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(54) Electrical connection for coaxial cables

(57) The electrical connection of a plurality of coaxial cables (32) each having a signal conductor (34), a dielectric layer (36) around the conductor, and a shielding (38) around the dielectric layer, to a printed circuit board (10), comprises a plurality of pins (16) arranged adjacent to each other in at least one layer (30) and projecting from at least one major surface of the printed circuit board wherein at least one of the plurality of pins is electrically connected to at least one electrically conductive region (24) of the printed circuit board, wherein each of the coaxial cables, or several of the coaxial cables, with their shieldings are arranged between two adjacent pins, and are in electric contact with at least one of the two adjacent pins, and wherein the printed circuit board comprises a plurality of signal line conductive regions (44) connected to the signal conductors of the coaxial cables.

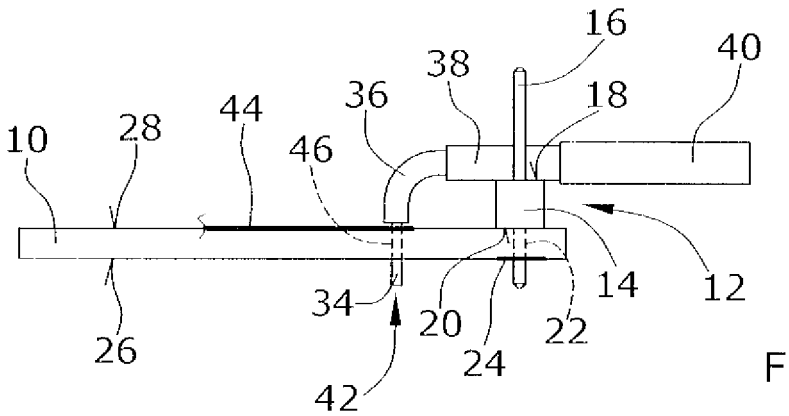

Fig.1

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an electrical connection of a plurality of coaxial cables to a printed circuit board, a coaxial cable harness provided with such an electrical connection, and a kit for an electrical connection of a plurality of coaxial cables to a plurality of pins of a printed circuit board.

Related Prior Art

[0002] It is known to use coaxial cables for high speed transmission of signals in particular for telecommunication applications. Coaxial cables harnesses used for high speed signal transmission typically comprise a connector to which a plurality of individual coaxial cables connectors are attached. Examples of coaxial cable connectors can be found in US-B-6 203 369, US-A-5 184 965, US-A-4 762 508, EP-A-0 311 041, EP-B-O 284 245, EP-A-0 074 205, and DE-C-41 16 176.

[0003] The connector of the coaxial cable assembly to which the individual coaxial cable connectors are attached, typically comprises individual pins to which the coaxial cable connectors are connected. Examples of those constructions can be found in EP-A-0 952 637, WO-A-2005/041364, and WO-A-2005/025010.

[0004] The known design of how to connect coaxial cables to the connector of a coaxial cable assembly requires some space within the housing in which the connector and the individual coaxial cable connectors are arranged. Within this housing thus a dedicated, permanently connected, mating interface between the individual coaxial cable connectors and the connector of the housing or shell is located. This construction consumes at least a certain space, adds additional costs and hardware components, i.e.. connector components, and results in possible reliability risks.

[0005] It is also known in the art to directly or indirectly attach coaxial cables to printed circuit boards. Examples of this kind of electrical connection between a coaxial cable and a printed circuit board can be found in JP-A-2003168499, EP-A-0 807 995, EP-A-0 450 996, EP-A-0 444 567, and EP-A-0 213 859..

[0006] Moreover, from US-A-6 053 770 it is known to directly insert the stripped coaxial cables into corresponding contact elements of a connector. In addition, US-A-5 241 135 describes a connector having individual contact elements for the signal conductors of a plurality of coaxial cables as well as a common contact element for all the shieldings of the plurality of coaxial cables, wherein the signal conductors and shieldings of the coaxial cables are electrically connected to the respective contact elements by soldering.

[0007] It is an object of the invention to provide an electrical connection between co axial cables and a printed circuit board which is easy to establish and/or requires less space and/or requires only few hardware components.

SUMMARY OF THE INVENTION

[0008] The present invention provides an electrical connection of a plurality of coaxial cables each having a signal conductor, a dielectric layer around the conductor, and a shielding around the dielectric layer, to a printed circuit board, comprising

- a plurality of pins arranged adjacent to each other in at least one layer and projecting from at least one major surface of the printed circuit board wherein at least one of the plurality of pins is electrically connected to at least one electrically conductive region of the printed circuit board,
- wherein each of the coaxial cables, or several of the coaxial cables, with their shieldings are arranged between two adjacent pins and are in electric contact with at least one of the two adjacent pins, and
- wherein the printed circuit board comprises a plurality of signal line conductive regions connected to the signal conductors of the coaxial cables.

[0009] According to one embodiment of the invention, the electrical connection of coaxial cables to a printed circuit board is made by electrically connecting the shieldings of the coaxial cables to a plurality of pins wherein at least one of the pins is electrically connected to at least one electrically conductive region of the printed circuit board. The printed circuit board also comprises a plurality of signal line conductive regions which are connected to the signal conductors of the coaxial cables. The coaxial cables are arranged with respect to the plurality of pins in such a manner that the shieldings of the coaxial cables are located between two adjacent pins, respectively, with the shielding in electric contact with at least one of the two adjacent pins.

[0010] Accordingly, one aspect of the present invention relates to the arrangement of the shieldings of the plurality of coaxial cables between the pins of at least one layer of a plurality of pins. These pins can be carried by the printed circuit board or by a support body which typically is made from an electrically insulative material, However, for providing a ground bussing in which the shieldings of the plurality of coaxial cables are electrically connected in a direct manner, the support body also can be made of or comprise electrically conductive material for providing the electric interconnection of the shieldings of the coaxial cables. In an alternative embodiment all shieldings, through the electrical contact to each respective adjacent pin, can be electrically connected to each other with one or several of the pins electrically connected to a contact region of the printed circuit board.

[0011] Generally, according to the invention, the elec-

tric contact between the shieldings and the pins can be made in different ways such as e.g. soldering, welding (laser welding), screwing, clamping or wrapping projecting shieldings around pins.

[0012] However, it is preferred to solder the shieldings to the individual pins. With respect to this embodiment of the present invention it is preferred that adjacent pins are thermally insulated from each other in order to prevent transfer of heat applied for soldering a coaxial cable shielding to a pin towards an adjacent pin to which a coaxial cable shielding is already soldered. Namely, such a heat transfer could result in melting of the already soldered electrical connection which is disadvantageous.

[0013] According to at least one embodiment of the invention, between each pair of adjacent pins there is arranged the shielding of at least one coaxial cable. In one embodiment each shielding is arranged between different ones of adjacent pins with the shielding being in electric contact with at least one of the pins. As an alternative, the shielding of two coaxial cables can be arranged side-by-side between the adjacent pins. In this case, the shieldings may be connected among each other e.g. by soldering and may be connected to at least one of the two adjacent pins e.g. also by soldering or each of the shieldings can be in electric contact with a different one of the two adjacent pins, respectively.

[0014] Also several coaxial cables with their shieldings one on top of the other can be arranged between adjacent pins, respectively. Finally, an array of coaxial cables arranged side-by-side and above and below each other with their shieldings can be positioned between adjacent pins.

[0015] Another important aspect of the present invention is the possibility to use standard pinstrip headers which are used for electrical connection purposes in electrical connectors or on printed circuit boards. Such pinstrip headers comprise a longitudinal strip-like plastics support body carrying a plurality of electrically conductive pins embedded in the body and projecting beyond opposite sides of the body. Such a pinstrip header e.g. can be connected to a printed circuit board by e.g. soldering the pins to a common electrically conductive region or individual electrically conductive regions of the printed circuit board. These pins can extend through vias in the printed circuit board or can be laterally bent (surface-mounted-device (SMD) type pinstrip header) to be soldered onto individual pads or a common pad region of the printed circuit board. Those portions of the pins extending beyond the support body opposite the printed circuit board can be used for electrically connecting the shielding of the coaxial cables to the pins. Standard 2.54 mm pinstrip headers provide the additional advantage that the pins comprise substantially square posts having a width of 0.64 mm and a pitch of 2.54 mm. This construction results in spaces of 1.9 mm between adjacent posts. This space is substantially the same as the outer diameter of a standard mini coaxial cable when the outer jacket covering the electrically conductive shielding or braid is stripped off. This matching of the space between adjacent pins with the outer diameter of the shielding of the coaxial cable allows insertion between two adjacent pins without deformation of the dielectric layer of the cable which could affect the signal transmission properties of the coaxial cable.

[0016] For the purposes of the invention pinstrip headers with only one layer of adjacent pins or several layers (e.g.. two layers) of adjacent pins can be used. The fixedly arranged pins also serve for guiding the individual coaxial cables prior to and upon establishing their electric contact to the pins. This feature however is also given when individual pins (e.g. without being embedded in an additional support body) are directly attached to the printed circuit board prior to the electrical connection of the shieldings to the pins. In this latter case the printed circuit board itself functions as a body for supporting or carrying the pins

[0017] The signal conductors of the coaxial cables having their shieldings electrically connected to the individual pins may be connected to the printed circuit board in several ways. For example, the signal conductors can be attached to individual signal contact pads of the printed circuit board where they are soldered. As an alternative, the signal conductors can also be inserted into through holes or blind holes of the printed circuit board surrounded by contact pads and/or provided with electrical through connections where the signal conductors are soldered. Also the mechanical and electrical contact can be accomplished by clamping means or by screws. All of these electrical connections of the signal conductors with the printed circuit board are possible to be carried out in connection with the present invention.

[0018] The printed circuit board used according to the invention can be a single or multiple layer printed circuit board and can have a single wiring layer on one of the major surfaces of the board or a plurality of wiring layers as basically known to those skilled in the art. The signal lines can be connected to contact pads or can extend into and/or through holes (being through holes or blind holes) provided in the single or multiple layer printed circuit board.

[0019] According to another aspect of the present invention there is provided a kit for an electrical connection of a plurality of coaxial cables each having a signal conductor, a dielectric layer around the conductor, and a shielding around the dielectric layer, to a plurality of pins, comprising

- a plurality of coaxial cables and
- a plurality of pins arranged adjacent to each other in at least one layer for projecting from at least one major surface of a printed circuit board,
- wherein each of the coaxial cables, or several of the coaxial cables, with their shieldings are arranged between two adjacent pins and can be in electric contact with at least one of the two adjacent pins.

[0020] Finally, the present invention can be used in a coaxial cable harness comprising

- a plurality of coaxial cables each having a signal conductor, a dielectric layer around the conductor, and a shielding around the dielectric layer,
- a housing having an inlet for the plurality of coaxial cables,
- a printed circuit board arranged in the housing,
- a connector element attached to the printed circuit board for connecting to a mating connector elements,
- a plurality of pins arranged adjacent to each other in at least one layer and projecting from at least one major surface of the printed circuit board wherein at least one of the plurality of pins is electrically connected to at least one electrically conductive region of the printed circuit board,
- wherein each of the coaxial cables, or several of the coaxial cables, with their shieldings are arranged between two adjacent pinsand are in electric contact with at least one of the two adjacent pins, and
- wherein the printed circuit board comprises a plurality of signal line conductive regions connected to the signal conductors of the coaxial cables for electrically connecting the signal conductors of the coaxial cables to electric contact elements of the connector element attached to the printed circuit board.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] A full and enabling disclosure of the present invention, including the best mode thereof, enabling one of ordinary skill in the art to carry out the invention, is set forth in greater detail in the following description, including reference to the accompanying drawing in which

Fig. 1 is a side view of a first embodiment of an electrical connection between a plurality of coaxial cables and a printed cir-cuit board,

Fig. 2 is a top plan view of the printed circuit board and the arrangement of coaxial cables shown in Fig 1,

Fig. 3 is a perspective view of the printed circuit board and the arrangement of coaxial cables shown in Fig. 1,

Fig. 4 is a side view of a second embodiment of an electrical connection between a plurality of coaxial cables arranged at both sides of a printed circuit board to the printed circuit board,

Fig. 5 is a perspective view of the arrangement of a plurality of coaxial cables and the printed circuit board as shown in Fig. 4,

Fig. 6 illustrates another embodiment of the electrical connection of a plurality of coaxial cables with a printed circuit board, wherein two layers of coaxial cables arranged on top of another,

Fig. 7 is a perspective view of the arrangement of a plurality of coaxial cables and the printed circuit board as shown in Fig. 6,

Fig. 8 is a side view showing an arrangement of a plurality of coaxial cables arranged in two layers one on top of the other and between a plurality of pairs of pins arranged in two layers, and a printed circuit board to which the shieldings and signal conductors of the plurality of coaxial cables are connected,

Fig. 9 is a perspective view of the arrangement of a plurality of coaxial cables and the printed circuit board as shown in Fig. 8,

Fig. 10 is a side view of a further embodiment of the present invention relating to the electrical connection of two layers of a plurality of coaxial cables arranged on both sides of a printed circuit board to the printed circuit board,

Fig. 11 is a perspective view of the arrangement of a plurality of coaxial cables and the printed circuit board as shown in Fig. 10, and

Fig. 12 is a top plan view onto a coaxial cable connector using one of the embodiments of the electrical connection of a plurality of coaxial cables to a printed circuit board according to Figs. 1 to 11 arranged within a housing wherein also the mating connector is shown.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0022] A first embodiment of the present invention is shown in Figs. 1 to 3. The first embodiment comprises a printed circuit board 10 and a standard pinstrip header 12 comprising a support body 14 e.g. of an electrically insulating material carrying a plurality of pins 16 extending beyond the support body 14 at two opposite lateral sides 18,20 thereof. The pins 16 are inserted into corresponding through holes 22 of the printed circuit board 10 and are electrically connected by soldering to an electrically conductive region 24 arranged on the lower side 26 of the printed circuit board 10. Accordingly, the support body 14 rests on the upper side 28 of the printed circuit board 10. Between adjacent pins 16 of the layer 30 of pins 16 of the pinstrip header 12 a plurality of individual coaxial cables 32 are arranged. Each coaxial cable 32 comprises a central signal conductor 34 with a dielectric layer 36 arranged around the signal conductor 34. Each coaxial cable 32 also comprises an electrically conduc-

tive shielding 38 which is arranged around the dielectric layer 36. Around the shielding 38 there is arranged an outer jacket 40 of the coaxial cable 32. In this embodiment as well as in the other embodiments shown in the drawings, the printed circuit board 10 is a single layer printed circuit board. However, also a multiple layer printed circuit board can be used having several wiring layers with grounding or signal line traces. Also, the pins 16 need not necessarily extend into through holes 22 but can be attached and connected to a grounding pad on one of the major surfaces (upper or lower side) of the printed circuit board 10 as e.g. in case of a SMD printstrip header having its pins bent by about 90 at one side of the support body 14.

[0023] For making electrical contact between the plurality of coaxial cables 32 and the printed circuit board 10, the coaxial cables are stripped off so that at the free end 42 the signal conductor 34 is exposed followed by a section in which the dielectric layer- 36 is exposed which in turn is followed by a section within which the shielding 38 is exposed. The individual coaxial cables 32 are arranged with their exposed shieldings 38 positioned and located between two respective adjacent pins 16 as shown in particular in Figs. 2 and 3. By clamping the shieldings 38 between respective adjacent pins 16 without substantial deformation of the dielectric layer 16 an electrical contact between the shieldings 38 and the pins 16 is established. The coaxial cables 32 and, in particular, their shieldings 38 may be secured by a fastening element or the like in the position shown in Figs. 1 to 3. In an alternative embodiment, the shieldings 38 can extend along the same length as the dielectric layers 26 and, accordingly, terminate close to the upper side 28 of the printed circuit board 10. This is advantageous for the shielding and signal transmission properties. In this case the signal traces 44 should be located at the lower side 26 of the printed circuit board so that contacts between the shieldings 38 and the traces 44 can be avoided easily.

[0024] In the present embodiment, according to Figs. 1 to 3 the shieldings 38 of the individual coaxial cables 32 are soldered to the pins 16 of the pinstrip header 12 and, accordingly, are electrically connected to the electrically conductive region 24. Accordingly, all the shieldings 38 of the plurality of coaxial cables 32 are electrically connected among each other for grounding or groundbussing purposes. As shown in Figs. 1 to 3, the individual signal conductors 34 of the coaxial cables 32 are electrically connected to individual signal line conductive regions (traces) 44 provided on the upper side 28 of the printed circuit board. The signal conductors 34 at the free ends 42 of the coaxial cables 32 are inserted into through holes 46, near the starting region of the traces 44, of the printed circuit board 10. It could also be provided that the traces 44 are arranged at the lower side 26 of the printed circuit board 10. In a multi-layer printed circuit board, the traces 24 and 44 can be formed in intermediate conductive layers..

[0025] An advantage of the electrical connection of the shieldings 38 of the coaxial cables 32 to the printed circuit board 10 is that according to the invention a standard 2.54 mm pinstrip header 12 can be used in connection with standard coaxial cables having an outer diameter at their shieldings 38 of about 1.9 mm. Namely, a standard 2.54 mm pinstrip header 12 comprises 0.64 mm square posts as individual pins 16 with a pitch of 2.54 mm. Accordingly, the distance between the two confronting inner sides of two adjacent pins 16 is about 1.9 mm and, accordingly, matches the outer diameter of the shielding 38 Therefore, the coaxial cables 32 with their shieldings 38 can be inserted between adjacent pins 16 without substantial deformation or modification of the dielectric layers 36 which in turn could affect signal transmission through the coaxial cables 32.

[0026] A second embodiment of an arrangement of a plurality of coaxial cables and a printed circuit board having electrically conductive regions to which the shieldings and signal conductors of the coaxial cables are electrically connected, is shown in Figs. 4 and 5. As far as these Figures show elements identical or similar to the corresponding elements of the embodiment of Figs. 1 to 3, the same reference numerals are used.

[0027] In the embodiment according to Figs. 4 and 5 the standard pinstrip header 12 is mounted to the printed circuit board 10 in an orientation reverse to the orientation shown in Figs. 1 to 3. Accordingly, the pins 16 now extend somewhat more beyond the lower side 26 of the printed circuit board 10 than in case of the arrangement of the pinstrip header 12 shown in Figs. 1 to 3. By this arrangement it is now possible that two sets of coaxial cables 32 arranged in two layers can be guided through the pinstrip header 12 at opposite sides of the printed circuit board 10 as shown in Figs. 4 and 5. The electrical connection of the shieldings 38 of the two layers of coaxial cables 32 to the pins 16 is identical to the electrical connection explained with respect the embodiment of Figs. 1 to 3. Accordingly, the electrical connection between the shieldings 38 and the pins 16 is performed by means of soldering. The signal conductors 34 are inserted from opposite sides through adjacent through holes 46 in the printed circuit board 10 in the close vicinity of which individual signal line conductive regions (traces) 44 of the printed circuit board 10 extend. In this embodiment, all traces 44 are shown to be arranged on the same side (upper side 28 in this embodiment) of the printed circuit board 10. However, it is also possible to provide two sets of traces 44 on the two sides 26,28 of the printed circuit board 10.

[0028] A further embodiment of an electrical connection according to the invention is shown in Figs. 6 and 7. Also here, as far as these Figures show elements identical or similar to the corresponding elements of the embodiment of Figs. 1 to 3, the same reference numerals are used.

[0029] In contrast to the embodiments according to Figs. 1 to 5, in Figs. 6 and 7 two layers of coaxial cables 32 are shown one on top of one another and guided with

their shieldings 38 between adjacent pins 16 of the pinstrip header 12. The shieldings 38 of the coaxial cables 32 are soldered to the individual pins 16. The dielectric layers 36 extending from the shieldings 38 of two respective coaxial cables 32 arranged one on top of the other, are bent by a degree of substantially 90° so that their signal conductors 34 are inserted in adjacent through holes 46 of the printed circuit board 10 from which individual traces 44 extend and with which traces 44 the signal conductors 34 are electrically connected preferably by soldering. Depending on the projecting lengths of the pins 16 more than two coaxial cables can be arranged one on top of the other between adjacent pins 16. Also more than one coaxial cable 32 and, in particular, two coaxial cables 32 can be arranged side-by-side between adjacent pins 16 depending on the spacing of adjacent pins 16.

[0030] Another embodiment of the present invention is shown in Figs. 8 and 9. Also here, as far as these Figures show elements identical or similar to the corresponding elements of the embodiment of Figs. 1 to 3, the same reference numerals are used.

[0031] In this embodiment, the standard pinstrip header L2 comprises a support body 14 for supporting two or more layers of pins 16 with adjacent coaxial cables 32 with their electrical shieldings 38 arranged between two pairs of two adjacent pins 16 of the two or more layers. This is shown in particular in Fig. 9. In this embodiment, the coaxial cable arrangement is similar to that of Figs. 6 and 7. However, it is to be noted that a pinstrip header 12 having two layers of pins 16 can also be used for inserting only one coaxial cable 32 between two pairs of adjacent pins 16 (of the two layers). The electrical connection between the shieldings 38 and the pins 16 and further to the conductive region 24 of the printed circuit board 10 is identical to the corresponding electrical connection between these parts of the other embodiments. Accordingly, most preferably, the shieldings 38 are soldered to the adjacent pins 16. However, it is not necessary in the embodiment of Figs. 8 and 9 that each shielding 38 of each coaxial cable 32 is soldered to all respective adjacent pins 16 (four in this example) between which the respective shielding 38 is arranged. It is possible to solder each shielding 38 only to one of the pins 16 wherein the shieldings 38 of a pair of superposed coaxial cables 32 are soldered to different ones of the pins 16. The signal conductors 34 of the coaxial cables 32 of the embodiment according to Figs. 8 and 9 are connected to individual traces 44 of the printed circuit board 10 as explained before and, in particular, as described in connection with the embodiment of Figs. 6 and 7.

[0032] A further embodiment of an electrical connection according to the invention is shown in Figs. 10 and 11. Also here, as far as these Figures show elements identical or similar to the corresponding elements of the embodiment of Figs. 8 and 9, the same reference numerals are used.

[0033] As in the embodiment according to Figs. 8 and 9, the electrical connection as shown in Figs. 10 and 11 uses a standard pinstrip header 12 with two layers of pins 16 supported by a support body 14. The orientation of the pinstrip header 12 in the embodiment of Figs. 10 and 11 is inverse to the orientation of the pinstrip header 12 as shown in Figs. 8 and 9. Accordingly, the pins 16 extend beyond the lower side 26 to an extent allowing insertion and connection of the shieldings 38 of one layer of coaxial cables 32 between the pins 16 at the lower side 26 of the printed circuit board 10. Accordingly, the arrangement of the two layers of coaxial cables 32 is similar to the arrangement shown in Figs. 4 and 5. Also the connection of the signal conductors 34 of the two layers of coaxial cables 32 to individual traces 44 of the printed circuit board 10 is the same as shown and explained in connection with the embodiment of Figs. 4 and 5.

[0034] Fig. 12 shows the application of the electrical connection of a plurality of coaxial cables to a printed circuit, board according to any one of the types described with reference to Figs. 1 to 11 to a connector housing 48 of a coaxial cable harness 50 comprising a cable 52 including a plurality of individual coaxial cables 32. The embodiment shown in Fig. 12 provides an electrical connection of the individual coaxial cables 32 to the printed circuit board 10 as shown in detail in Figs. 10 and 11. The electrical connection in this embodiment is used in order to connect the coaxial cables 32 to a connector 54 by which the cable 52 can be connected to a mating connector 56 arranged e.g. in a face plate 58 of another electric unit for e.g. processing the signals transmitted by the coaxial cables 32. The connector housing 48 needs merely little space for the connection of the coaxial cables 32 to the connector 54 and, in particular, no intermediate connector interfaces as common when connecting coaxial cables to connectors is necessary. This reduces the hardware expenditure in a cable harness for connecting the individual cables to a connector arranged in a connector housing 48 attached to the cable 52.

[0035] The grounding path in the embodiment according to Fig. 12 is from the shieldings 38 of the coaxial cables 32 via the grounding trace 24 directly to the housing 48 or via the connector 54 to the housing 48. The grounding path is continued through the mating connector 56 to the face plate 58 and/or the printed circuit board to which the mating connector 56 is (electrically and/or mechanically) connected.

[0036] In the embodiments described above and shown in the drawings, single layer printed circuit boards are used. It is to be noted here that also multiple-layer printed circuit boards can be used. Also it is possible that the signal lines of the individual coaxial cables are connected to contact pads on the printed circuit board or are extending through holes (blind holes or through holes) of the multi-layer- printed circuit board to be connected therein.

[0037] Although the invention has been described and illustrated with reference to specific illustrative embodiments thereof, it is not intended that the invention be

limited to those illustrative embodiments. Those skilled in the art will recognize that variations and modifications can be made without departing from the true scope of the invention as defined by the claims that follow. It is therefore intended to include within the invention all such variations and modifications as fall within the scope of the appended claims and equivalents thereof.

Claims

1. An electrical connection of a plurality of coaxial cables each having a signal conductor, a dielectric layer around the conductor, and a shielding around the dielectric layer, to a printed circuit board, comprising

- a plurality of pins (16) arranged adjacent to each other in at least one layer (30) and projecting from at least one major surface of the printed circuit board (10) wherein at least one of the plurality of pins (16) is electrically connected to at least one electrically conductive region (24) of the printed circuit board (10),
- wherein each of the coaxial cables (32), or several of the coaxial cables (32), with their shieldings (38) are arranged between two adjacent pins (16), and are in electric contact with at least one of the two adjacent pins (16), and
- wherein the printed circuit board (10) comprises a plurality of signal line conductive regions (44) connected to the signal conductors (34) of the coaxial cables (32).

2. The electrical connection according to claim 1, wherein the distance between two adjacent pins (16) of the at least one layer of pins (16) is at least substantially equal to an outer diameter of the shielding (38) of a coaxial cable (32).

3. The electrical connection according to claim 1 or 2, wherein at least two coaxial cables (32) are arranged on top of each other between two adjacent pins (16) of the at least one layer of pins (16).

4. The electrical connection according to any one of claims 1 to 3, wherein the plurality of pins (16) are arranged in an array comprising at least two layers with the pins (16) arranged in columns of at least two pins (16) extending substantially perpendicular to the extension of the layers.

5. The electrical connection according to any one of claims 1 to 4, wherein the plurality of pins (16) extend through respective holes (46) formed in the printed circuit board (10).

6. The electrical connection according to claim 5, wherein the plurality of pins (16) project beyond at least one of the opposite major surfaces (26,28) of the printed circuit board (10).

7. The electrical connection according to claim 6, wherein coaxial cables (32) are arranged between respective adjacent pins (16) on both major surfaces of the printed circuit board (10) with the shieldings (38) of the coaxial cables (32) in electric contact with the pins (16).

8. The electrical connection according to any one of claims 1 to 7, wherein the plurality of pins (16) are carried by a support body (14) providing a standard pin header (12) of a two-part socket and pin connector which includes a plurality of sockets on the one part and a plurality of pins on the other part of the connector.

9. The electrical connection according to any one of claims 1 to 8, wherein each of the coaxial cables (32) is bent between a point of its shielding (38) arranged between two adjacent pins (16) of the plurality of pins (16) and in electric contact with at least one of the two adjacent pins (16), and a free end of the respective coaxial cable (32), and wherein the dielectric layer (36) is bent towards the printed circuit board (10).

10. The electrical connection according to claim 9, wherein the signal conductor (34) at the free end (42) of the coaxial cable (32) extends through respective holes (46) in the printed circuit board (10) and is soldered to respective signal line conductive regions (44) of the printed circuit board (10) with the signal line conductive regions (44) arranged around the hole (46) on at least one major surface (26,28) of the printed circuit board (10).

11. The electrical connection according to claim 9 or 10, wherein the signal line conductive regions of the printed circuit board (10) are arranged on that major surface (26) of the printed circuit board (10) which is opposite to the electric contact site of the shielding (38) of the respective coaxial cable (32).

12. The electrical connection according to any one of claims 1 to 11, wherein the plurality of pins (16) are carried by a support body (14) of a thermally insulative material

13. The electrical connection according to any one of claims 1 to 12, wherein the plurality of pins (16) are carried by a support body (14) of an electrically conductive material.

14. The electrical connection according to any one of claims 1 to 13, wherein the shieldings (38) of at least some of the plurality of coaxial cables (32) are soldered to the respective adjacent pins.

15. A kit for an electrical connection of a plurality of coaxial cables each having a signal conductor, a dielectric layer around the conductor, and a shielding around the dielectric layer, to a plurality of pins, comprising

- a plurality of coaxial cables (32) and
- a plurality of pins (16) arranged adjacent to each other in at least one layer for projecting from at least one major surface of a printed circuit board (10),
- wherein each of the coaxial cables (32), or several of the coaxial cables, with their shieldings (38) are arranged between two adjacent pins (16), and are adapted to be in electric contact with at least one of the two adjacent pins (16).

16. A coaxial cable harness comprising

- a plurality of coaxial cables (32) each having a signal conductor (34), a dielectric layer (36) around the conductor, and a shielding (38) around the dielectric layer (36),
- a housing having an inlet for the plurality of coaxial cables (32),
- a printed circuit board (10) arranged in the housing,
- a connector element attached to the printed circuit board (10) for connecting to a mating connector elements,
- a plurality of pins (16) arranged adjacent to each other in at least one layer and projecting from at least one major surface of the printed circuit board (10) wherein at least one of the plurality of pins (16) is electrically connected to at least one electrically conductive region of the printed circuit board (10),
- wherein each of the coaxial cables (32), or several of the coaxial cables, with their shieldings (38) are arranged between two adjacent pins (16), and are in electric contact with at least one of the two adjacent pins (16), and
- wherein the printed circuit board (10) comprises a plurality of signal line conductive regions (44) connected to the signal conductors (34) of the coaxial cables (32) for electrically connecting the signal conductors of the coaxial cables (32) to electric contact elements of the connector element attached to the printed circuit board (10).

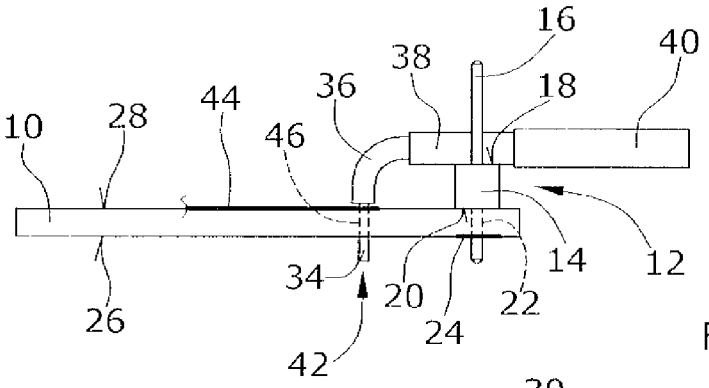

Fig.1

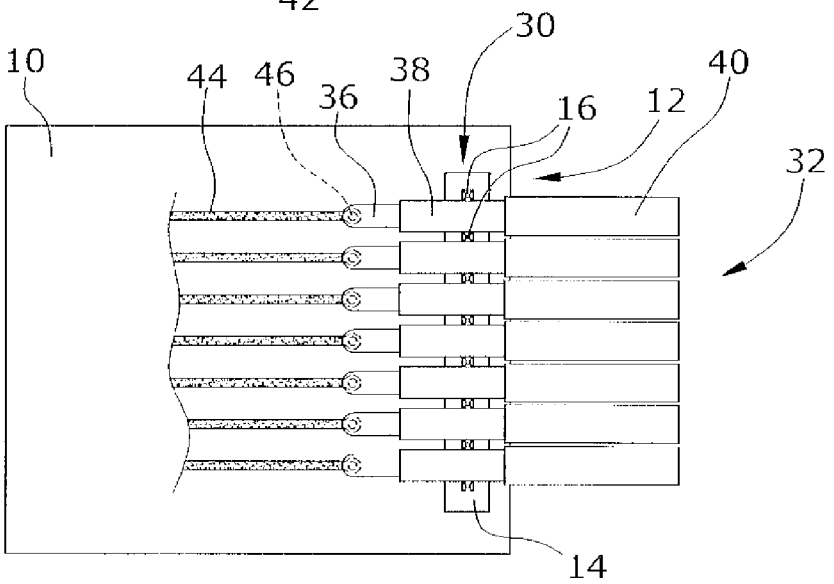

Fig.2

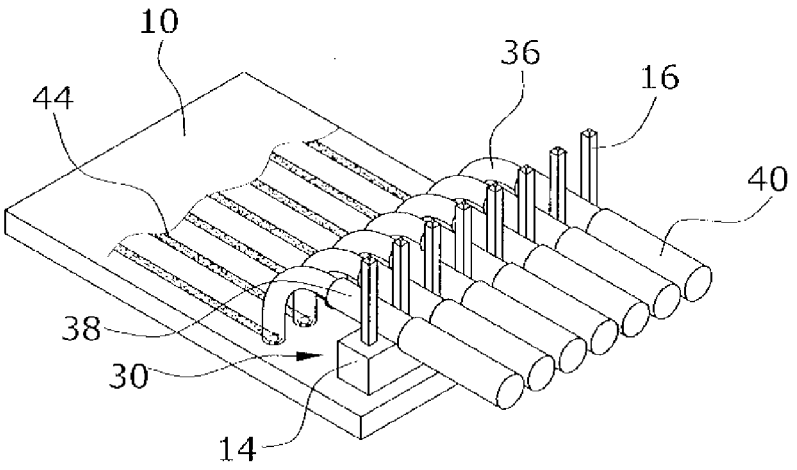

Fig.3

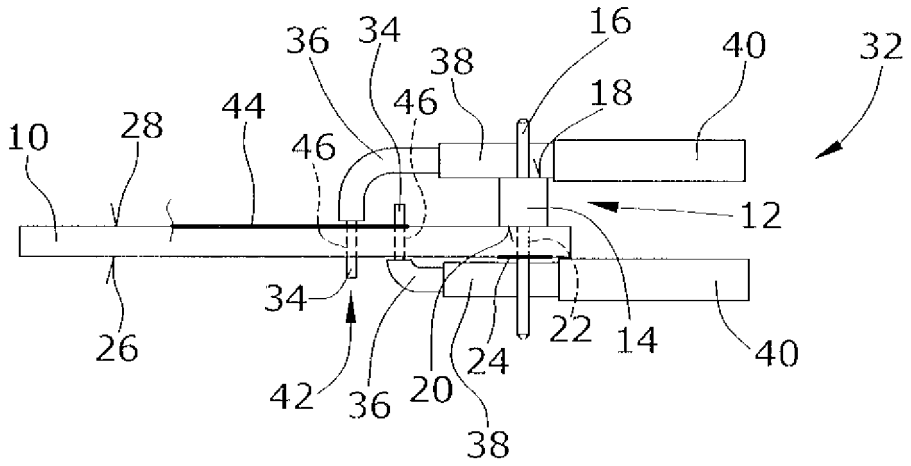
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Fig.4

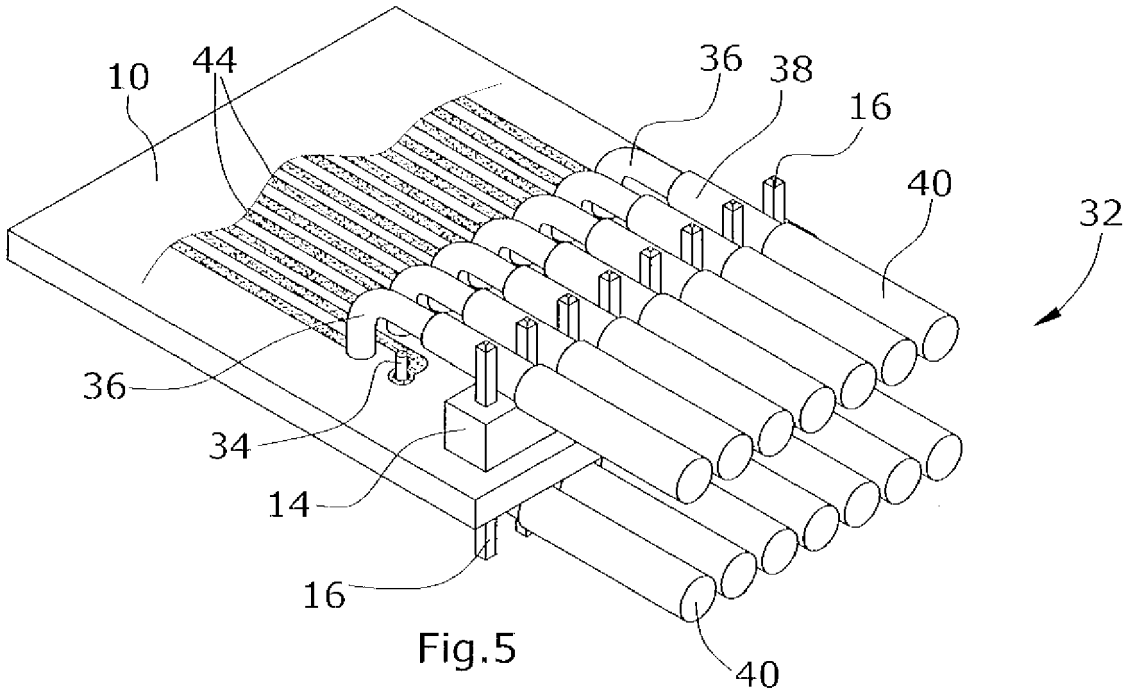
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Fig.5

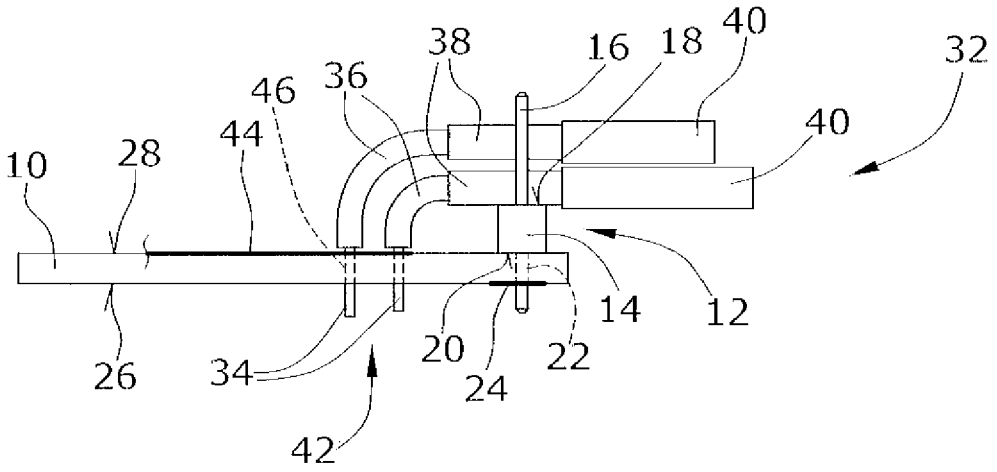
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Fig.6

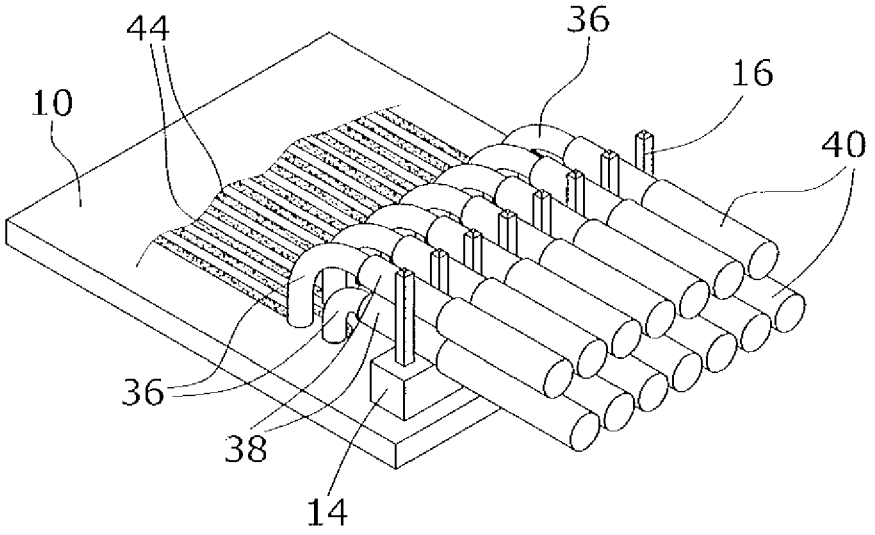
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Fig.7

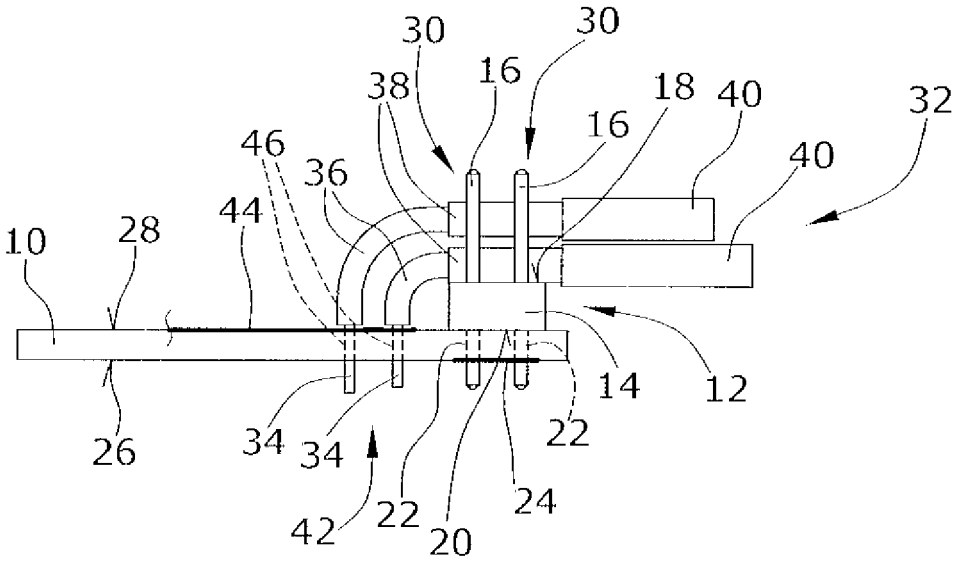
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Fig.8

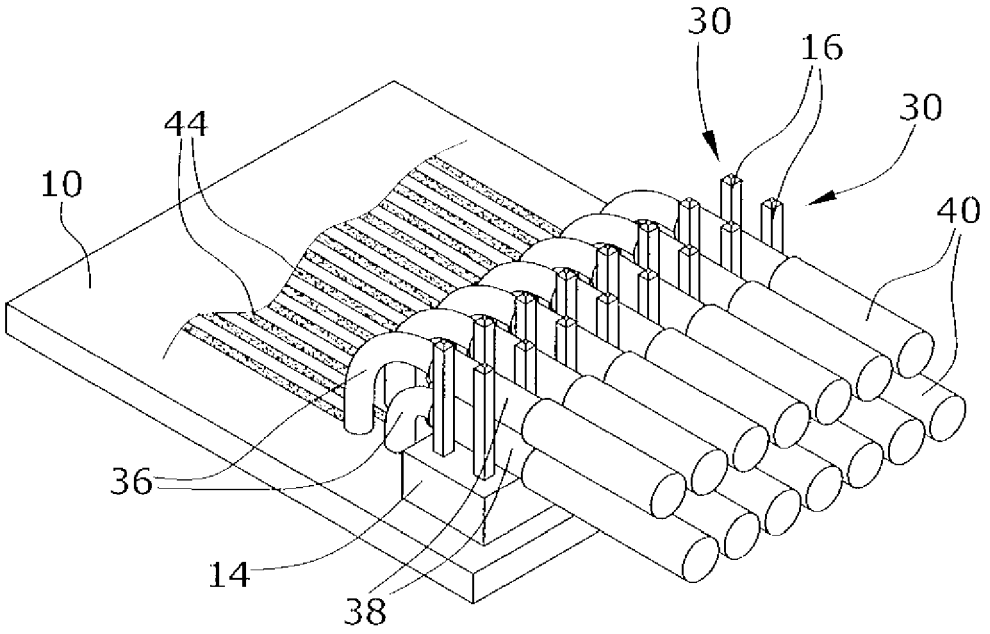
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Fig.9

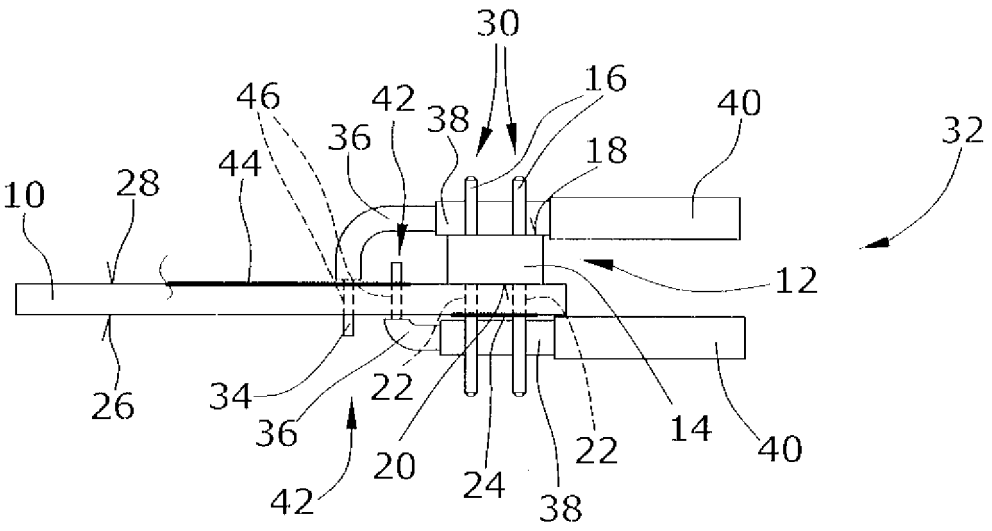
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Fig.10

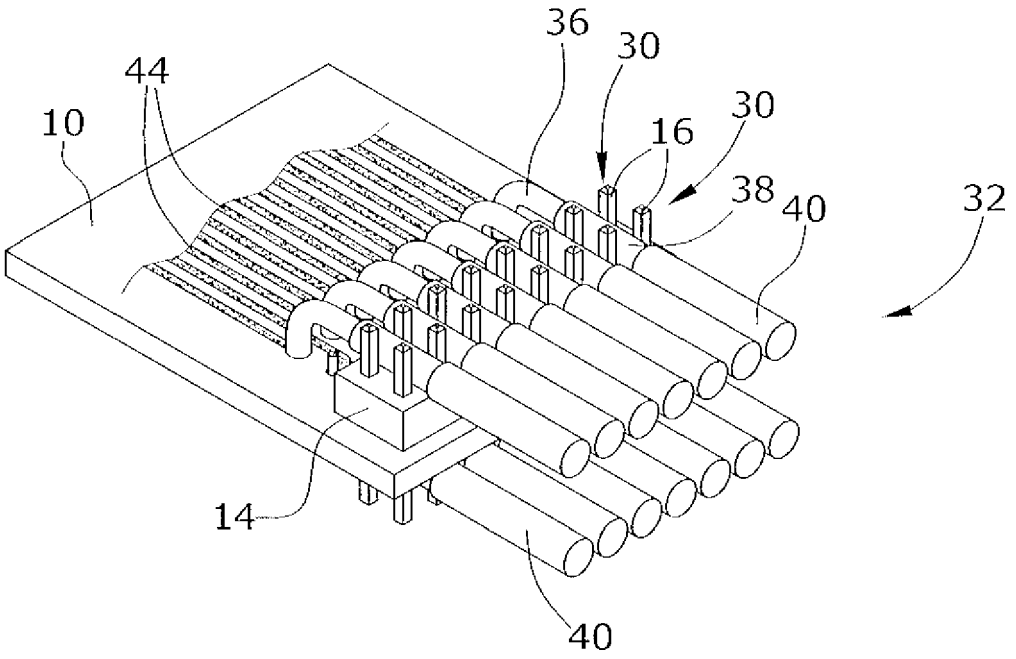
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Fig.11

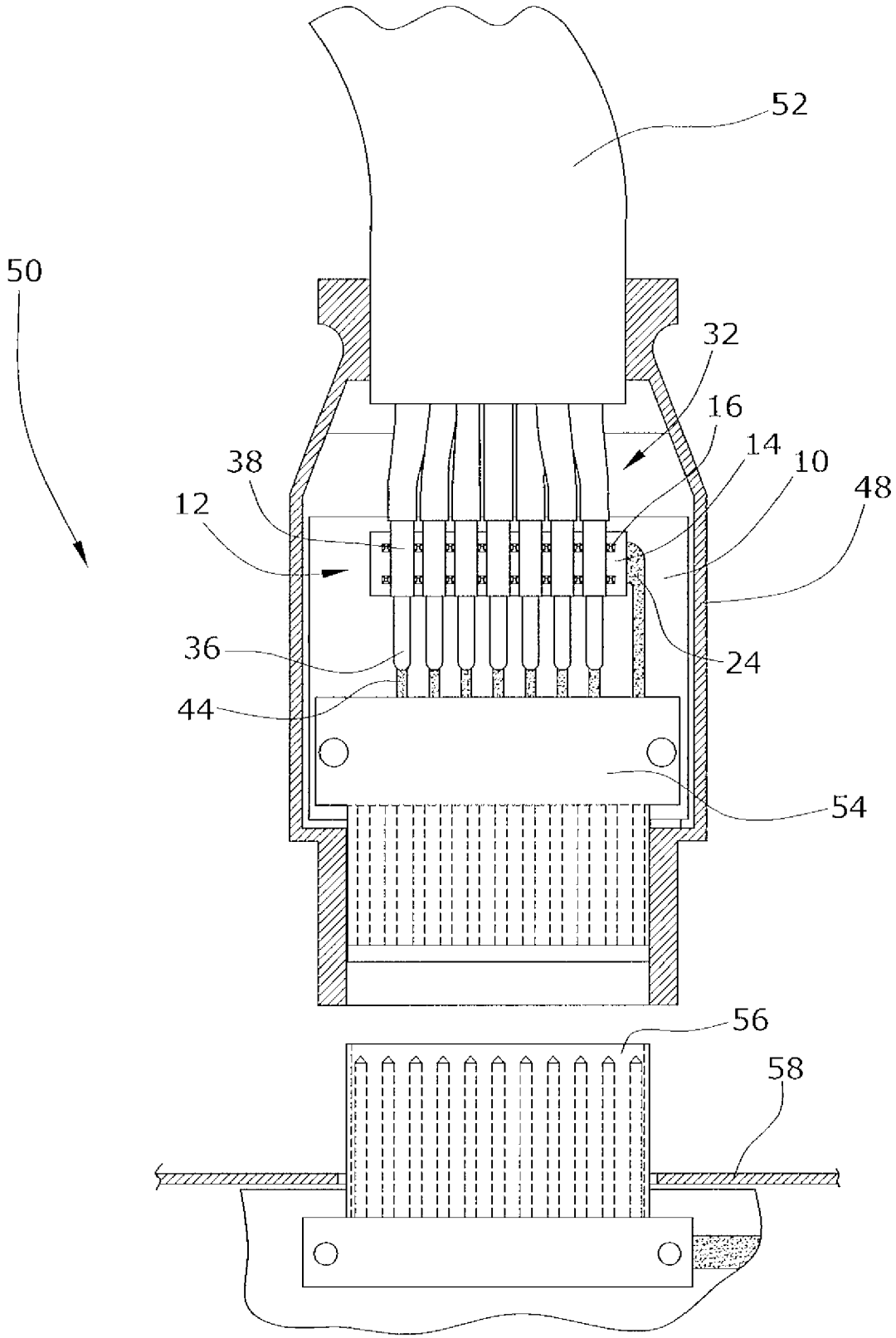

Fig.12

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 11 8525

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H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 January 2007	Langbroek, Arjen

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