into the slot 48 of the housing 4 so that at least the wire receiving portions 66 of the terminals 58 and 60 stand above the ribs 45 of the base 44. The strips 62 are located longitudinally of their respective slots 46 and 48 with the centre to centre spacing between the terminals 58 of the terminal pairs 8 and 10, equal to the centre to centre spacing between the signal wires W1 and W2 of the cable C1, the centre to centre spacing between the terminals 60 of the terminal pair 8 being equal to the centre to centre spacing between the signal wires W1 and W2 of the cable C2. The spacing between the wires of the two cables, will, in practice, be the same.

The housing 4 is placed in the shield 14 so that the wire receiving portions 66 of the terminals 92 and 94 are received through the slot 50 of the housing 4 with the wire receiving portions 66 of those terminals standing above the ribs 45. The centre to centre spacing between the terminals 92 and 94 is equal to the centre to centre spacing between the drain wires W3 of the cables C1 and C2 when they have been laid in the notches 38 and 40 respectively. The shield 12 is placed over the base 16 of the upper housing 2. The cables C1 and C2 are laid in their respective notches 38 and 40 with jacketed portions of the cables in the notches, and the bared cable wires extending across the ribs 45. The housing 2 is now mated with the housing 4, so that the central parts 30 of the bars 28 of the housing 2 are received in the recesses 54 of the housing 4, as best seen in Figure 6, with the end parts 32 of the bars 28 in face to face engagement with the abutment surfaces 52 of the housing 4 and the rim 18 of the housing 2 in surface to surface engagement with the surfaces 56 of the housing 4. As best seen in Figures 5 and 6, the ribs 90 of the shield 14 snap into the slots 82 of the shield 12 so that the housings 2 and 4 and the shields 12 and 14 are firmly latched together in mating relationship. During the mating operation, the signal wires W1 and W2 of the cable C1 are received in the wire receiving slots 68 of the terminals 58, the wires W1 and W2 of the cable C2 being received in the wire receiving slots 68 of the terminals 60, and the drain wires W3 of the cables C1 and C2 are received in the wire receiving slots 68 of the terminals 92 and 94, respectively. The wire receiving portions 66 of the terminals of the terminal pair 10 enter the slot 22 of the housing 2, the wire receiving portions 66 of the terminals of

the terminal pair 8 entering the slot 24 of the housing 2 and the wire receiving portions 66 of the terminals 92 and 94 entering the slot 26 of the housing 2. The wire stuffer ribs 20 of the housing 2 accordingly stuff the respective wires W1 to W3 into the wire slots 68 of their respective terminals whereby each wire is firmly and permanently electrically connected to a respective terminal. Thereby, the signal wire W1 of the cable C1 is commoned, to the signal wire W1 of the cable C2, the signal wire W2 of the cable C1 is commoned to the signal wire W2 of the cable C2 and the drain wire W3 of the cable C1 is commoned to the drain wire W3 of the cable C2 and to the shields 12 and 14. The jackets J of the cables C1 and C2 are snugly confined in the notches 38 and 40 of the housing 4 by the rim 18 of the housing 2. The relative arrangement of the parts of the kit of parts during their assembly to the cables will best be apparent from Figures 3 and 4. During the mating operation, the side walls 80 and the side wall portions 83 of the shield 12 slide over the side walls 88 and the side wall portions 89, respectively, of the shield 14, so that the housings 2 and 4 are confined by the shields 12 and 14, as will best be apparent from Figure 5.

Stocking is simplified because the housing 2 and 4 are supplied to the user joined to each other by the carrier strips 6.

Each shield 12 and 14 can readily be made by stamping and forming from a single piece of sheet metal stock. The need for securing the terminals 92 and 94 to the shield 14 is avoided. By forming the shields with means for latching them together about the housings the need to provide the housings with latching means as also avoided.

The assembled connector may be sealed, for example, by means of a sealing shell (not shown).

Claims

1. An electrical connector assembly, comprising, a first insulating housing (2) having a base (16), a second insulating housing (4) having a base (44) formed with terminal receiving openings (46, 48) therein and a signal wire receiving electrical terminal (58,60) for reception in each terminal receiving opening (46,48) with a signal wire receiving portion (66) of the terminal (58,60) projecting from the base (44) of the second housing (4), the housings (2,4) being matable, with the terminals (58,60) received in the terminal receiving openings (46,48) and signal wires (W1,W2) extending across the wire receiving portions (66) of the terminals (58,60); characterized in that one of the housings (2,4) has a through, terminal receiving opening (50) formed in the base (44) thereof,

the assembly further comprising a metal shield (14) for receiving the base (44) of said one housing (4) with a drain wire receiving terminal (92,94) formed integrally with the shield (14) projecting through said through opening (50) with a drain wire receiving portion (66) of that terminal (92,94) upstanding from the base of said one housing (4).

2. A connector assembly as claimed in claim 1 characterized in that said other housing (2) has a stuffer member (20) for driving a drain wire (W3) extending across said drain wire receiving portion (66), into said drain wire receiving portion (66) as said housings (2,4) are mated.
3. A connector assembly as claimed in claim 1 or 2, characterized in that the signal wire receiving terminals comprise two pairs (8,10) of signal wire receiving terminals (58,60), the terminals of each pair (8,10) being connected together by a common strip (62) for reception in respective slots (46,48) in the base (44) of the second housing (4), said slots (46,48) being parallel to, and spaced from, each other.
4. A connector assembly as claimed in claim 3, characterized in that a further and similar drain wire receiving terminal (94) is formed integrally with said shield (14), said through opening being in the form of a through slot (50) in the base (44) of the second housing (4), said further drain wire receiving terminal (92,94) being receivable through said slot (50) with its drain wire receiving portion (66) upstanding from the base (44) of the second housing (4) to receive a further drain wire (W3) extending across that drain wire receiving portion (66), said through slot (50) being parallel to, and spaced from said parallel slots (46,48).
5. A connector assembly as claimed in any one of the preceding claims, characterized in that said other housing (2) has a flat base (16), the wire stuffer members being in the form of parallel ribs (20) upstanding from that base (16) and defining between them parallel slots (22,24,26) for receiving the wire receiving portions (66) of said terminals (58,60, 92, 94), locating bars (28) upstanding from the base (16) of said other housing (2) at the ends of the parallel ribs (20), having central parts (30) remote from that base (16) and end parts (32) nearer thereto.
6. A connector assembly as claimed in claim 5, characterized in that said one housing (4) has opposed, parallel side walls (34) and opposed,

- parallel end walls (36), further ribs (45) defining said terminal receiving openings (46,48,50) and extending at right angles to the side walls (34) cooperating therewith to define elongate recesses (54) for receiving said central parts (30) of the locating bars (28), the end walls (36) defining cable receiving notches (38,40), stop surfaces (52) for abutment by the end parts (32) of the locating bars (28) being provided at the ends of the elongate recesses (54).
7. A connector assembly as claimed in claim 6, characterized in that the flat base (16) of said other housing (2) has a flat peripheral rim (18) surrounding said parallel ribs (20) and said locating bars (28), the side walls (34) and the end walls (36) of said one housing (4) having flat edge surfaces (56) for engagement with said rim (18) when the housings (2,4) are mated.
8. A connector assembly as claimed in any one of the preceding claims, characterized in that said metal shield (14) has a flat base (84), the, or each, drain wire receiving terminal (92,94) being struck out therefrom, and elongate side walls (88) upstanding from opposite edges of that base (84), each of these side walls (88) having a longitudinally extending latching rib (90), a further metal shield (12) for receiving said other housing (4) having latching slots (82) for receiving said latching ribs (90) with a snap action.
9. A connector assembly as claimed in any one of claims 1 to 7, characterized in that the housings (2,4) are matable with each other about at least one cable (C1,C2) having a cable jacket (J) which has been stripped intermediate the ends of said at least one cable (C1,C2), to expose said signal and drain wires (W1,W2,W3) thereof, the housings (2,4) having peripheral surfaces (18,42,56) for engagement with each other and with the jacket (J) of said at least one cable (C1,C2) when the housings are in mated relationship, said metal shield (14) having latching means (90) for cooperation with complementary latching means (82) of a further metal shield (12) for receiving said other housing (2), firmly to latch the housings (2,4) in mating relationship.
10. A connector assembly as claimed in any one of the preceding claims, characterized in that the housings (2,4) are formed integrally with other, being connected together by means of carrier strips (6).
11. A stamped and formed, one-piece metal shield for an electrical connector housing (4), the shield (14) comprising a rectangular base (84), to provide at least a partial enclosure for the housing (4), there being struck out from the base (84) at least one electrical terminal (92,94) in the form of an elongate plate in a plane at right angles to the base (84) and having one end connected to the base (84), the other end of the at least one terminal (92,94) being free and being formed with a wire receiving slot (68) opening in a direction away from the base (84).
12. A metal shield as claimed in claim 11, wherein the shield further comprises side walls (88) and opposed end walls (86), wherein each side wall (88) is formed with a latching rib (90) at a position remote from the base (84) and extending parallel with the base (84).
13. A metal shield as claimed in claim 11 or 12, wherein the end walls (86) have end portions (89) of the same height as the side walls but are otherwise lower than the side walls (88).

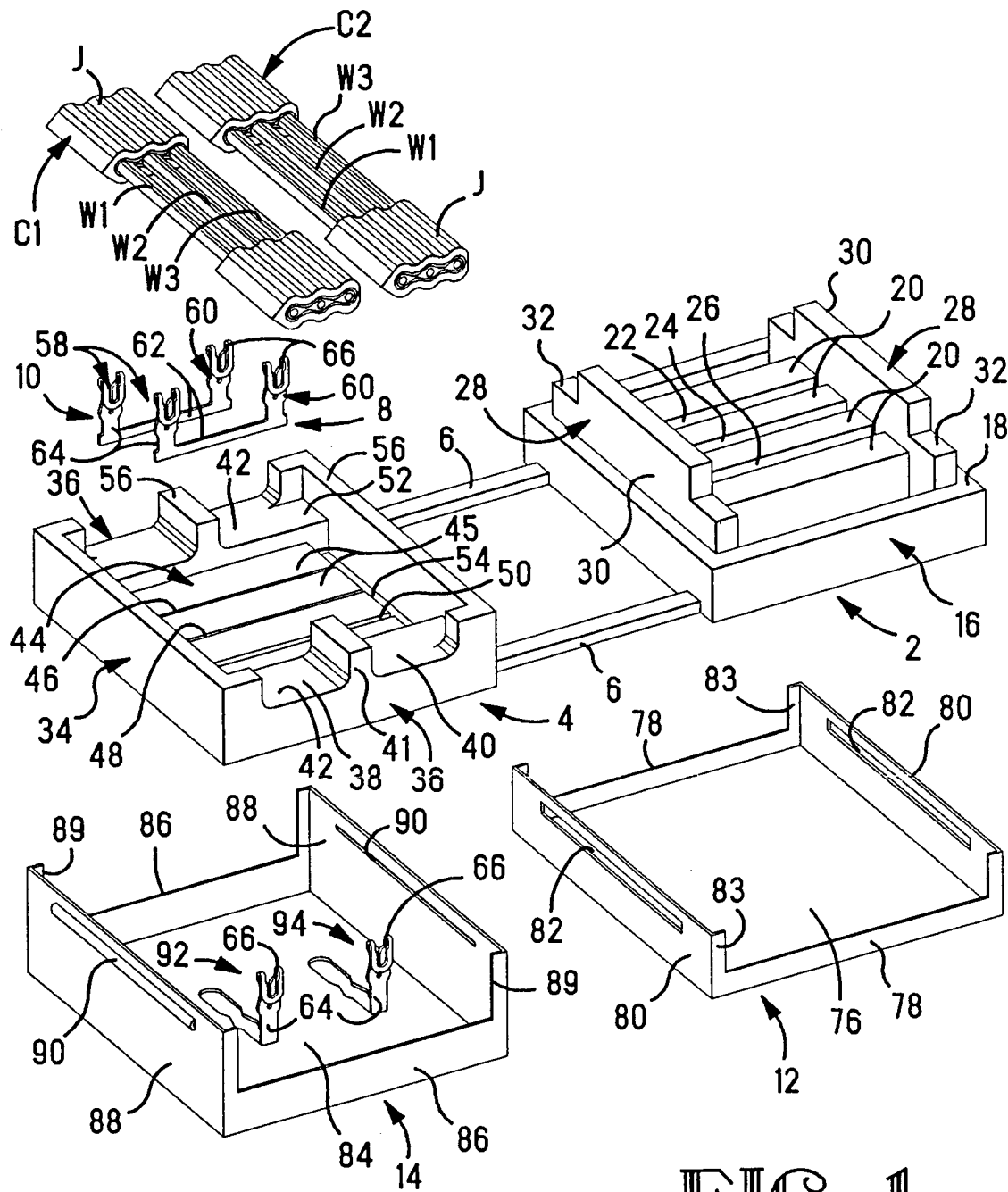


FIG. 1

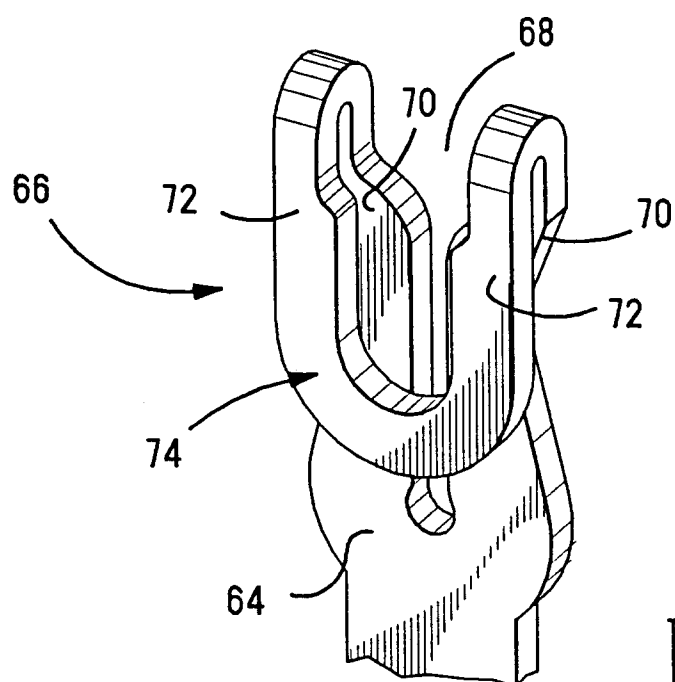
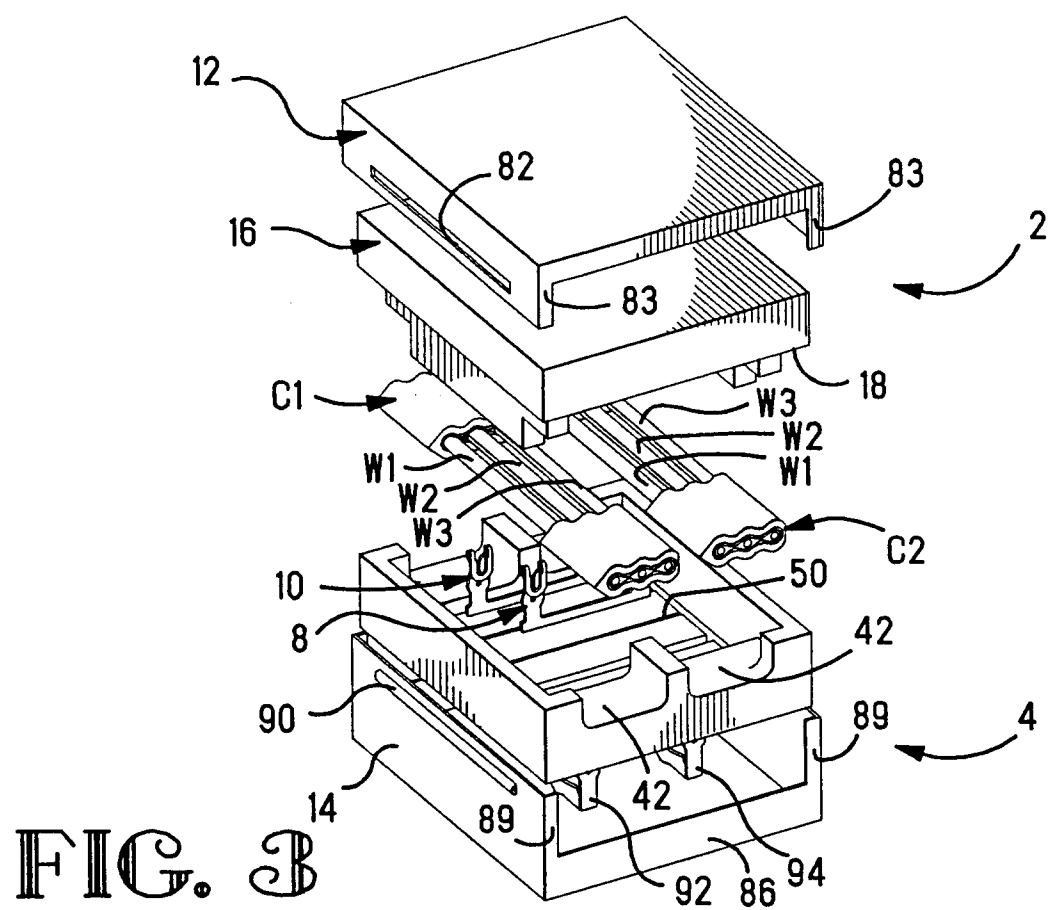


FIG. 2



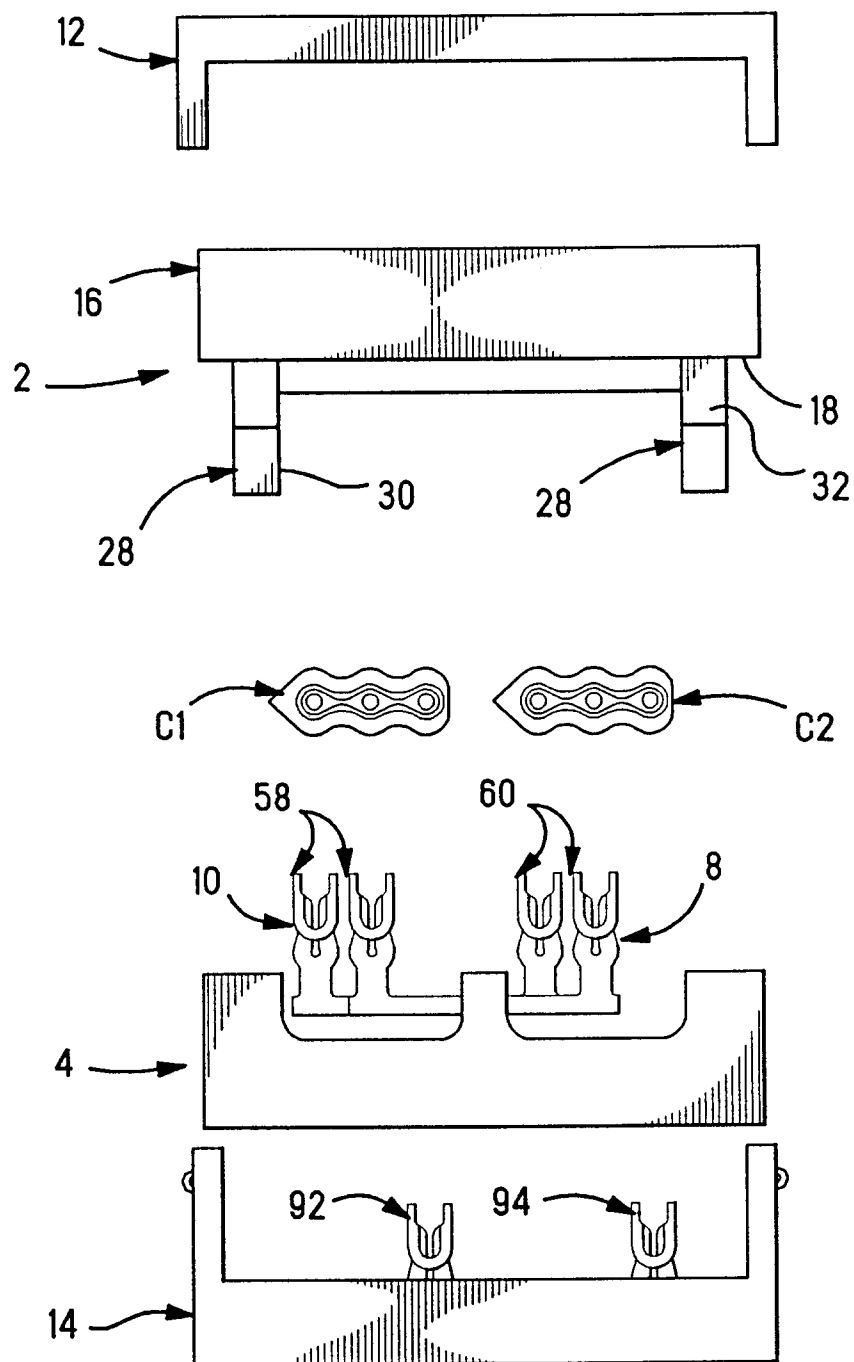
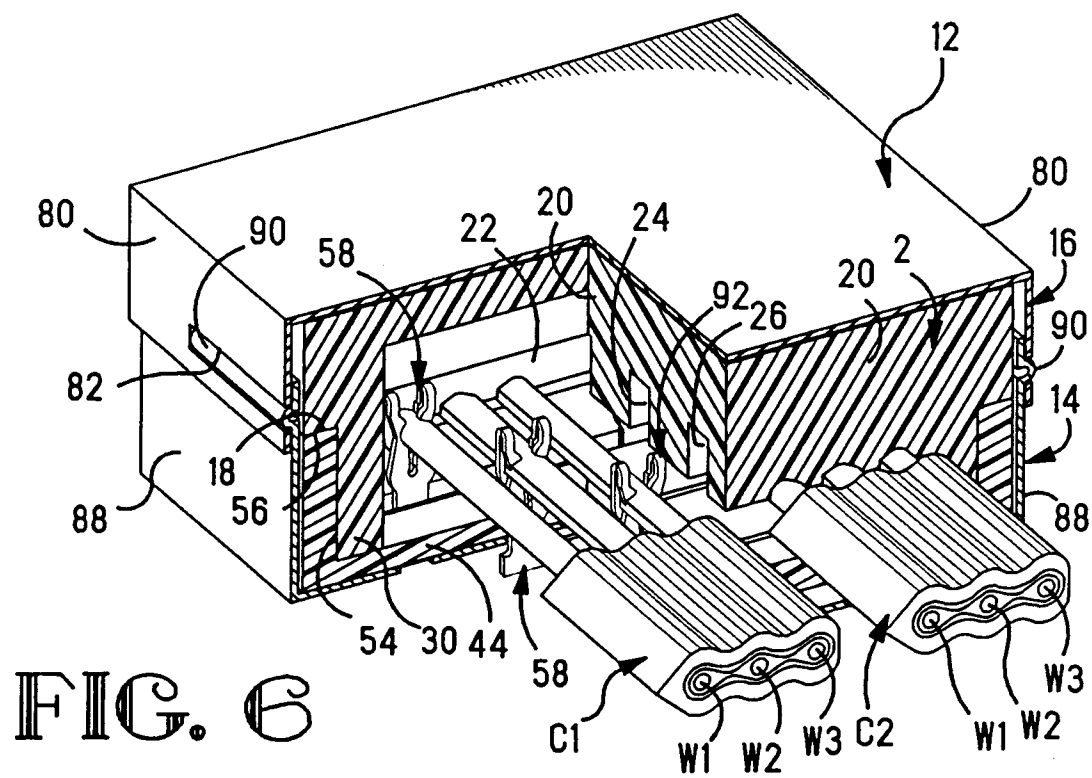
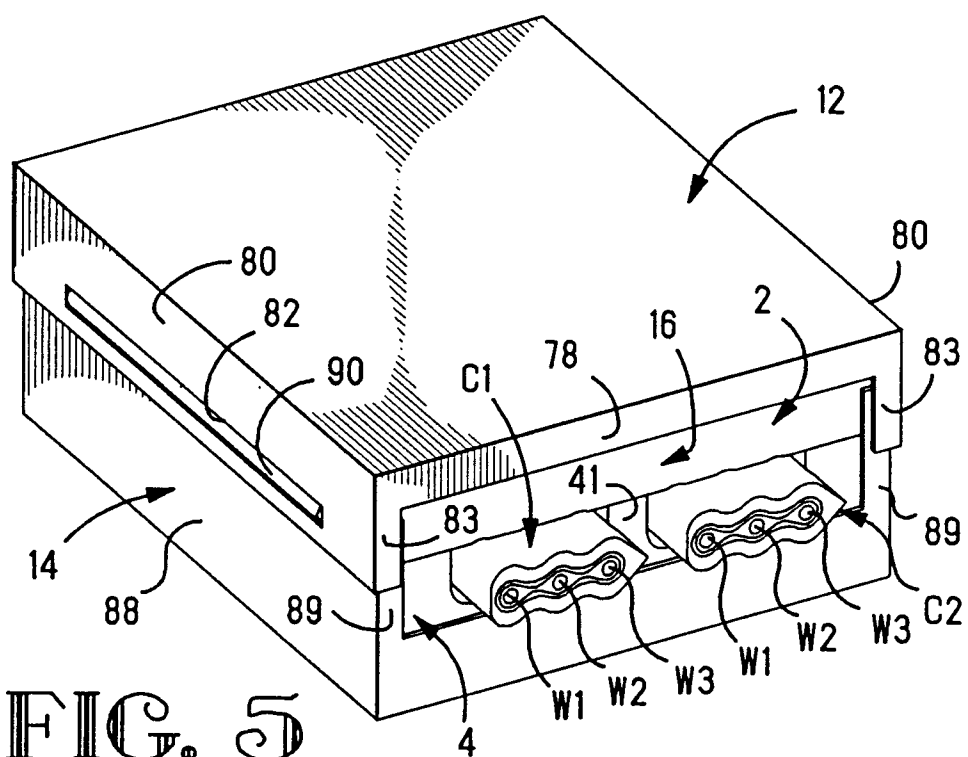


FIG. 4





European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 93 10 8029

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.5)
A	US-A-4 163 598 (BIANCHI ET AL.) * column 2, line 23 - column 4, line 48; figures 1-6 * * column 3, line 58 - column 9, line 14; figures 1-14 * ---	1,2,10	H01R23/66 H01R13/658 H01R9/07
A	US-A-4 772 212 (SOTOLONGO) ---	1,8	
A	GB-A-2 248 528 (AMP INCORPORATED) * page 4, line 29 - page 10, line 13; figures 1-7 * ---	1,11	
D,A	US-A-3 842 392 (ALDRIDGE ET AL.) * column 2, line 50 - column 6, line 49; figures 1-12 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H01R
The present search report has been drawn up for all claims			
Place of search THE HAGUE	Date of completion of the search 30 JULY 1993	Examiner TAPPEINER R.	
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	