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(54) Power connector

(57) A power connector and a method for mounting the same comprising at least one connector means (7; 61) directly connected to a screening means (5;77) and at least one connector means (9;63,65,67) being connectable to the screening means (5;77), each via an individual component (14;69,71,73).

According to this invention each component (14; 69,71,73) is attached around and electrically connected to its individual connector means (9;63,65,67) and the screening means (5;77) is attached around each component (14;69,71,73) and around the at least one connector means (7;61) directly connected to the screening means (5;77), and makes contact between them when the connector is mounted.

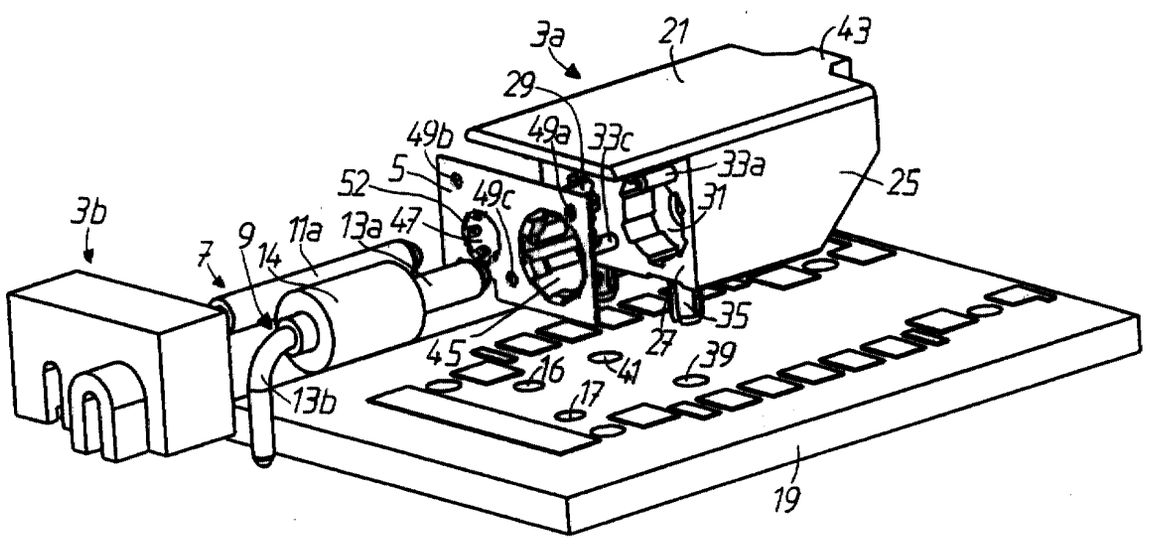

Fig.1

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Description

TECHNICAL FIELD

[0001] The present invention relates to a method for mounting a power connector comprising at least one connector means directly connected to a screening means and at least one connector means being connectable to the screening means, via an individual component.

RELATED ART

[0002] Power connectors are used in electronic circuits. In one type of power connectors commonly used a filtering means is soldered both to one connector means and to a screening means. The filtering means, the screening means and the connector means are all arranged in a housing. US 3,840,841 discloses such types of filtered connectors.

[0003] Until now, the mounting and assembling of power connectors needed a very long time. In fact, the filtering means had to be soldered to the screening means and the connector means had to be mounted into the housing and then into the screening means. After that, the connector means had to be soldered to the screening means and connected by a wire to the filtering means, the first end of the wire being soldered to the filtering means and the other end being soldered to the connector means. To carry out such a process four production tools are needed.

SUMMARY

[0004] Soldering after mounting is difficult and time consuming. In the same way assembling and mounting of a connector comprising a great number of parts is also difficult and time consuming. The production of such power connectors is thus expensive.

[0005] The object of the present invention is to make an easy built power connector.

[0006] This object has been achieved by a method of the initially defined kind, characterised by the following steps:

- attaching each component to its individual connector means;
- attaching the screening means to a first housing;
- penetrating the connector means and thus each component through the screening means and the first housing;
- attaching a second housing to the first housing and hence enclosing the screening means, the connector means and each component in the assembled first and second housing.

[0007] This method provides a quick and easy and thus non-expensive way of mounting a power connector. In particular, any soldering of the filtering means to the connector means and to the screening means before or after the mounting is hence eliminated.

[0008] Suitably each component is a filter. Filters are used for getting rid of ripples.

[0009] Preferably the contact between the screening means and each component and the connector means directly connected to the screening means is provided with contact members, such as conducting tongues. Thus no further soldering is needed.

[0010] In order to decrease the number of mounting steps to provide an easier mounting method, the power connector could comprise:

- a first housing to support the connector means and to which the screening means is mountable;
- a second housing to be mounted on the first housing in order to shield the connector means when they have been mounted at the screening means after that the screening means has been mounted to the first housing.

[0011] This makes the power connector easy to assemble.

[0012] The screening means is suitably a plate having openings adapted to the different sizes of the connector means directly connected to the screening means and each component, respectively, each opening being provided with contact members to make contact after insertion of the connector means directly connected to the screening means and each component through the openings.

[0013] Preferably the contact members are conducting tongues, resilient towards the centre of the openings in the screening means. Then contact is made automatically when the component and the connector means are inserted into the openings.

[0014] At least two mounting pins can be provided on the first housing onto which pins the screening means and the second housing are mountable when the connector is put together. This also contributes to a quick and easy way of mounting the power connector.

[0015] The first housing can be provided with a cap for a robot to grab when the connector is automatically mounted.

[0016] Suitably the connector means are provided with a bent, which divides the connector means into two parts, a first part and a second part, the second part being adapted to be inserted into receiving means in a circuit board when the connector is mounted on the circuit board. This makes the power connector easy to mount on a circuit board.

[0017] The bent is preferably 90°.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

Fig. 1 and Fig. 2 show, from different directions, each an exploded, perspective view of the same first embodiment of a power connector which can be easily mounted according to the invention; and

Fig. 3 shows a perspective view of the same power connector as in fig. 1 and 2 in assembled position mounted on a circuit board.

Fig. 4 shows a perspective view of a second embodiment of a power connector which can be mounted according to the invention.

DETAILED DESCRIPTION OF EMBODIMENTS

[0019] Fig. 1 and fig. 2 show the same first embodiment of a power connector 1, which is, according to the invention, easy to mount, exploded from two different directions. Fig. 3 shows the same embodiment once assembled. The parts of the connector are thus exactly the same. However, some of the parts are only numbered in one of the figures. The connector 1 comprises a unit 3, which is composed of a first housing 3a and a second housing 3b, a screening means 5, here called a screen, a first connector means 7, below called a pin and a second connector means 9, below called a component pin 9.

[0020] The pin 7 is in this embodiment cylindrical and provided with a 90° bent, which divides the pin 7 into a first part 1 la and a second part 11b, the second part 11b having a smaller diameter than the first part 11a. The angle between the two parts 11a, 11b could however be varied. The component pin 9 is like the pin 7 in this embodiment cylindrical and provided with a 90° bent resulting in a first part 13a and a second part 13b, the second part 13b having a smaller diameter than the first part 13a.

[0021] Even this angle between the two parts 13a, 13b could be varied. The component pin 9 is also provided with a component, such as a filter, for example comprising an AC discharge capacitor or the like. In this embodiment the component is a cylindrical filter 14, which can be soldered around a part of the first part 13a of the component pin 9. This makes the diameter of the component pin 9 partly bigger than the diameter of the pin 7. The two second parts 11b and 13b are adapted to be inserted into holes 16 and 17, respectively, in a circuit board 19 when the connector is mounted on the circuit board 19. Of course the two pins 7,9 can change places in the figure.

[0022] The first housing 3a is a cover comprising a roof 21, two long side walls 23,25 and one short side wall 27. Thus the first housing 3a has one open short side. The first housing 3a is made of an insulating material. The short side wall 27 is adapted to receive the pin 7 and the filter 14 on the component pin 9 through two openings 29 and 31, respectively, placed beside each other. The diameters of the openings 29, 31 are seized after the pins 7 and 9, respectively, and therefor the right one 29 in Fig. 1, which is adapted to receive the component pin 9 with its filter 14, has a larger diameter than the left one. The short side wall 27 is in this embodiment provided with three mounting pins, of which only two 33a, 33c can be seen in fig. 1. The mounting pins 33a, 33c are pointing out towards the second housing 3b from the first housing 3a. They are placed one (only 33a can be seen) in each comer near to the roof 21 of the short side wall 27 and one 33c on the opposite side of the short side wall 27 between the two openings 29,31. The number of mounting pins could of course be varied.

[0023] The short side wall 27 is also provided with, in this embodiment, two circuit board mounting pins 35,37. They are placed on the side opposite to the roof 21 and they are adapted to be put into two holes 39 and 41, respectively, in the circuit board 19 when the connector is mounted on the circuit board 19. The two long side walls 23,25 are in this embodiment bevelled on the side not attached to the short side wall 27. The roof 21 is provided with a small cap 43 for a robot to grab when the connector is mounted automatically. It is arranged on the opposite side in relation to the short side wall 27. The roof 21 is attached to the short side wall 27 such that the roof 21 is projecting a distance equal to the width of the second housing 3b. The second housing 3b should be inserted under this projecting part of the roof 21 when the connector 1 is mounted, as apparent from Fig.3.

[0024] The screen 5 is adapted to be placed between the two housing parts 3a,3b and it should also be penetrated by the two pins 7,9. It is thus provided with two openings 45,47 of the same sizes and positions as the openings 29 and 31, respectively, in the short side wall 27. Furthermore the screen 5 is provided with three smaller mounting holes 49a,49b,49c, which are adapted to be mounted on the three mounting pins 33a,33c,the one not seen, respectively, sitting on the short side wall 27. The openings 45,47 are provided with contact members 51,52, such as resilient tongues. They are as the rest of the screen 5 made of a conducting material. They are pointing out from the openings 45,47 in the mounting direction, which is to the right in the figure. The contact members 51,52 are resilient against the centre of the openings 45,47 in order to ensure contact to the pins 7,9, which are penetrating in mounted position. The openings 29,31 in the short side wall 27 are formed to receive these contact members 51,52 as well as the pins 7,9.

[0025] When the connector 1 is mounted, the screen 5 is first placed just in front of the short side wall 27 of the first housing 3a. The mounting pins 33a,33c and the one not seen are thus penetrating the mounting holes

49a,49b,49c. Then the first parts 11a, 13a of the pins 7,9 are put into the openings 29,45 and 31,47 respectively.

[0026] To close the unit 3 the second housing 3b is connected to the first housing 3a by the mounting pins 33a,33c and the one not seen, which snap in to three small mounting holes 53a,53b,53c, respectively, in the second housing 3b. Two holes 55,57 for giving room for the pins 7 and 9, respectively, are also provided in the second housing 3b. The holes 55,57 have got the same diameter as the openings 45 and 47, respectively, but they have an opening 59 and 61, respectively, for the second parts 11b,13b of the pins 7,9.

[0027] Fig. 3 shows the power connector 1 in mounted position and also mounted on the circuit board 19 once the method according to the invention implemented.

[0028] Fig. 4 shows a perspective view of a second embodiment of the power connector according to the invention. The only difference from the first embodiment is that instead of two connector means there are four connector means 61,63,65,67 provided. They are called a first pin 61, a second pin 63, a third pin 65 and a fourth pin 67. For example the different pins could be used for different direct currents. Other numbers of connector means are also possible. The connector means 61,63,65,67 are as in the first embodiment provided with a 90° bent, which could be varied.

[0029] In this shown embodiment three of the connector means, the second, the third and the fourth pins 63,65,67, are each provided with a component 69,71,73 soldered around the pins 63,65,67. The components are, in this embodiment, filters provided for getting rid of ripples. The power connector comprises a first housing 74, a second housing 75 and a screening means 77 as in the first embodiment. The difference from the first embodiment is that both the housings 74,75 and the screening means 77 are adapted to receive four pins instead of two. Accordingly there are four openings, one smaller than the rest adapted to receive the first pin 61, in both the first and second housings 74,75 and the screen 77. The openings in the screen 77 are as in the first embodiment provided with contact members, such as tongues resilient towards the centre of the openings, for making contact to the first pin 61 and to the components 69,71,73.

[0030] As in the first embodiment the first housing 74 is provided with mounting pins (not visible in Fig. 4) adapted to be received in mounting holes in the screen 77 and the second housing 75. The first housing 74 is also provided with circuit board mounting pins as in the first embodiment.

[0031] This new process is easy to implement even for very small versions. In addition, thanks to this new method, the process-time can be decreased by at least a factor 8. Any handling during the process is less sensitive than with the existing process. Also only one application tool is needed instead of four while the whole connector comprises only five parts instead of seven. Lastly, a very significant improvement is provided with regard to the control of the true position in the process.

[0032] Although the invention is described with respect to two embodiments it should be understood that modifications could be made without departing from the scope thereof as expressed in the attached claims. Accordingly, the invention should not be considered to be limited to the described embodiments, but defined only by the following claims, which are intended to embrace all equivalents thereof.

Claims

1. A method for mounting a power connector comprising at least one connector means (7;61) directly connected to a screening means (5;77) and at least one connector means (9;63,65,67) being connectable to the screening means (5;77), via an individual component (14;69,71,73), **characterised by** the following steps:

   - attaching each component (14;69,71,73) to its individual connector means (9;63,65,67);
   - attaching the screening means (5;77) to a first housing (3a;73);
   - penetrating the connector means (7,9; 61,63,65,67) and thus each component (14; 69,71,73) through the screening means (5;77) and the first housing (3a;73);
   - attaching a second housing (3b;75) to the first housing (3a;73) and hence enclosing the screening means (5;77), the connector means (7,9;61,63,65,67) and each component (14; 69,71,73) in the assembled first and second housing.

2. A method according to claim 1, **characterised by** contacting the screening means (5;77) to each component (14;69,71,73) and the connector means (7;61) directly connected to the screening means (5;77) with contact members (51,52), such as conducting tongues.

3. A method according to any one of the claims 1 or 2, **characterised in that** the attaching of the second housing (3b;75) to the first housing (3a;73) is performed by providing at least two mounting pins (33a,33c) on the first housing (3a;73), onto which pins (33a,33c) the screening means (5;77) and the second housing (3b;75) are mountable when the connector is assembled.

4. A method according to any one of the claims 1-3, **characterised by** providing a cap (43) for a robot to grab when the connector is automatically mounted on a circuit board (19).

5. A method according to any one of the claims 1-4, **characterised by** providing a bent to the connector means (7,9;61,63,65,67), the bent dividing the connector means (7,9;61,63,65,67) into two parts, a first part (1 la,13a) and a second part (11b,13b), the second part (11b,13b) being adapted to be inserted into holes (16,17) in a circuit board (19) when the connector is mounted on the circuit board (19).

6. A power connector adapted to be mounted using the method according to any one of the claims 1-5, **characterised in that** the contact between the screening means (5;77) and each component (14; 69,71,73) and the connector means (7;61) directly connected to the screening means (5;77) is provided with contact members (51,52), such as conducting tongues.

7. A power connector according to claim 6, **characterised by**

- a first housing (3a;73) to support the connector means (7,9;61,63,65,67) and to which the screening means (5;77) is mountable;
- a second housing (3b;75) to be mounted on the first housing (3a;73) in order to shield the connector means (7,9;61,63,65,67) when they have been mounted at the screening means (5; 77) after that the screening means (5;77) has been mounted to the first housing (3a;73).

8. A power connector according to claim 7, **characterised in that** the screening means (5;77) is a plate having openings (45,47) adapted to the sizes of the connector means (7;61) directly connected to the screening means (5;77) and each component (14; 69,71,73), respectively, each opening (45,47) being provided with contact members (51,52) to make contact after insertion of the connector means (7; 61) directly connected to the screening means (5; 77) and each component (14,69,71,73) through the openings (45,47).

9. A power connector according to claim 8, **characterised in that** the contact members (51,52) are conducting tongues, resilient towards the centre of the openings (45,47) in the screening means (5;77).

10. A power connector according to claim 9, **characterised by** at least two mounting pins (33a,33c), provided on the first housing (3a;73) onto which pins (33a,33c) the screening means (5;77) and the second housing (3b;75) are mountable when the connector is put together.

11. A power connector according to claim 10, **characterised in that** the first housing (3a;73) is provided with a cap (43) for a robot to grab when the connector is automatically mounted.

12. A power connector according to claim 11, **characterised in that** the connector means (7,9; 61,63,65,67) are provided with a bent, which divides the connector means (7,9;61,63,65,67) into two parts, a first part (11a,13a) and a second part (11b,13b), the second part (11b,13b) being adapted to be inserted into receiving means (16,17) in a circuit board (19) when the connector is mounted on the circuit board (19).

13. A power connector according to claim 12, **characterised in that** the bent is 90°.

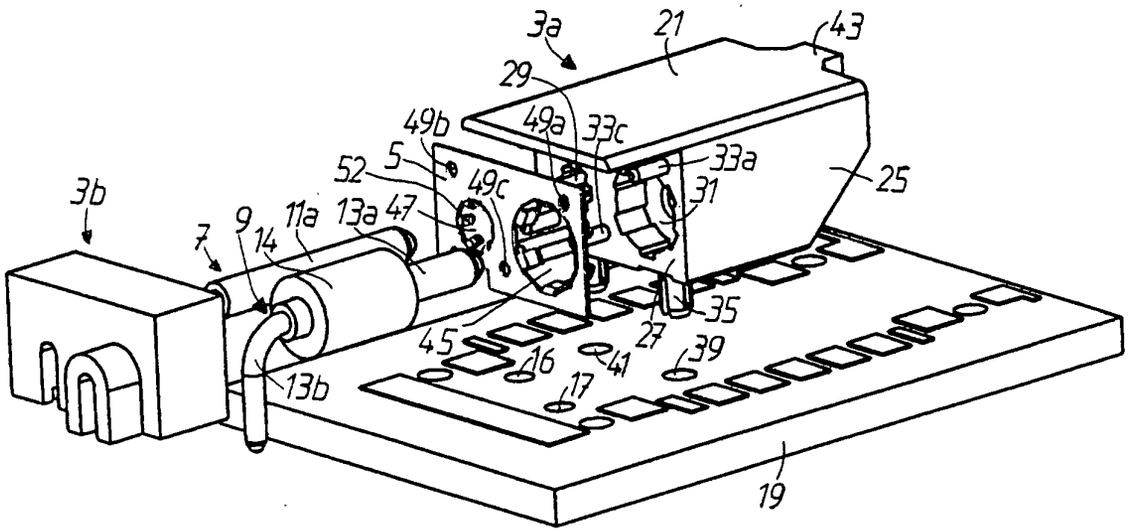
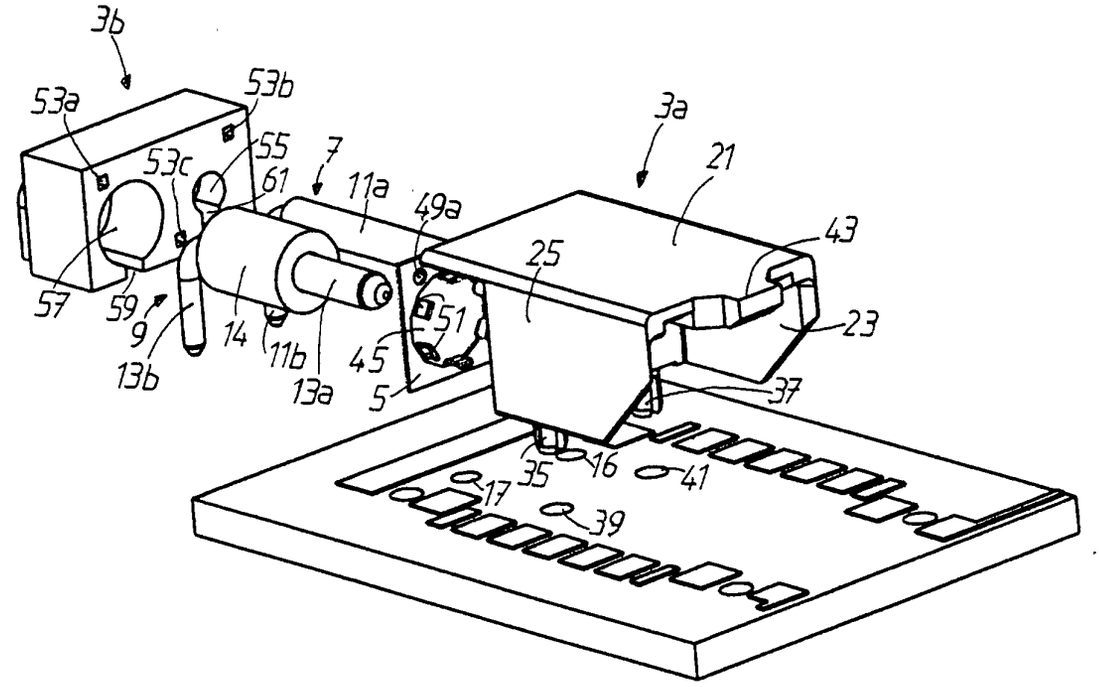

3a
21
43
29
49b
49a
33c
5
52
49c
33a
25
3b
9
11a
13a
47
31
7
14
45
16
41
27
39
35
17
13b
19

Fig. 1


3b
53a
53b
3a
21
55
7
53c
61
11a
49a
43
25
57
59
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11b
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23
45
13b
13a
5
37
35
16
41
17
39

Fig. 2

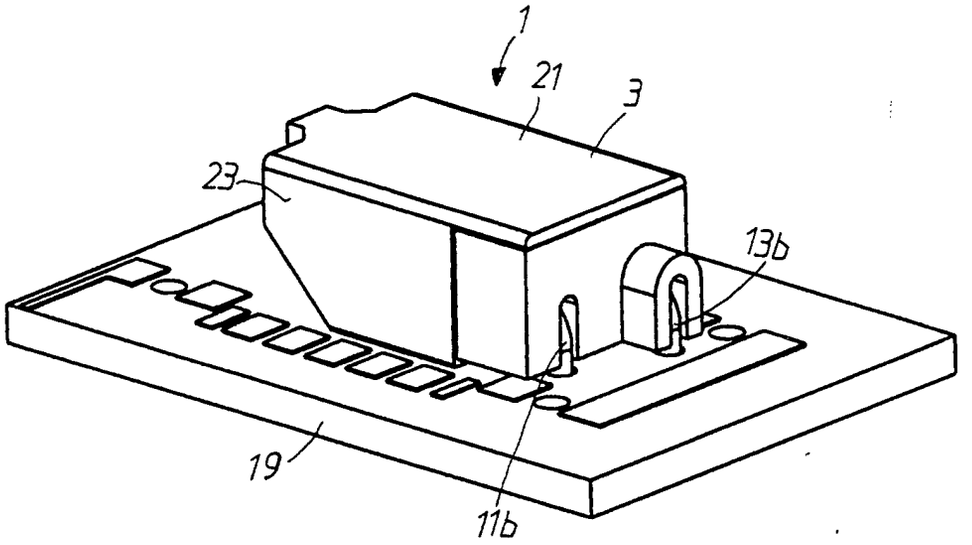

Fig. 3

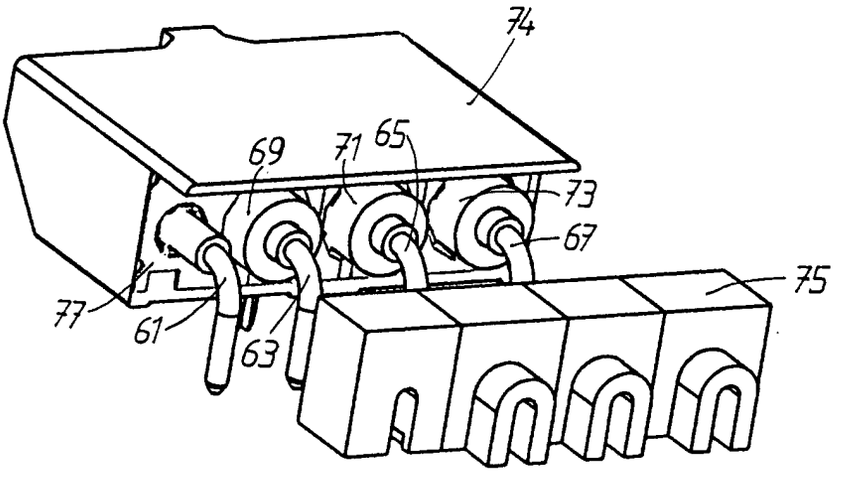

Fig. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 85 0031

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y	WO 93 08622 A (ITT) 29 April 1993 (1993-04-29) * page 4, line 4 - line 17 * * page 7, line 1 - line 22 * * page 9, line 7 - line 26; figures 3,5,7,8 *	1-3,6-10 5	H01R13/719
X	EP 0 038 657 A (AMP) 28 October 1981 (1981-10-28) * page 2, line 19 - line 32; figures 1,2 *	1,3	
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	26 April 2001	Alexatos, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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