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U1S S2123 S2215

(56) Documents cited
GB 2167912 A **GB 2146495 A** **GB 2013423 A**
EP 0311263 A2 **EP 0232521 A2** **EP 0080772 A1**
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(58) Field of search
UK CL (Edition K) H2E
INT CL[5] H01R

(54) Electrical connectors

(57) A connector for connecting a plug to electrically insulated wires has a moulded housing (10, 11,) with a cavity (50) for receiving the plug. A first set of connecting elements (80) can receive insulated wire and make electrical contact with the electrically conductive core. A second set of contacts (90) are connected to the contacts of the first set and extend from the first set (80) to the cavity (50) such that they can come into electrical contact with contacts carried by the plug.

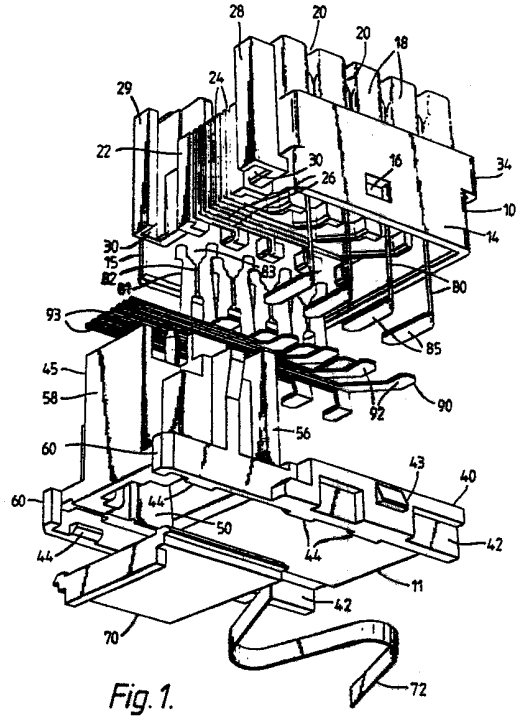

Fig. 1.

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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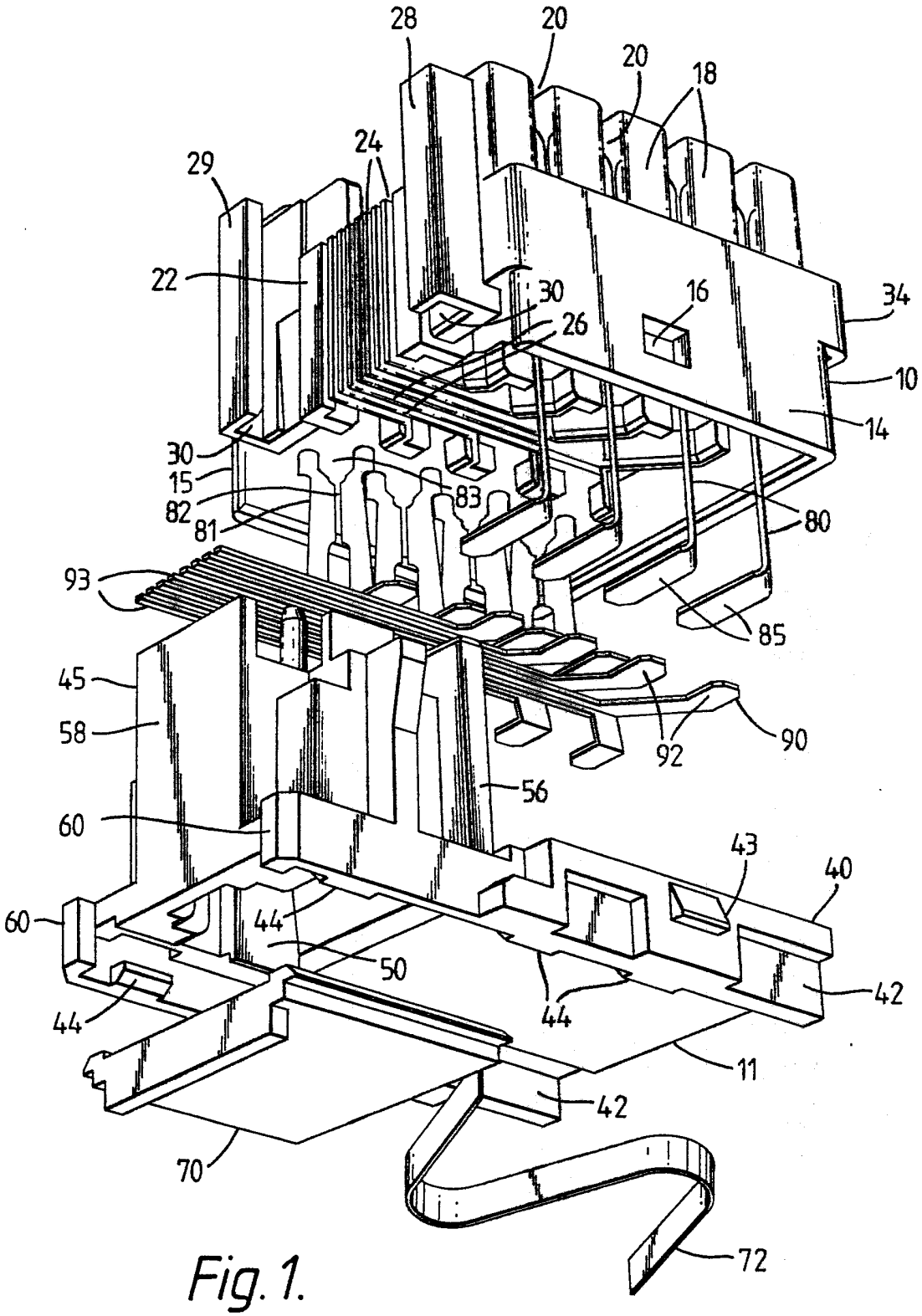
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11
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70
72

Fig. 1.

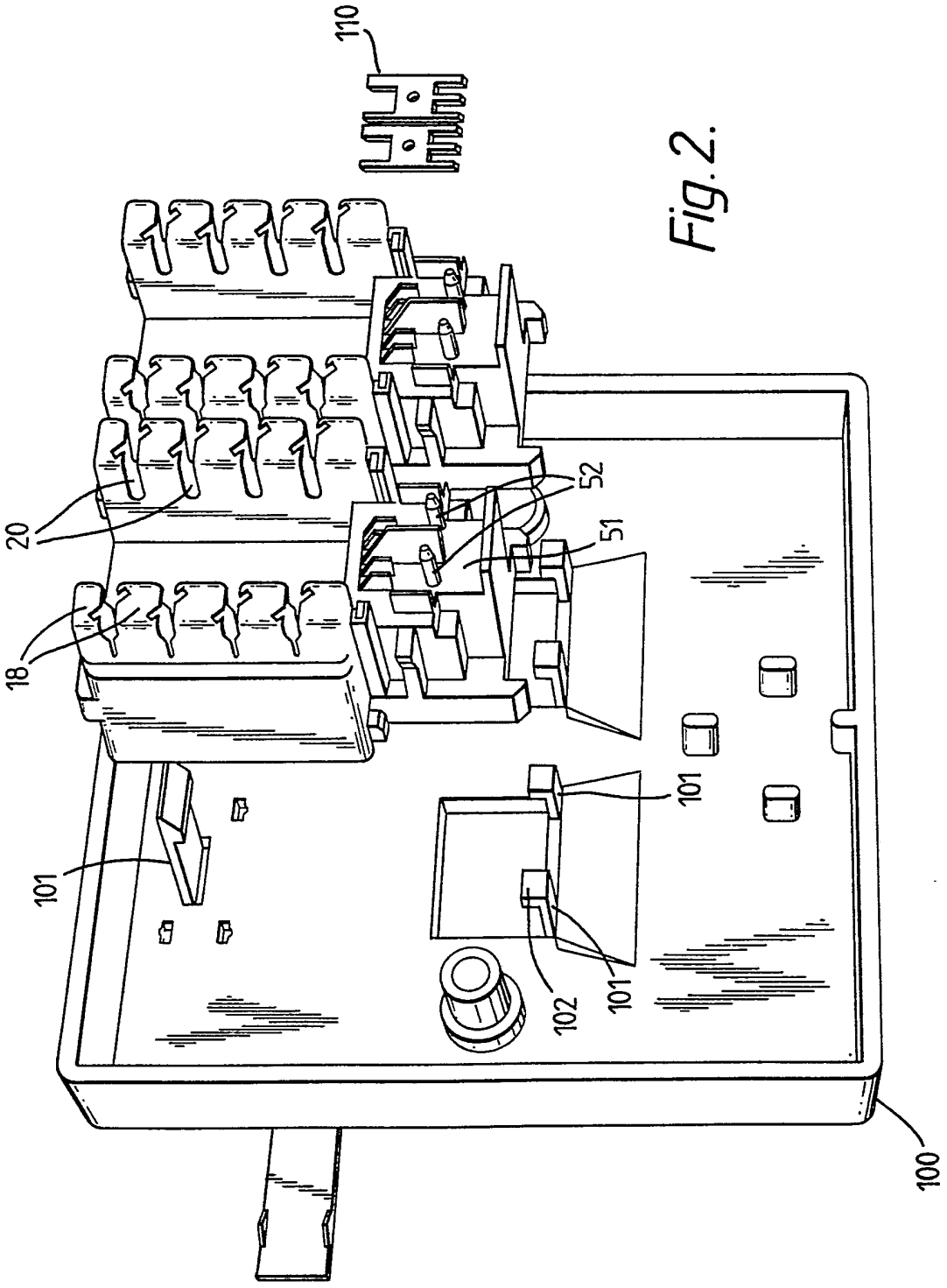


Fig. 2.

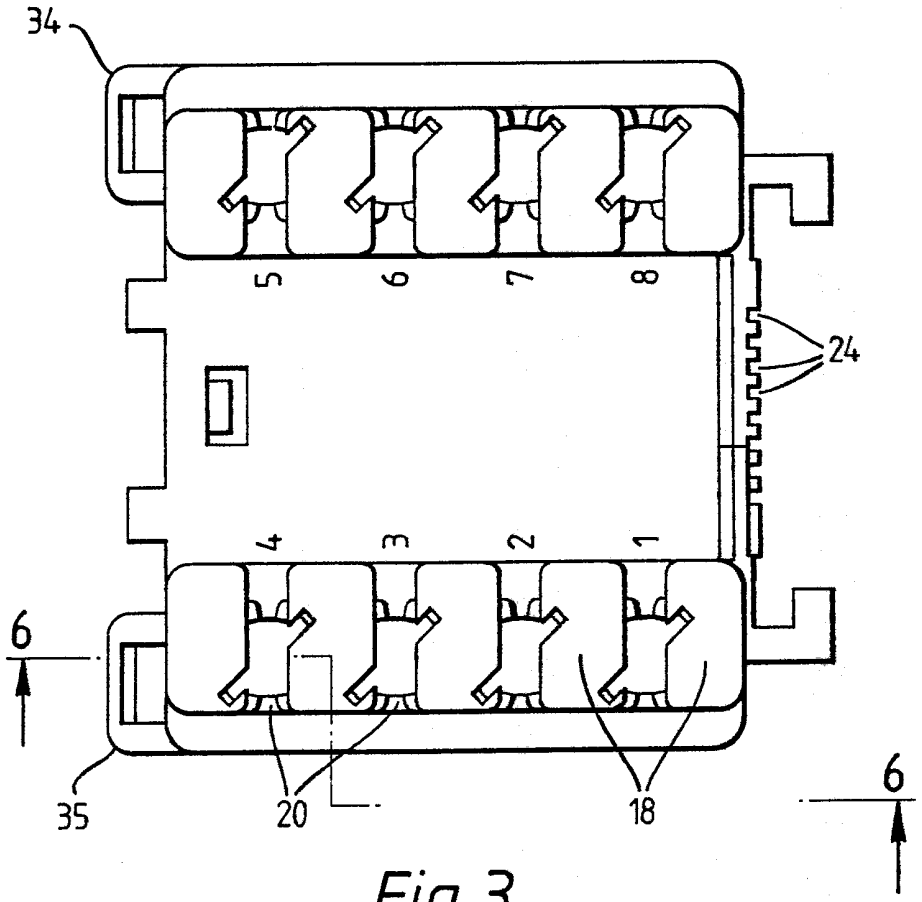


Fig.3.

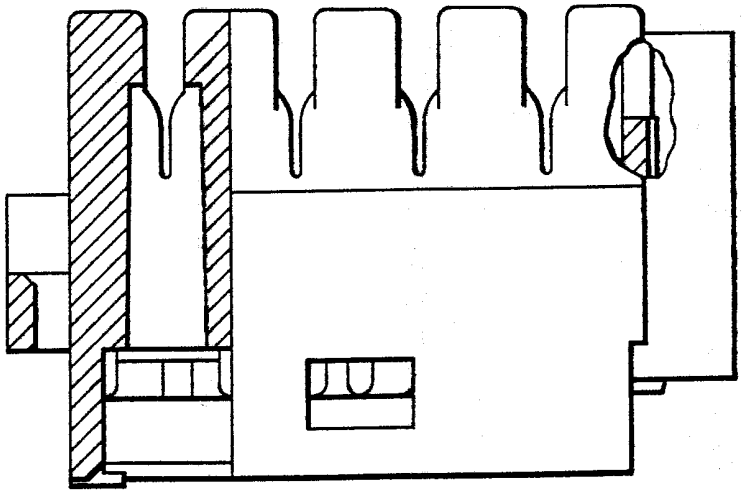


Fig.6.

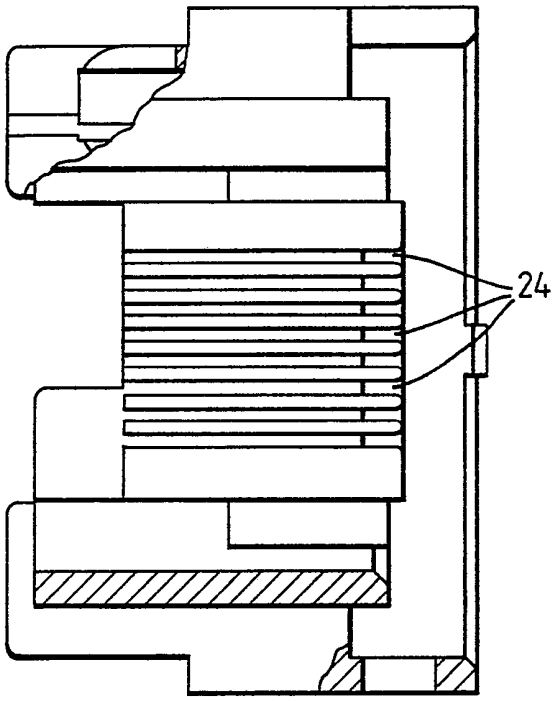


Fig. 4.

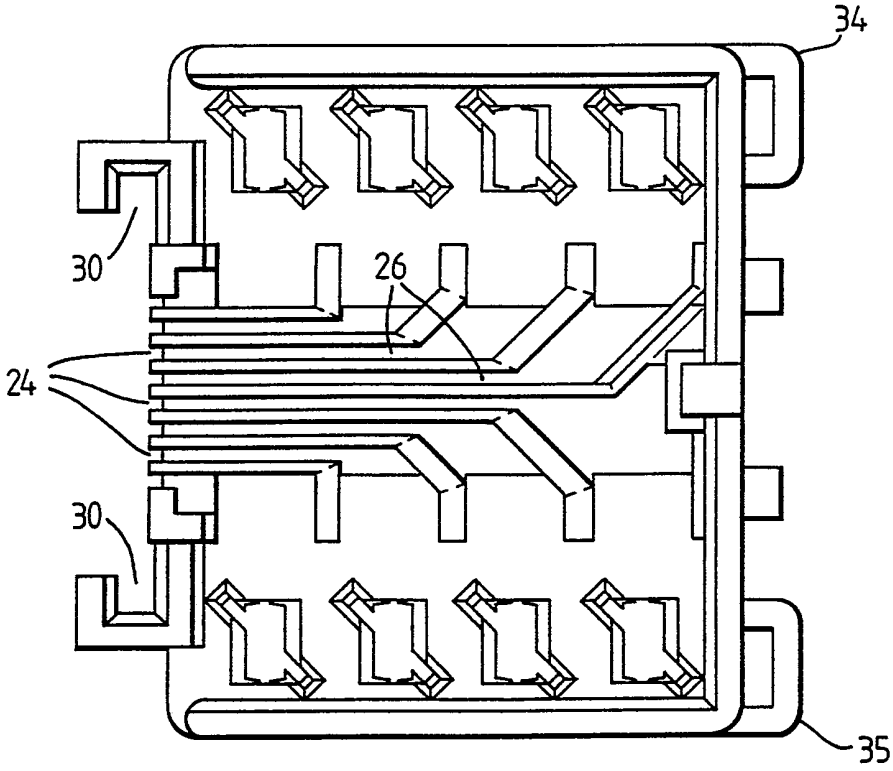


Fig. 5.

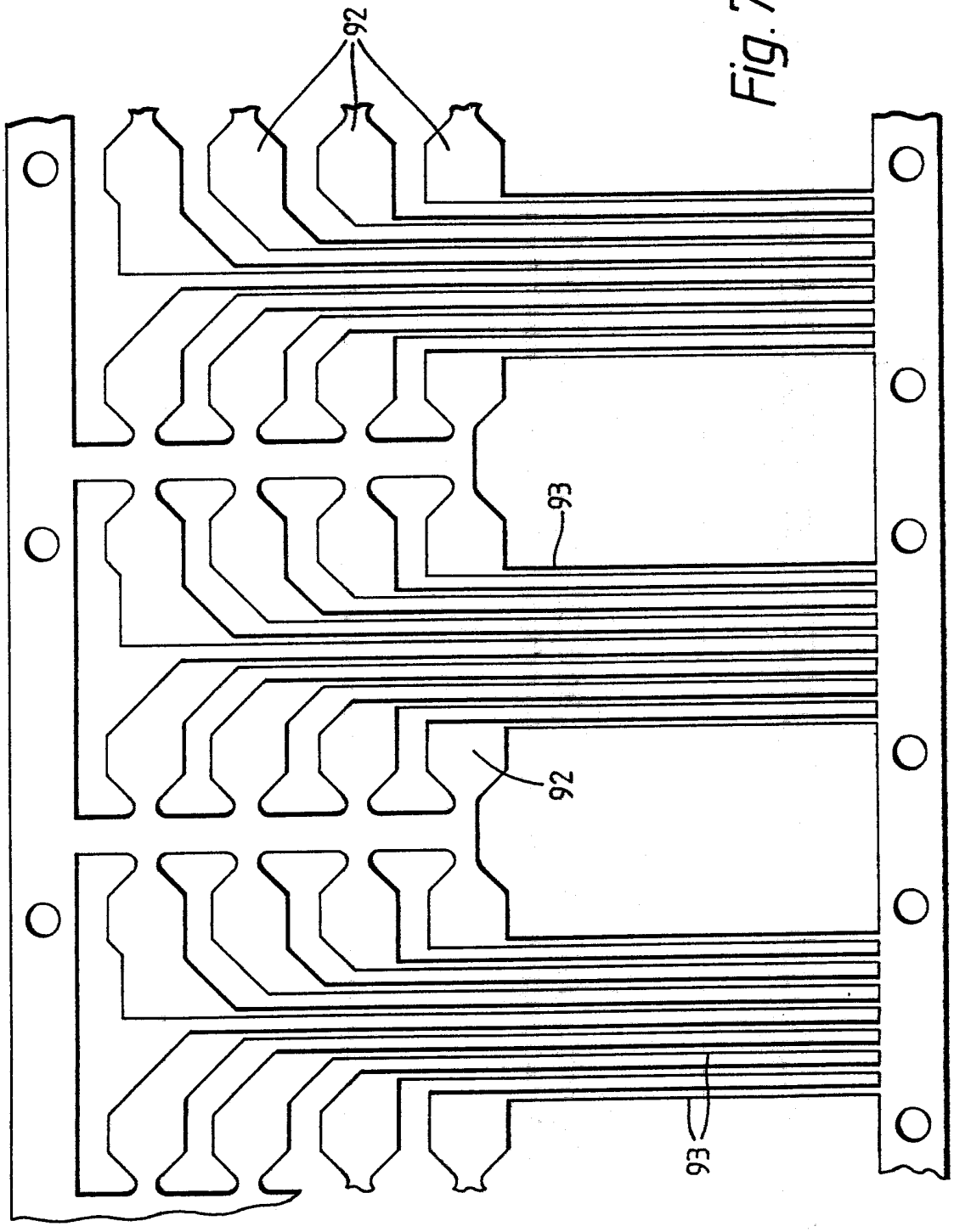


Fig. 7.

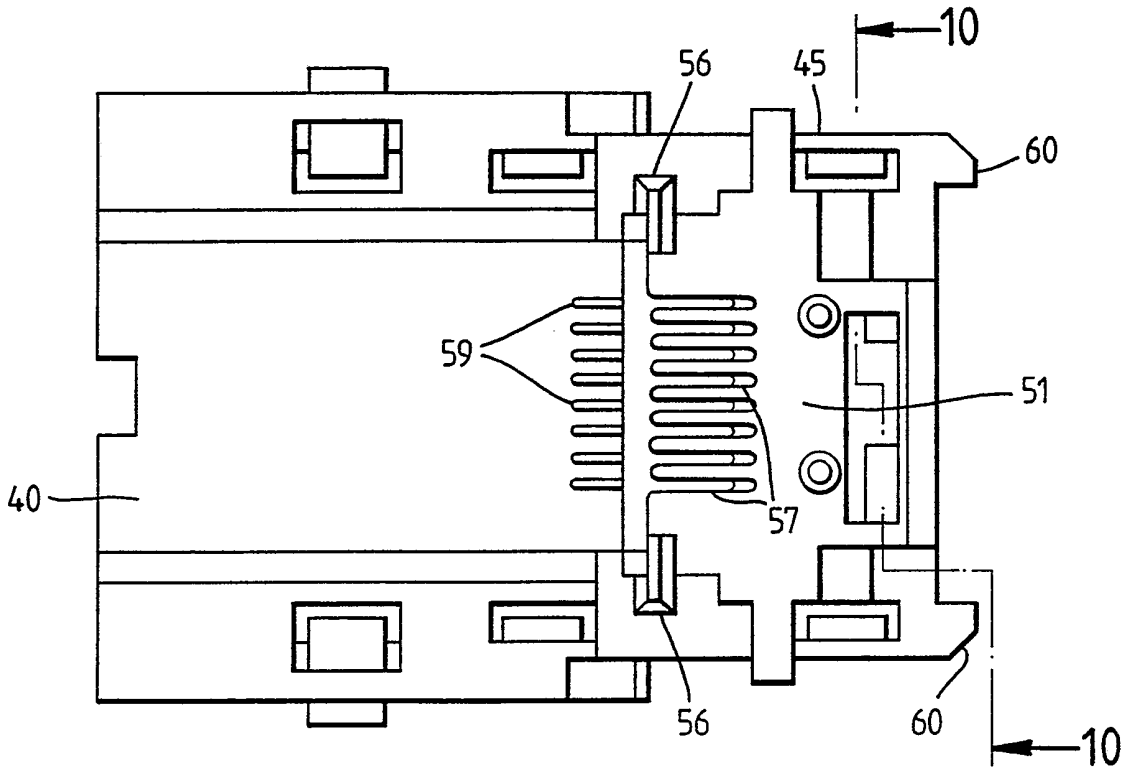


Fig. 8.

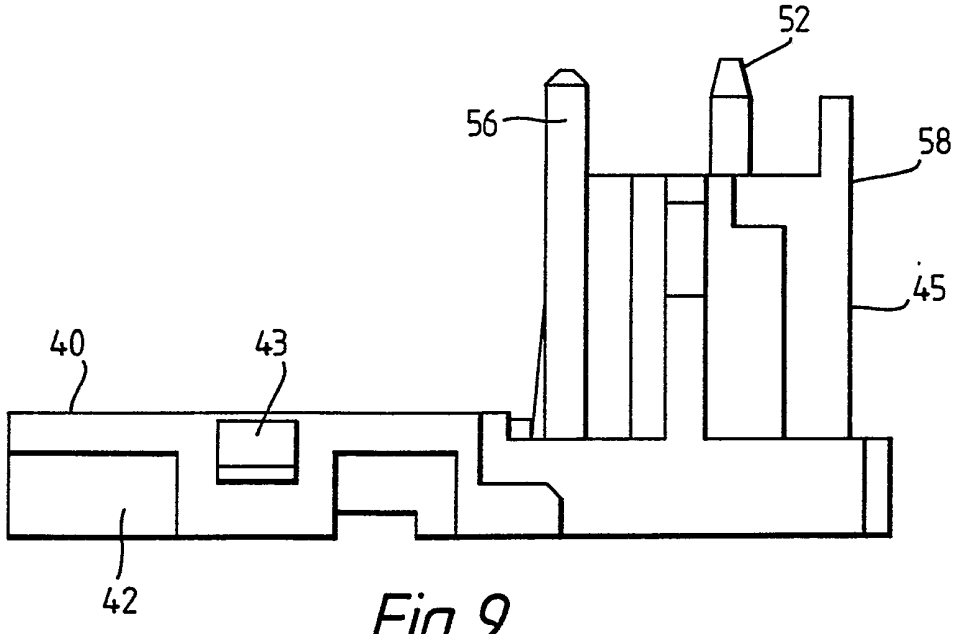


Fig. 9.

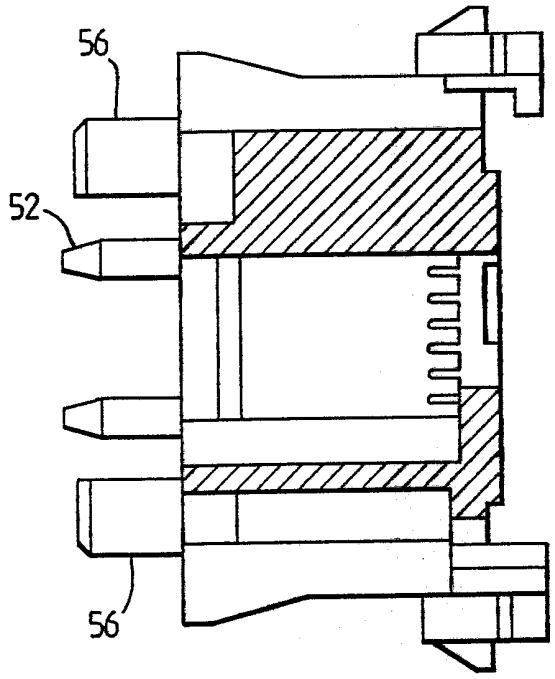


Fig.10.

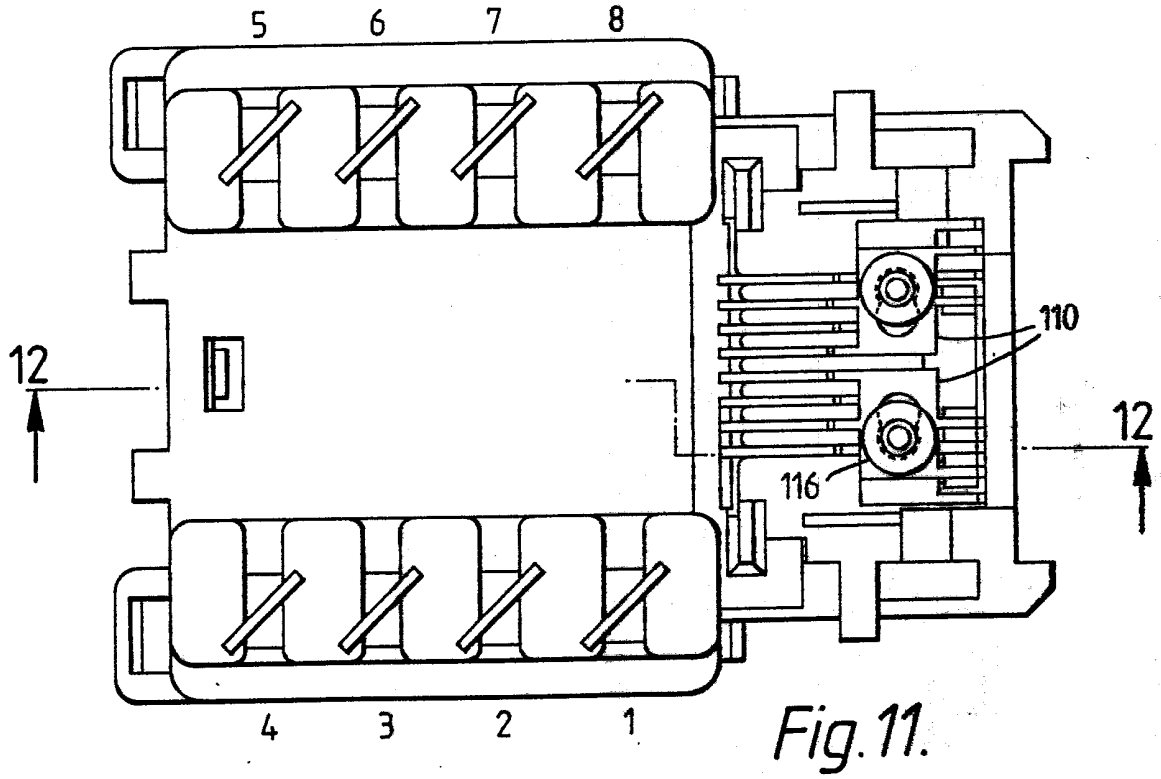


Fig.11.

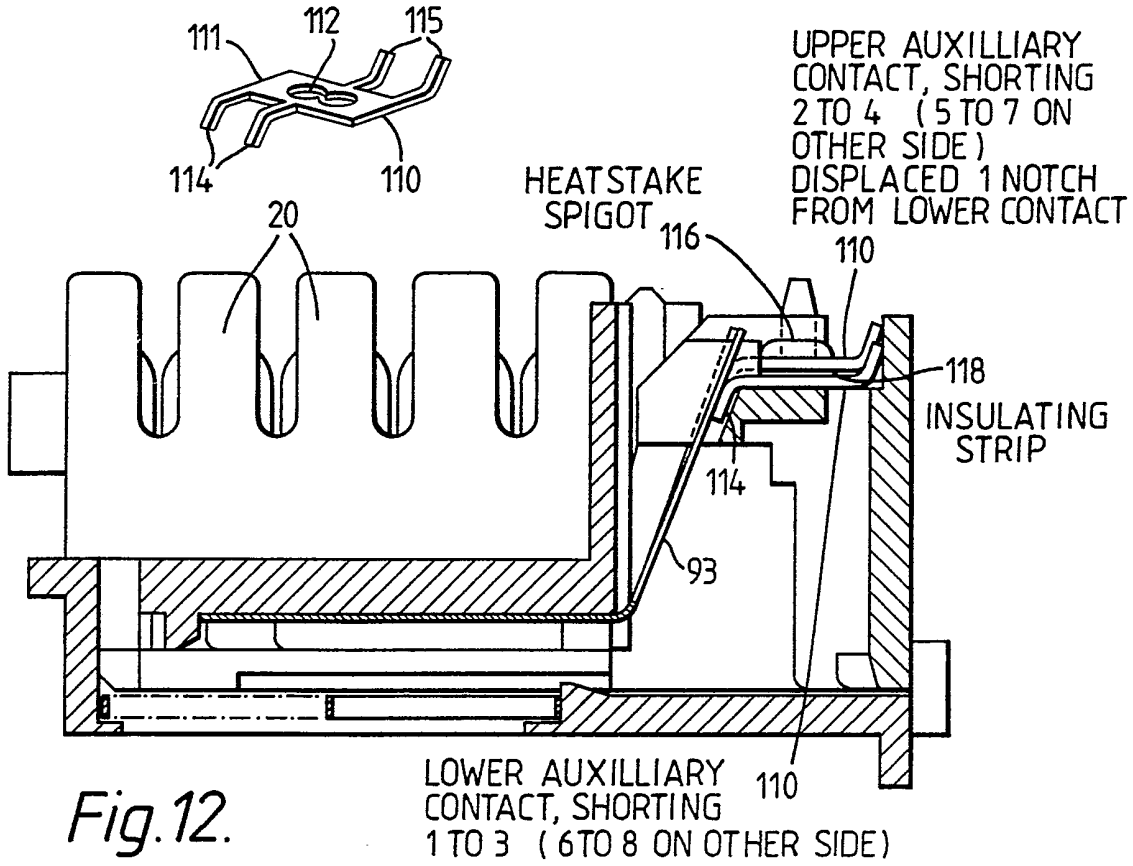

111
112
115
114
110
UPPER AUXILLIARY CONTACT, SHORTING 2 TO 4 (5 TO 7 ON OTHER SIDE) DISPLACED 1 NOTCH FROM LOWER CONTACT
HEATSTAKE SPIGOT
116
110
20
118
INSULATING STRIP
114
93
LOWER AUXILLIARY CONTACT, SHORTING 1 TO 3 (6TO 8 ON OTHER SIDE)
110

Fig.12.

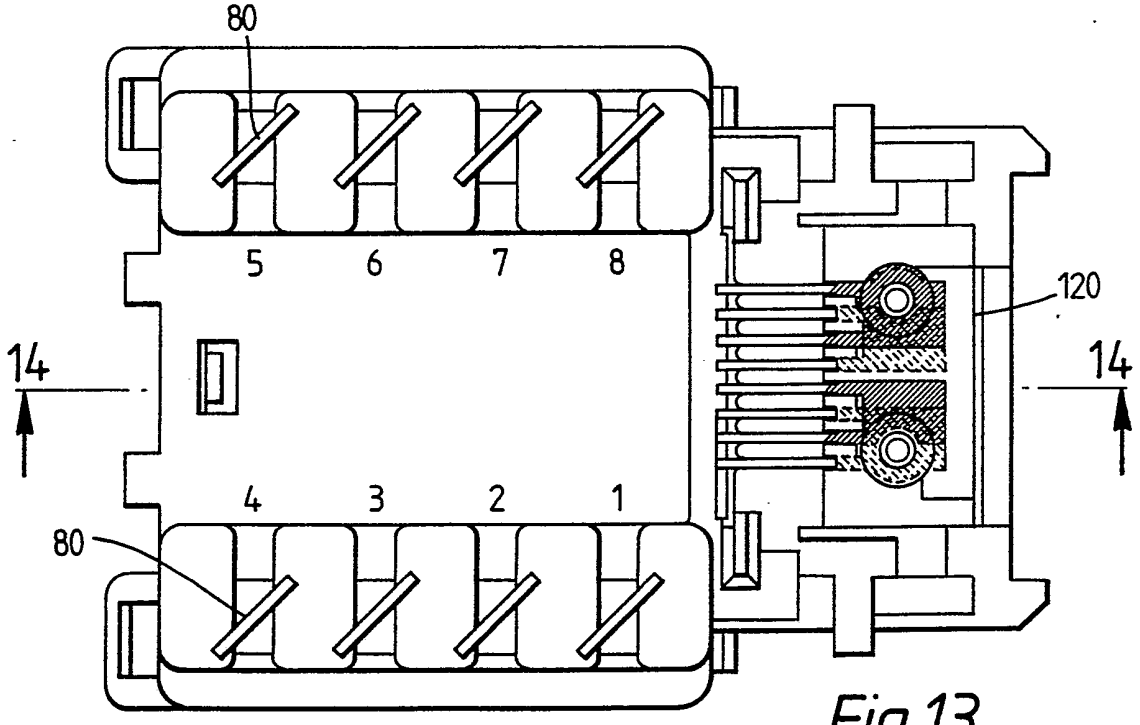

80
5
6
7
8
120
14
14
4
3
2
1
80

Fig.13.

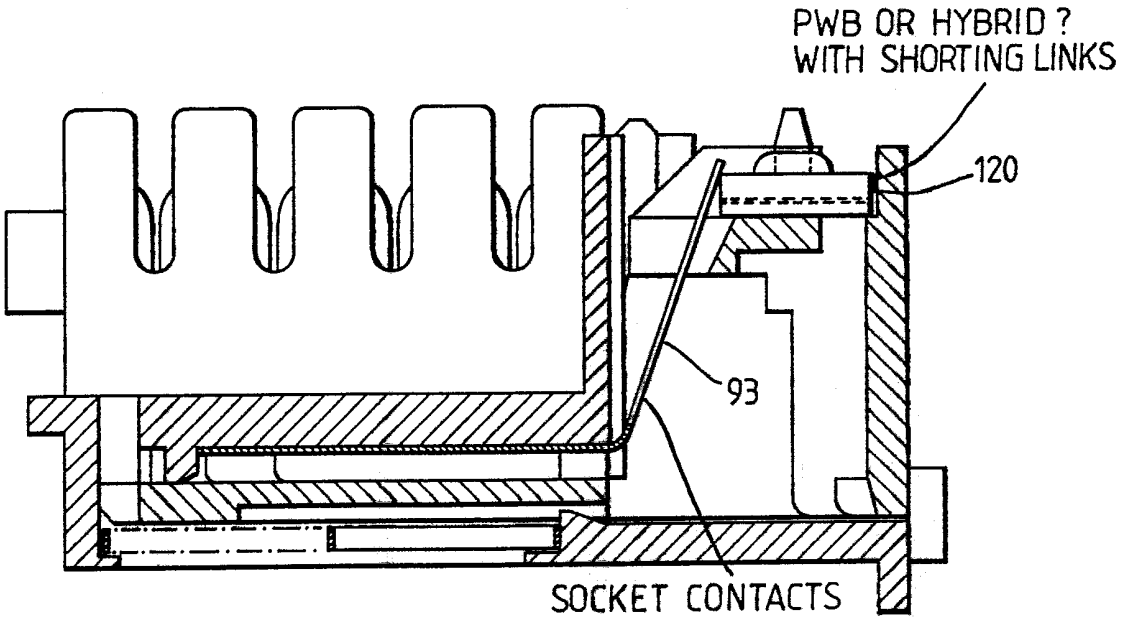

PWB OR HYBRID ?
WITH SHORTING LINKS
120
93
SOCKET CONTACTS

Fig.14.

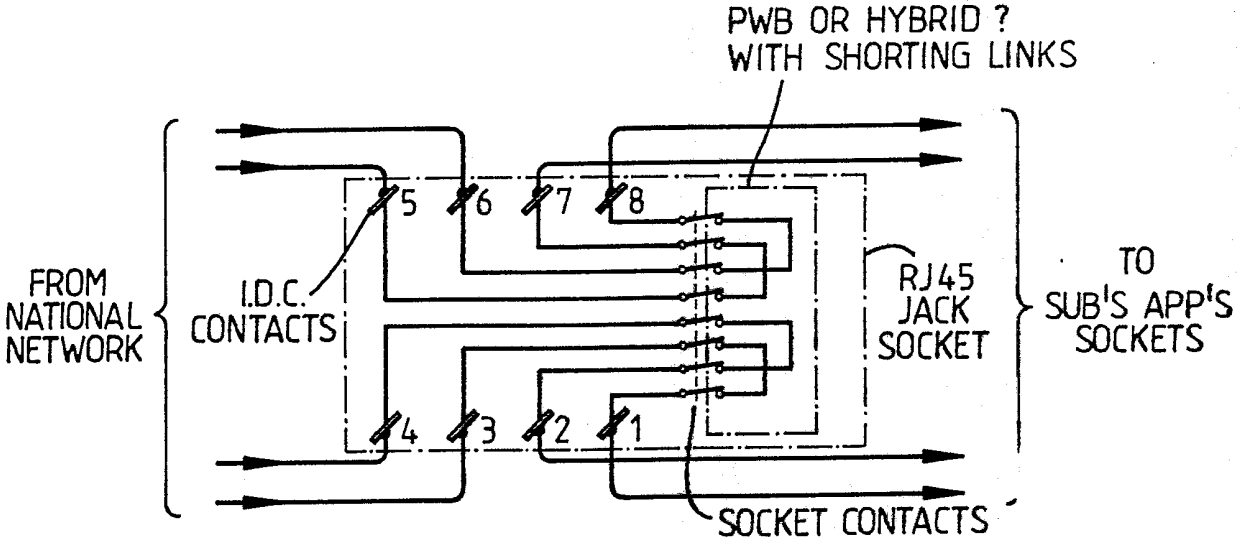
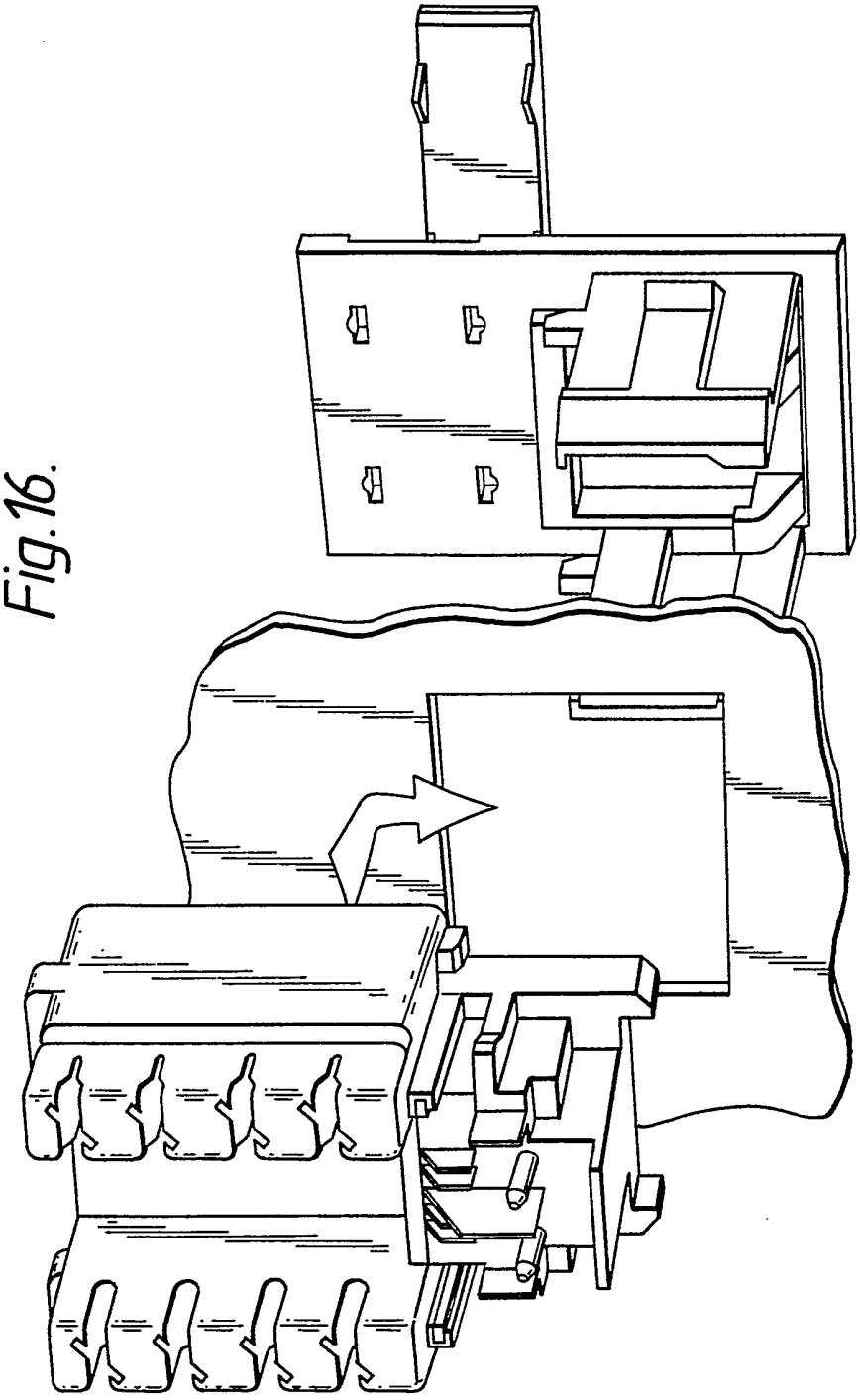

PWB OR HYBRID ?
WITH SHORTING LINKS
FROM
NATIONAL
NETWORK
I.D.C.
CONTACTS
5
6
7
8
4
3
2
1
RJ45
JACK
SOCKET
TO
SUB'S APP'S
SOCKETS
SOCKET CONTACTS

Fig.15.

Fig.16.



ELECTRICAL CONNECTORS

DESCRIPTION

This invention relates to a connection device for providing a connection between an electrical cable terminated by a plug and electrically insulated wires. It has application, for example, in telecommunications where a telephone instrument is connected by a lead with an appropriate plug to a jack provided in a wall panel. The jack requires connection to telephone wires on the opposite side of the wall panel.

Arrangements are known in which a jack is provided on a wall panel the jack being connected by way of a printed circuit board to terminal elements which can be connected to the telephone wires. Such arrangements are not easily assembled nor are they easily changed when faulty. The present invention is concerned with improved connection apparatus.

According to one aspect of the present invention there is provided a connector for connecting a plug to electrically insulated wires said connector comprising a moulded housing having a cavity or chamber for receiving said plug, a first set of connecting elements each arranged to receive an insulated wire and to make electrical contact with the core thereof, and a second set of connecting elements each of which are connected to the elements of the first set and which extend from the first set to said cavity to define contacts for electrical connection to contacts carried by the plug.

According to another aspect of the present invention there is provided a face plate or adaptor element for use with a connector of the type defined in said one aspect, said face plate or adaptor element being formed on its interior surface with a plurality of projecting elements which are so arranged and positioned that they can engage the housing of the connector such that the connector can be mounted to the face plate or adaptor element by a clip type connection.

The invention will be described now by way of example only with particular reference to the accompanying drawings:-

In the drawing Figure 1 is an exploded view of a connector in accordance with one embodiment of the present invention.

Figure 2, is a perspective view illustrating how the connector of the present invention can be secured to a face plate;

Figure 3, is a plan view of the first housing part of the connector;

Figure 4 is an end view of the housing part.

Figure 5, is an underneath plan view of the housing part.

Figure 6, is a section on the lines 6-6 of Figure 3;

Figure 7 is a plan view of a contact set used in the apparatus of Figure 1.

Figure 8 is a plan view of the second housing part;

Figure 9 is a side elevation of the second housing part;

Figure 10 is a section on the line 10-10 of Figure 8; and

Figure 11 is a plan view of a completed connector;

Figure 12 is a section of the line 12-12 of Figure 11;

Figure 13 is a plan view of a modified form of completed connector;

Figure 14 is a section on the line 14-14 of Figure 13;

Figure 15 shows electrical connections which can be provided by the arrangement of Figures 13 and 14, and

Figure 16 shows the mounting of a connector when used with a trunking or patch panel.

Referring to the drawings, a connector housing comprises a moulded upper body part (10) and a moulded lower body part (11). The upper body part (10) has opposite generally rectangular side walls (14), and (15) each with a through aperture (16). Projecting

upwardly from a position adjacent each side wall are two lines of pillar like structures (18). The pillar like structures (18) define clamping means between which are formed slots (20) which can, as will be described later, receive electrically conductive connecting elements (80). An end wall (22) of the upper body part (10) is formed with a series of parallel grooves (24). The grooves (24) communicate with similar grooves (26) which are formed in the lower wall of the upper body part (10). Each of the grooves (26) extends to a position adjacent the lower part of a slot (20) defined by the pillar like structures (18). The end wall (22) also has oppositely facing in moulded parts (28), (29) each of which defines a channel (30). At its opposite end the upper body part (10) is formed with integral hook elements (34), (35) which form clamping means for electrically conductive cables.

The lower body part (11) has a generally shallow first end portion (40) which has opposite side walls (42) the outer surface of which is formed with wedge shaped projections (43). On the inner surface of each side wall (42) there are formed inwardly directed flange portions (44). The opposite end portion (45) of the lower body part (11) has a moulded part which defines

a cavity (50) for receiving a plug such as that formed on the end of a cable extending from a telephone instrument or a terminal of the type used in computing equipment. The cavity (50) is closed by an end wall (51) from which project a pair of pins (52) Adjacent the first end portion (40) there are formed oppositely disposed upstanding columns (56). The end wall (51) of the lower body part (11) intermediate the columns (56) is formed with parallel slots (57). Small upright projections (59) are formed on the surface of first end portion (40). The spacing and lateral dimensions of the slots (57) and projections (59) are similar to those of the grooves (24). The lower body portion (11) has a planar wall (58) which projects upwardly a distance approximately corresponding to that of the columns (56). The other end of the wall (58) terminates against a projecting part (60) of each of the side walls (42). The lower body part (11) can receive a shutter (70) which locates between the opposite side walls (42) and is retained in position by the flanges (44). The shutter (70) can slide between positions in which it closes the entrance to the cavity (50) and a position in which that cavity (50) is open. A spring (72) is mounted against the shutter (70) to bias it towards the closed position.

A set of eight electrical connecting elements (80) extend into the slots (20) defined by the pillar like structures (18) on the upper body part (10). Each of these elements (80) has a cutting-clamping contact element (81) which is bifurcated and defines a relatively narrow contact slot (82) which opens into a wide mouth portion (83). The arrangement is such that when an electrically insulated wire is placed in the mouth portion (83) and forced downwardly into the narrow contact slot (82) the insulation on the wire is automatically cut so that contact is made between the central conductive core of the wire and the material of the connecting element (80). It will be seen that cutting-clamping contact elements (81) are generally planar and are disposed at substantially 45° to a line through the pillar like structures (18) i.e. 45° to the planar of each slot (20). This type of arrangement is described for example in U.K. Patent Specification No. 2013423. Each connecting element (80) also has a foot portion (85) which is formed integrally with the cutting-clamping contact elements (81).

A second set of connecting elements (90) are shown in the exploded view of Figure 1. This set includes a series of eight contact tongues (92) each of which, in

use is welded to a foot portion (85). An elongate contact strip (93) extends from each contact tongue (92). During assembly of the connector the ends of the conductive strips (93) are initially located in the grooves (26) and are bent slightly around the corner between the lower wall of the upper body part (10) and the end wall (22). As the two body parts (10) and (11) are brought together, the free ends of the conductive strips (93) are guided into and located in the slots (57) of the end wall (51) of the lower body part (11). The free ends of the conductive contact strips (93) are urged into the grooves (24) of the upper body part (10) in the event that a plug is inserted into the cavity (50). The free ends of the elongate conductive contact strips (93) are thus located in the cavity (50) in the completed structure and contact is established by way of these elongate conductive contact strips (93) with the connecting elements (80) which extend upwardly into the pillar like structures (18) of the upper body part (10). In the completed structure the lower body part (11) is retained in contact with the upper body part (10) by means of a snap-fit connection between the wedge shaped projections (43) and the apertures (16) of the upper body part (10).

As can be seen in Figure 2 the completed structure can be mounted on the interior of a wall mountable face plate (100) of conventional size. The interior surface of the face plate is formed with integrally moulded projecting elements (101). Each element (101) is formed with a lip (102) which can engage an exterior portion of the body parts (10, 11). The structure of the present apparatus enables it to be simply clipped into position using the projecting elements (101) formed of the interior surface of the face plate (100). Connection of telephone wiring or the like can be achieved easily by pushing the conductive wires into the contact slots (82) of the contact elements (81).

A feature of the present arrangement is that it provides an integral assembly for receiving a plug connected to a telephone instrument or the like and which also provides a connection facility to telecommunications wiring. It can be mounted on a face plate such as that shown in Figure 2 and is also suitable for fitting into trunking or patch panels by use of suitable adaptors. The connection to the adaptor can be similar to that described for the face plate of Figure 2, an example being shown in Figure 16. Appropriately shaped elements (110) such as those

shown in Figures 11 and 12 can be mounted on the pins (52) to short-out predetermined ones of the elongated conductive contact strips (93) of the connecting elements (80, 90) when the plug is not received in the socket (50).

As shown in Figures 11 and 12 each element (110) has a body (111) with an aperture (112) and two sets of projecting fingers (114, 115). The apertures (112) are so shaped as to allow the body (111) to be located over the pins (52) in one of two positions and secured in position by a heat-staked spigot (116). As shown in Figures 11 and 12 two elements (110) are located on each pin (52) with an insulating strip (118) between. When no plug is located in the cavity (50) the fingers (114) of the element (110) contact and provide a short circuit between selected ones of the contacts (93). This can be for testing purposes, when a plug is inserted into the cavity (50). The short circuits are removed since the contacts (93) are moved away from the fingers (114).

Figures 13 and 14 show an alternative arrangement in which a printed circuit board (120) is mounted on the pins (52). The printed circuit board can provide a short circuit between selected contacts or it can be

used to connect preselected resistances between the connecting elements (80, 90). One particular connection configuration is shown in Figure 15.

Another feature of the device is that it can be mounted the opposite way to that which is conventionally employed. This means that the conductive strips (93) within the cavity (50) will be uppermost and this assists in preventing dust or similar objects from gathering on the strips (93) and possibly shorting-out one or more connecting elements (80, 90). It also assists in preventing the shutter spring (72) from overcoming the retaining clip on the plug when it is in position.

The set of connecting elements (90) can be manufactured by a conventional stamping technique to form a series of sets as shown in Figure 7 of the drawings. To assemble the device as shown in, for example, Figure 1 the upper and lower body parts (10, 11) are located substantially as shown in that figure. The contact elements (81) are located in the appropriate position so that they extend up into the upper body part (10). The set of connecting elements (90) is then located so that its contact tongues (92) are against the foot portion (85) of the contact

elements (81). These elements (81) are then welded together. The lower body part (11) is then brought upwardly towards the upper body part (10). The columns (56) move into the channels (30) on the upper body part (10) and during this movement the end portion (45) of the lower body part (11) causes the elongate conductive contact strips (93) to be bent around the junction of the lower face and end face of the upper body part (10) so that they are urged into the slots (57). It will thus be seen that this is a particularly simple technique for assembling a connector of the present type.

CLAIMS:

1. A connector for connecting a plug to electrically insulated wires said connector comprising a moulded housing having a cavity or chamber for receiving said plug, a first set of connecting elements each arranged to receive an insulated wire and to make electrical contact with the core thereof, and a second set of connecting elements each of which are connected to the elements of the first set and which extend from the first set to said cavity to define contacts for electrical connection to contacts carried by the plug.

2. A connector as claimed in claim 1 wherein the elements of the second set each have two portions, a first portion extending from the elements of the first set and a second portion extending into said cavity, said second portion extending substantially at right angles to the first portion.

3. A connector as claimed in claim 2 wherein the housing has two parts which are secured together, the elements of the second set having been bent into said upper and lower parts during assembly of said housing.

4. A connector as claimed in any preceeding claim wherein each element of the first set is made from generally planar material and has a central slot which has a contact slot for receiving the conductive core of an insulated wire, and an opening which is wider than said contact slot, the contact slot having walls with sharp edges and a width less than the core diameter so that when a wire is pushed into the slot the insulating material is cut and contact made between the core and the connecting element.

5. A connector as claimed in cliam 4 wherein the body defines a plurality of clamping elements each associated with a connecting element of the first set, each clamping element having a slot for receiving an insulated wire so that the wire is clamped in the slot, and wherein each element of the first set is mounted in the slot of its associated clamping element

such that the plane of the contact extends at substantially 45 degrees to that of the slot.

6. A connector as claimed in any preceeding claims wherein the elements of first set are welded to those of the second set.

7. A connector as claimed in any preceeding claim wherein the cavity is provided with a shutter for closing the cavity in the absence of a plug.

8. A connector as claimed in the preceeding claim wherein the body is formed with clamping means for clamping a cable of which the insulated wires form a part.

9. A connector as claimed in any preceeding claim including means for providing a short circuit connection or a connection having a selected impedance between selected ones of said second set of connecting elements.

10. A connector as claimed in any one of claims 3 to 9 wherein the two body parts are secured by a snap fit connection.

11. A connector as claimed in any one of claims 3 to 10 wherein the connecting elements of the second set extend along elongate channels formed in one of the body parts.

12. A connector as claimed in any preceeding claim wherein the body is formed with means enabling the connector to be attached to a wall mountable face plate.

13. A face plate or adaptor element for use with a connector of the type defined in claim 1, said face plate or adaptor element being formed on its interior surface with a plurality of projecting elements which are so arranged and positioned that they can engage the housing of the connector such that the connector can be mounted to the face plate or adaptor element by a clip type connection.

14. A face plate or adaptor element as claimed in claim 13, wherein the projecting elements are moulded integrally with the material of the face plate.

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