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(54) **Connector assembly with a mounting bracket**

(57) A bracket is provided for sturdily supporting and maintaining alignment of a plug-in type connector which is mounted to a circuit board adjacent a panel of a computer box. The support provided by the bracket helps the connector to withstand forces from a mated plug by transmitting undesirable forces to the panel. The bracket includes a front panel having an opening to receive a plug. An embracing member extends rearwardly from the front plate, having an opening for receiving a portion of the connector. In an embodiment, the front plate abuts an interior surface of the panel when the connector is mounted, and the bracket may be secured to the panel by screws. In an embodiment, the bracket is integral to the panel, wherein the panel serves as the front plate of the bracket.

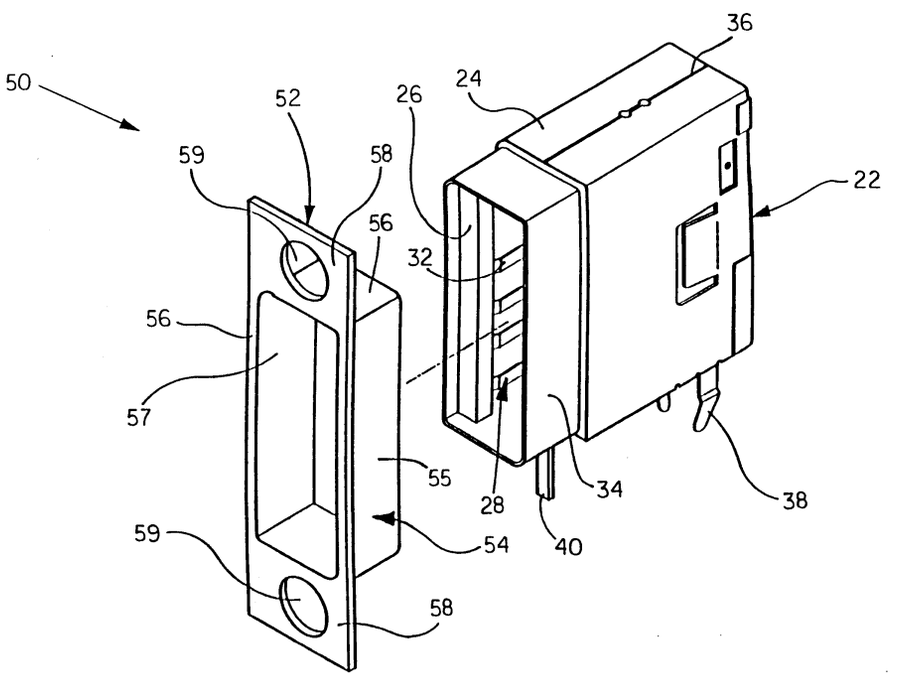

FIG. 3

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Description

Background of the Invention

[0001] The present invention generally relates to the art of electrical connectors and, more particularly, to a bracket for mounting an electrical connector.

[0002] Conventionally, a connector used in a computer generally has an insulative housing which holds a plurality of conductive terminals. At one side of such a connector, the terminals are configured to connect to electrical contacts on a circuit board, and at an another side of the connector, the terminals are configured to mate with a cooperative plug. For preventing electromagnetic interference (EMI), it is known to substantially enclose the housing with a metallic shield for electrically connecting a circuit board pins and enclosed by metallic shielding for preventing electromagnetic interference (EMI). These shields often have seams at which edges of the formed metal blank come together.

[0003] The metallic shield of the connector typically has downwardly extending mounting legs which serve to mount the connector to the circuit board. In a conventional mounting technique, the conductive terminal pins and the mounting legs of the metallic shield are inserted through correspondingly-located holes in the main board or the control circuit board (hereinafter referred to as circuit board). From the underside of the circuit board from which the terminal pins and mounting legs protrude, solder is applied to affix and electrically connect these elements to the circuit board. These soldered mounting legs hold the connector in position on the circuit board.

[0004] Computer connectors function to receive the plugs of computer peripheral equipment for communicating signals and providing electrical power. In this environment, the connectors are subjected to frequent insertion and extraction of the plug, as well as to forces acting on the plug during use, such as from tugging on the attached cord. Particularly harmful are forces against the connector that are oblique relative to a plug-in direction of the plug. Conventionally-mounted connectors are not suited to adequately withstand these forces. It has been found that the mounting legs in conventional connectors tend to work loose from the circuit board and undesirably shift when subjected to these oblique forces. Moreover, seams in the shield tend to pull apart in response to these oblique forces, thereby potentially adversely affecting the relationship between the housing and the shield which may ultimately affect mating with a plug connector.

Summary of the Invention

[0005] The present invention provides a bracket which includes an embracing member that insertably receives and supports at least a portion of a connector, the bracket being supported by an adjacent panel of a computer box. Exemplary embodiments are disclosed in which the front plate is securable to the wall by screws, adhesive or some other fastener. Also disclosed is an exemplary embodiment in which the bracket is integral to the wall, such that the embracing member projects from the panel. The connector is mounted to an adjacent circuit board, and is maintained in alignment by the bracket.

[0006] Advantageously, the bracket holds the connector in proper alignment and provides enhanced support to withstand forces on the connector as transmitted from a mated plug for connection to a peripheral device. Mounting the connector with this enhanced support helps the connector to withstand offset plugging forces, thereby avoiding the loosening problems incurred with conventionally-mounted connectors.

[0007] An advantage of the present invention is that it provides a bracket for securely holding a connector in alignment to withstand forces subjected upon the connector from a mated plug.

[0008] Another advantage of the present invention is that it prevents damage to the mounting engagement of the connector to a circuit board, thereby maintaining the integrity of the connection to the circuit board.

[0009] Additional features are described in, and will be apparent from, the detailed description of the preferred embodiments, the claims, and from the drawings.

Brief Description of the Drawings

[0010] FIG. 1 is a side elevational view of a conventional connector in undesirable shifted positions on a circuit board as resulting from forces having an upward or downward component.

[0011] FIG. 2 is a plan view of a conventional connector in undesirable shifted positions on a circuit board as a result of forces having a leftward or rightward component.

[0012] FIG. 3 is an exploded view of a connector assembly including a bracket according to an embodiment of the present invention.

[0013] FIG. 4 is a perspective view of the connector assembly of FIG. 3 shown in an assembled state, the bracket being mounted to a panel of a computer box and the connector being mounted to a circuit board.

[0014] FIG. 5 is an exploded view of a connector assembly including a bracket according to another embodiment of the invention.

[0015] FIG. 6 is a perspective view of the connector assembly of FIG. 5 shown in an assembled state, the bracket being mounted to a panel of a computer box and the connector being mounted to a circuit board.

[0016] FIG. 7 is an exploded view of a connector assembly according to still another embodiment of the invention.

[0017] FIG. 8 is a perspective view of the connector assembly of FIG. 7 shown in an assembled condition.

[0018] FIG. 9 is a cross sectional view of the connec-

tor assembly of FIGS. 7 and 8, as taken generally along line IX-IX of FIG. 8.

[0019] FIG. 10 is an exploded view of a connector assembly including a bracket according to yet another embodiment of the invention.

[0020] FIG. 11 is a perspective view of the connector assembly of FIG. 10 shown in an assembled condition.

[0021] FIG. 12 is a perspective view of the connector assembly of FIGS. 10 and 11, the bracket being mounted to the panel of a computer box, the connector being mounted to a circuit board, and the panel having a resilient grounding tab in conductive contact with the connector.

Detailed Description of the Presently Preferred Embodiment

[0022] Referring now to the Figures, wherein like numerals designate like components, FIGS. 1 and 2 illustrate a circuit board 20 to which a shielded input/output connector 22 is conventionally mounted. The connector 22 is configured to be mounted to a circuit board 20 and to receive a mated plug (not shown) from a front side thereof in a generally known manner. The plug typically establishes an input/output connection for conducting a signal and/or power between a computer and a peripheral device.

[0023] The connector 22 includes an outer conductive shield 24, and an insulative housing 26 that holds a plurality of conductive terminals 28 (FIG. 1). Each of the terminals 28 has a tail portion 30 extending out of the housing 26 for termination to conductors on the circuit board 20. Opposite the tail portion 30, each terminal 28 has a contact portion 32 (FIGS. 3-6) residing within the housing 26 for engaging respectively mated terminals of the plug. As illustrated, the connector 22 has a 90-degree configuration such that the tail portions 30 are at right angles to a plug-in direction for the plug contact portions 32.

[0024] The conductive shield 24 substantially encloses the housing 26, having a front profiled portion 34 with a frontal opening for receiving the plug. The shield 24 generally wraps around the housing 26, having a seam 36 (FIG. 1) at which two edges of the shield 24 are secured together in a known manner. As illustrated in FIG. 1, the shield 24 includes a pair of side mounting legs 38 which extend from sides of the shield 24 downwardly through mounting holes in the circuit board 20. The illustrated connector 22 further includes a front mounting leg 40 which extends downwardly from an underside of the shield 24 for insertion through a mounting hole in the circuit board 20. Solder is applied to the mounting legs 38, 40 and terminals ends 30 at an underside of the circuit board 20 to establish conductive contact and to secure the connector 22 in its mounted position relative to the circuit board 20.

[0025] It has been found that such a connector 22, when conventionally mounted as illustrated in FIGS. 1 and 2, is susceptible to loosening from the circuit board 20 and possible failure when subjected to significant forces misaligned from the plug-in direction. For example, FIGS. 1 and 2 further illustrate the undesirable movement and repositioning of the connector 22 relative to the circuit board 20, which commonly occurs as the connector 22 is subjected to various forces. During use, the connector 22 is repeatedly subjected to forces resulting from the insertion, extraction, tugging and/or vibration of the plug. When such forces are excessive, or if such forces are applied to the connector 22 at an angle from the intended plug-in direction, the connector 22 may be forced to tilt forwardly or rearwardly, as shown in FIG.1, or to torsionally rotate rightwardly or leftwardly, as shown in FIG. 2. Such movement can cause separation of the seam 36 or loosening or bending of the mounting legs 38, 40 and terminal pins 38, or even worse, cause these elements to shear or break.

[0026] The present invention provides a device which facilitates fixedly mounting a connector with improved integrity, advantageously avoiding the problems described in connection with conventionally-mounted connectors as caused by external plug forces. Generally, this is accomplished by providing a bracket having embracing member supported by an adjacent panel, such as the panel of a computer box, the embracing member being shaped to which insertably receive a portion of the connector to maintain its alignment.

[0027] Now turning to FIGS. 3-13, in accordance with various embodiments of the invention, various connector assemblies are shown, including a connector and a mounting bracket. The connector may be of a conventional type, for example, the connector 10 described above in connection with FIGS. 1 and 2.

[0028] Referring to FIGS. 3-6, connector assemblies 50 (FIG. 3, 4) and 60 (FIGS. 5-6) are illustrated, each including connector 22 and a respective bracket 52, 62 configured for mounting against a panel, such as a panel 45 (FIGS. 4, 6) of a computer box . The bracket 52 shown in FIGS. 3 and 4, for example, includes an embracing member 54 defining an open interior shaped to closely receive and surround a perimeter of the front profiled portion 34 of the connector 22. In particular, the illustrated embracing member 54 includes a pair of parallel, opposed fist and second side walls 55 and a pair of parallel, opposed third and fourth upper and lower walls 56.

[0029] Additionally, the bracket 52 includes a generally planar front plate 56 having a mating opening 57 aligned with the opening in the shield 24 of the connector 22. In the embodiment illustrated in FIGS. 3 and 4, the planar front plate 56 forms a pair of upper and lower tabs 58 extending away from the mating opening 57, a screw hole 59 being disposed in each of the tabs 58.

[0030] FIG. 4 shows the connector as mounted to a circuit board 20 within a panel 45 of a fixed chassis, such as a computer box. The circuit board 20 is fixed by some conventional means (not shown) relative to the panel 45

of the computer box. The front plate 56 of the bracket 52 is positioned to abut the panel 45. Screws 47 (FIG. 4) are threaded through the screw holes 59 (FIG. 3), thereby fixing the bracket 52 to the panel 45. An opening is defined within the panel 45 corresponding in alignment with the mating opening 57 of the bracket 52 so that a plug can be inserted for mated connection with the connector 22 from externally of the panel 45.

[0031] The bracket 62 shown in FIGS. 5 and 6 also has an embracing member 63 similar the embracing member 54 described in connection with FIGS. 3 and 4, wherein the embracing member 63 is shaped to closely receive and surround a perimeter of the front profiled portion 34 of the connector 22. Additionally, the bracket 62 includes a generally planar front plate 64 having a mating opening 65 aligned with the opening in the shield 24 of the connector 22. In this embodiment, the front plate 64 has a pair of side tabs 66 extending away from opposite sides of the mating opening 65, a screw hole 68 being disposed in each of the side tabs 66.

[0032] Being fixed by screws 47 relative to the panel 45, the brackets 52 (FIGS. 3, 4) and 62 (FIGS. 5, 6) maintain the connector 22 in proper alignment relative to the panel 45 and the circuit board 20. The embracing member 54, 63 supports the profiled portion 34 of the connector shield 24 to resist movement in lateral directions. Accordingly, the bracket 54, 63 transmits lateral forces to the panel 45, reducing torsional forces against the connector 22 which could otherwise cause the mounting legs 38, 40 to loosen from the circuit board 20.

[0033] Now turning to FIGS. 7-9, another connector assembly 70 is illustrated according to an exemplary embodiment including a bracket which is integral to elements of the computer box. In particular, the integral bracket includes an embracing member 72 having two opposed sidewalls 74 and an upper wall 76 which project rearwardly from a planar panel 78. The panel 78 serves as a front plate of the bracket. An opening 80 is defined within the sidewalls 74 and upper wall 76 which is shaped to receive the front profiled portion 34 of the connector 22.

[0034] In the illustrated embodiment, the panel 78 includes a plurality mounting tabs 82 projecting rearwardly therefrom for mounting the panel 78 to a base 84. Particularly, each of the tabs 82 has a screw hole 86 disposed therein for receiving a threaded screw 88. The base 84 has screw holes 90 disposed therein which correspond in alignment to the screw holes 86 in the tabs 82, so that the screws 82 secure the panel 78 to the base 84. The screws 88 are illustrated as inserted from a bottom of the base 84, however, embodiments are possible in which the screws 88 are instead inserted from above.

[0035] The base 84 has an upwardly extending flange 92 configured to fit between the opposed side walls 74 of the embracing member 72. As shown in FIG. 8, the flange 92 contacts and supports a lower side of the profiled portion 34 of the connector 22, holding the connector 22 upwardly in the opening 80 of the panel 78. The connector is thereby open to an exterior side of the panel 78 for receiving a plug.

[0036] The walls 74, 76 of the embracing member and the flange 92 support the profiled portion 34 of the connector shield 24 to resist movement in lateral directions. Accordingly, the embracing member 72 of the integral bracket transmits lateral forces to the panel 78, reducing torsional forces against the connector 22 which could otherwise cause the mounting legs 38, 40 to loosen from the circuit board 20.

[0037] Referring now to FIGS. 10-12, a further exemplary embodiment is illustrated of a connector assembly 99 including an input/output connector 122 and a bracket 100. The bracket 100 includes a front plate 102 and a pair of opposed U-shaped embracing members 104 which project rearwardly from sides of the front plate 102. An opening 106 is generally formed within an interior of the embracing members 104 for receiving a portion of the connector 122 therein. The connector 122 does not extend forwardly through the opening in the bracket 100. However, the connector 122 fits snugly between the two U-shaped members 104.

[0038] In the assembly shown in FIGS. 10-12, the connector 122 has a horizontal configuration, as compared to the vertical configuration of the connector 22 shown in FIGS. 1-9. The connector 122 has an insulative housing 124 which holds conductive terminals 126. Each of the terminals 126 has a tail end that projects downwardly from the housing 124 for insertion through a circuit board 120 for contacting signal or power contacts. Additionally, the connector 122 has a conductive shield 124 that substantially encloses the housing 125 to reduce electromagnetic interference. The conductive shield 124, as shown, is generally U-shaped, having a top plate 128, and two side plates 130 extending downwardly from the top plate 128, thereby covering three sides of the rectilinear housing 125.

[0039] As illustrated in FIG. 10, the shield 124 includes a plurality of mounting legs 132 which extend downwardly from the side plates 130 for mountably engaging the circuit board 120. Additionally, the shield 120 includes a pair of teeth 134, each tooth 134 extending slightly downwardly from a forward location one of the side plates 130. When the connector 122 is inserted into the bracket 100, each tooth 134 fits slidably into a respective groove 136 formed interiorly in the bracket 100. Thereby, the grooves 136 limit the amount of insertion of the teeth 134 to thereby position of the connector 122 in the bracket 100 at a desired position. A notch 138 may also be disposed in each of the embracing members 104 for accommodating and supportably engaging an edge of the circuit board 120, as shown in FIG. 12.

[0040] The bracket 100 includes a front plate 100 having an opening therein which corresponds to a plug opening in the connector 122. The two U-shaped embracing members define a receptacle for receiving the connector. The shield of the connector does not extend

through the opening in the bracket. However, the connector fits snugly between the two U-shaped members.

[0041] As illustrated in FIG. 11, the shield 124 does not extend across a bottom portion of the housing. Accordingly, when the connector 122 has been conventionally mounted on a circuit board, without the bracket 100, the shield 124 has been known to deflect as a result of plug forces. In particular, the side plates 130 may tend to spread apart, thereby loosening the shield 124 relative to the housing 125, when conventionally mounted. This problem is solved by the bracket 100, however. The bracket 100 constrains the shield 124 in its desired shape and position.

[0042] FIG. 12 illustrates the connector 122 and bracket 100 in an assembled condition in a computer. The connector 122 is mounted to the circuit board 120, the mounting legs 132 extending through the circuit board 120. The bracket 100 receives a front portion of the mounted connector 122, and the front plate 102 of the bracket 100 abuts against an interior surface of a panel 145 of a computer box. The bracket 100 helps transmit undesirable forces from the plug to the panel 145 and/or to the circuit board 120. In particular, the planar contact between the front plate 102 and the panel 145, and the contact between the notches 138 of the embracing members 104 against the circuit board 120, helps prevent undesirable shifting of the connector 122 on the circuit board 120.

[0043] Also shown in FIG. 12, the connector assembly 122 can additionally include a resilient, conductive tongue 150 which is affixed to the panel of a computer box 145. The tongue 150 is deflected to apply a downward bias in contact against a portion of the shield which is exposed rearwardly of the bracket 100. This contact completes a circuit for electrically commoning the computer box 145 and the shield 124 for improved grounding. Additionally, the downward bias of the tongue 150 against the connector 122 helps hold the connector in a desired position.

[0044] In an embodiment, the bracket 100 is made of plastic. The bracket 100 can be colored a desired color to enhance the appearance of a computer or other device in which the connector assembly is used. For example, in an embodiment wherein the panel 145 is constructed of transparent or translucent material, the bracket 100 can be colored to match or complement the color of the panel 145. Of course, in such an embodiment wherein the panel 145 is constructed of a non-conductive material, a ground wire could be connected to the tongue 150.

[0045] Although the present invention has been described with reference to the preferred embodiment thereof, it will be understood that the invention is not limited to the specific features of the described embodiment. Various substitutions and modifications to the present invention will be apparent to those skilled in the art. Such substitutions and modifications may be made without departing from the spirit and scope of the invention. Therefore, all such substitutions and modifications are intended to be embraced within the scope of the invention as defined in the appended claims.

Claims

1. A bracket (52, 62, 72, 100) for receiving a mating portion of an input/output electrical connector (22, 122), said bracket comprising:

a front plate (56, 64, 78, 102) having an opening therein, said front plate having a front surface and a rear surface, and said opening (57, 65, 80, 106) extending between said front and said rear surface, said front surface being generally planar; and
an embracing member (54, 63, 72, 104) comprising a first wall and a second wall extending from said rear surface of said front plate (56, 64, 78, 102) at opposite first and second edges of said opening, said first wall and said second wall being parallel to each other and a third wall extending transversely to said first wall and said second wall from a third edge of said opening (57, 65, 80, 106), said first wall, said second wall and said third wall together defining a receptacle about said opening for receiving the mating portion of the electrical connector (22, 122).

2. The bracket (52, 62) of claim 1 wherein said front plate (56, 64) of said bracket comprises apertures therein for receiving means for mounting (47) said bracket to a panel (45) of a computer box.

3. The bracket (52, 62) of claim 2 wherein said front surface of said front plate is mounted against said panel (45) of a computer box.

4. The bracket (52, 62) of claim 1 further comprising a fourth wall extending from said rear surface of said front plate (56, 64) at a fourth edge of said opening opposite to said third edge of said opening.

5. The bracket (72) of claim 1 wherein said front plate is a panel (78) of a computer box.

6. The bracket of claim 1 in combination with said electrical connector (22, 122).

7. An electrical connector assembly (50, 60, 70, 99) comprising:

a connector (22, 122) including:
an insulative housing (26, 125) including a plurality of terminal receiving cavities;
a plurality of terminals (28, 126) disposed in

said terminal-receiving cavities, each said terminal comprising a contact portion for mating to a terminal of a mating connector and a tail portion for mating with a conductor on a circuit board (20, 120); a conductive shield (24, 124) covering the housing, said shield having an opening for engagement with a mated plug; and a bracket (32, 62, 72, 100) embracing said shield; said bracket including a front plate (56, 64, 78, 102) with a mating opening therein, said front plate having a mating opening aligned with said opening in said shield, said front plate having a front surface and rear surface, said rear surface of said front plate, and interior surfaces of said embracing member abutting against exterior surfaces of said shield.

8. The electrical connector assembly of claim 7, wherein said front surface of said bracket (32, 62, 72, 100) is adapted to be mounted against a panel about an opening in the panel.

9. The electrical connector assembly (99) of claim 8 in combination with a conductive tongue (150) for electrically commoning the panel (145) to said shield (124).

10. The electrical connector assembly (99) of claim 7 wherein said embracing member comprises two U-shaped members (104) that embrace lateral sides of said shield.

11. The electrical connector assembly (99) of claim 10, wherein said front plate (102) extends laterally outwardly of each of said embracing members (104).

12. The electrical connector assembly (99) of claim 7, wherein said bracket (100) is unitarily formed.

13. The electrical connector assembly (99) of claim 12, wherein the bracket (100) is made of plastic.

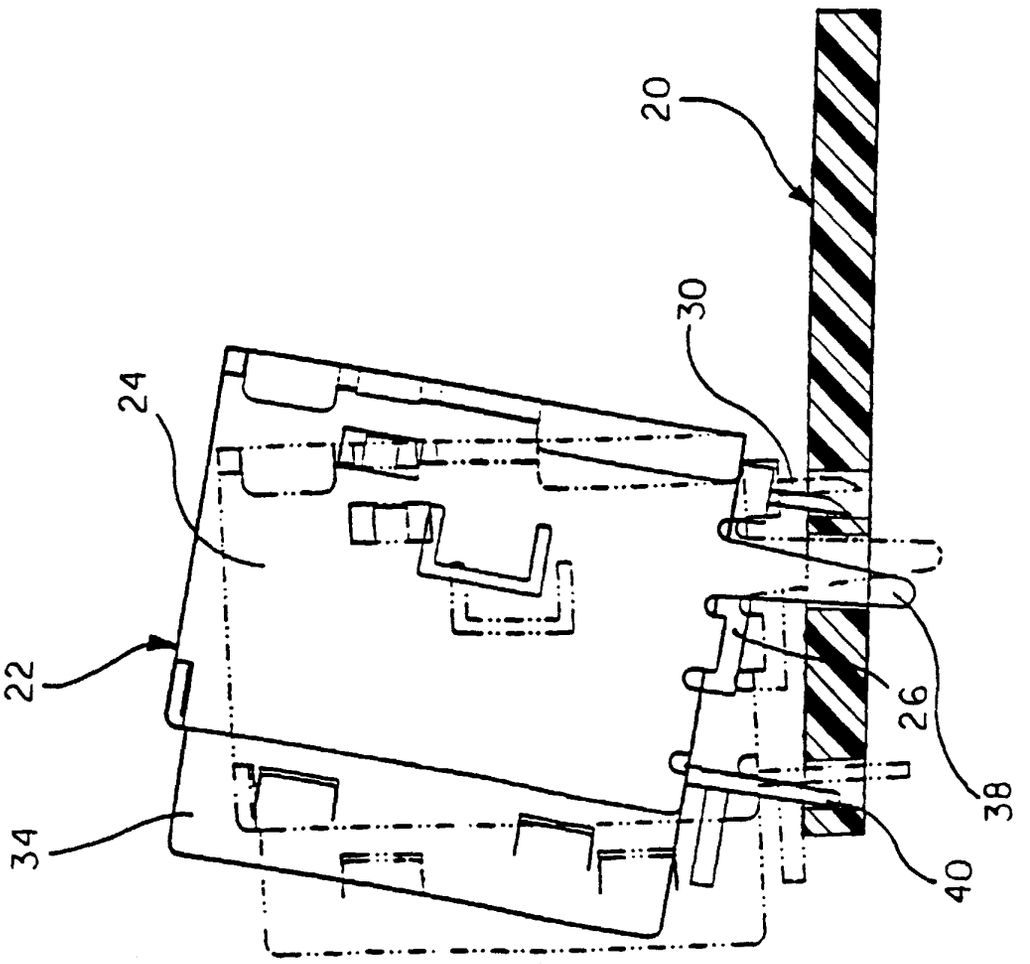

FIG. 1
(PRIOR ART)

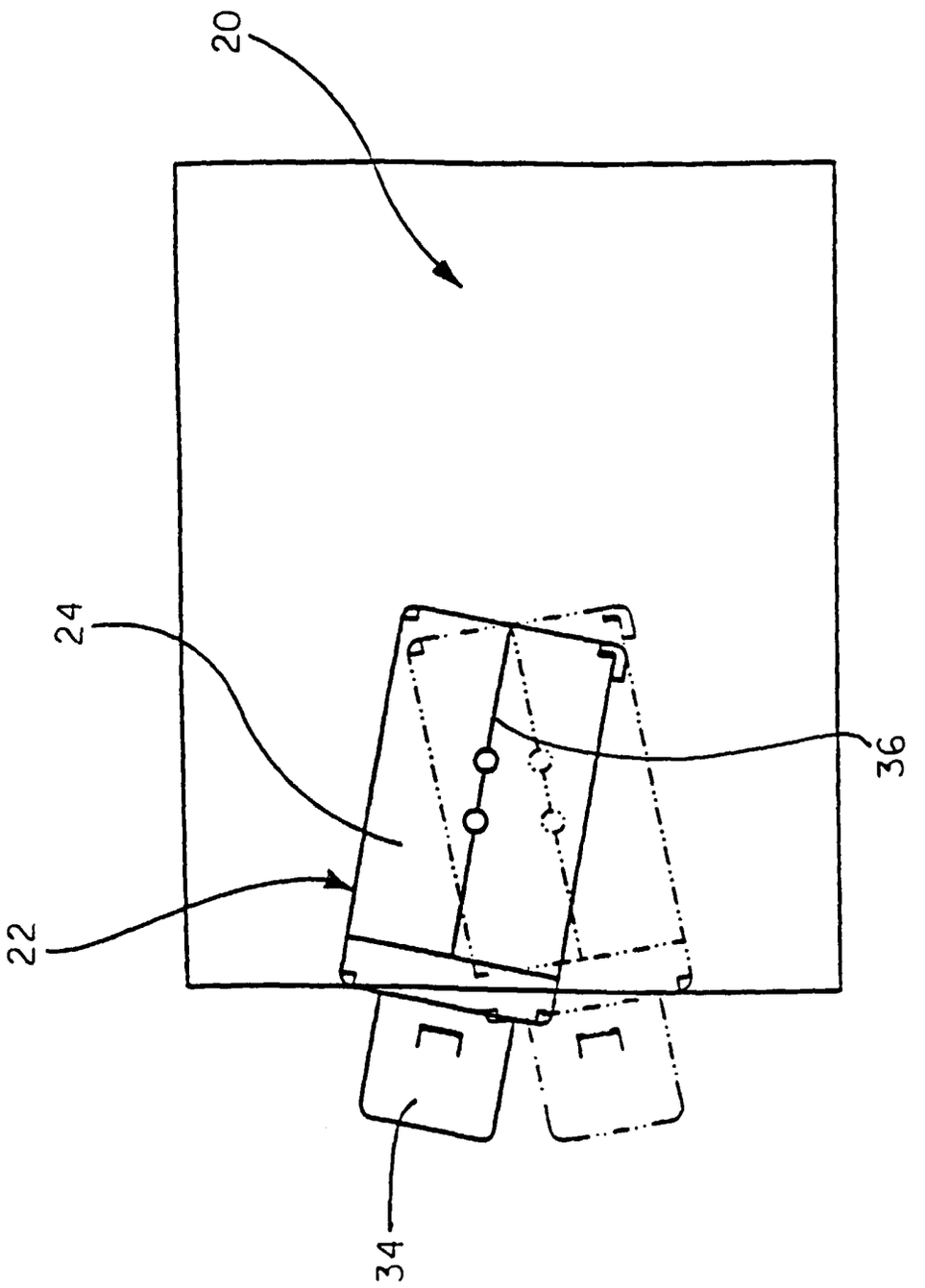

FIG. 2
(PRIOR ART)

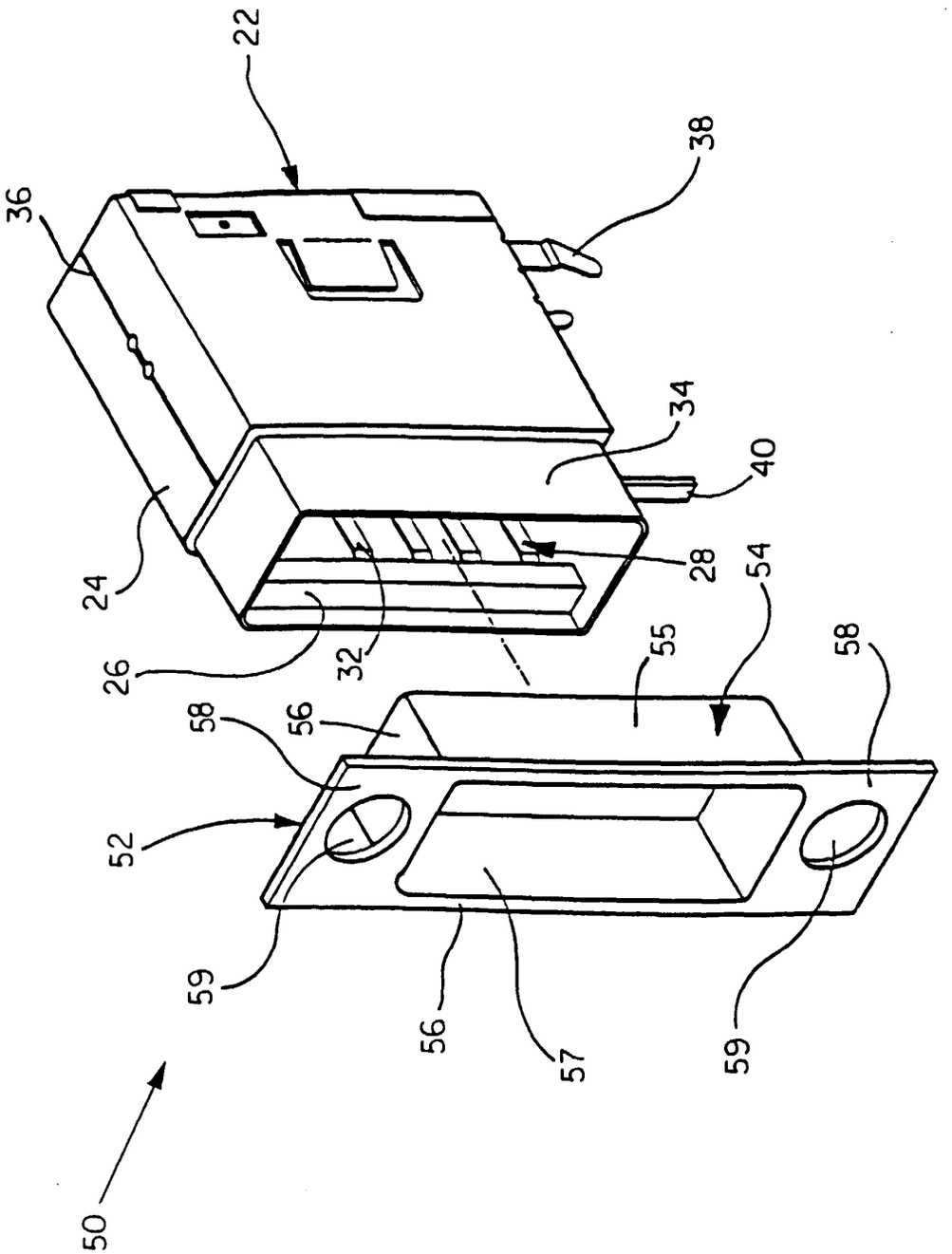

FIG. 3

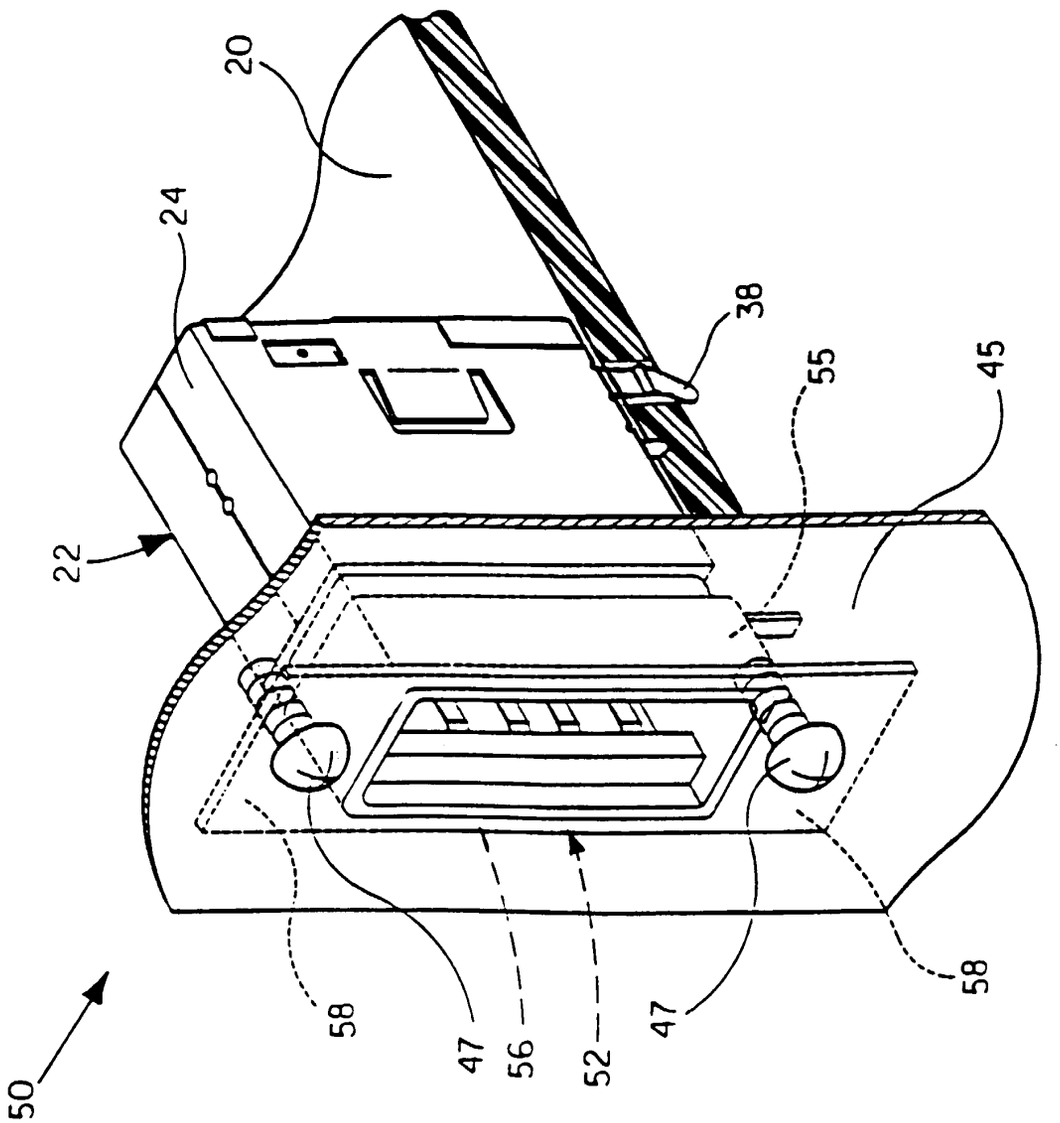

FIG. 4

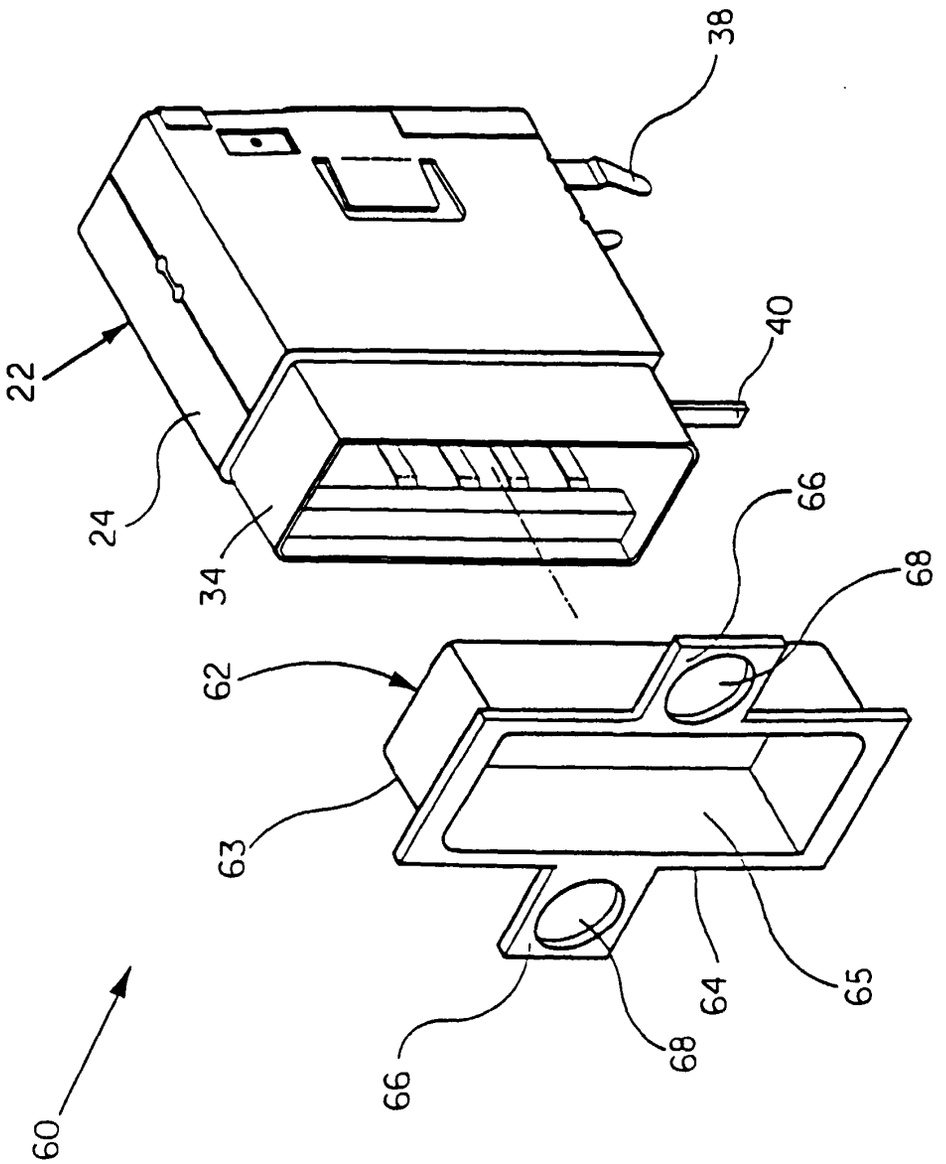

FIG. 5

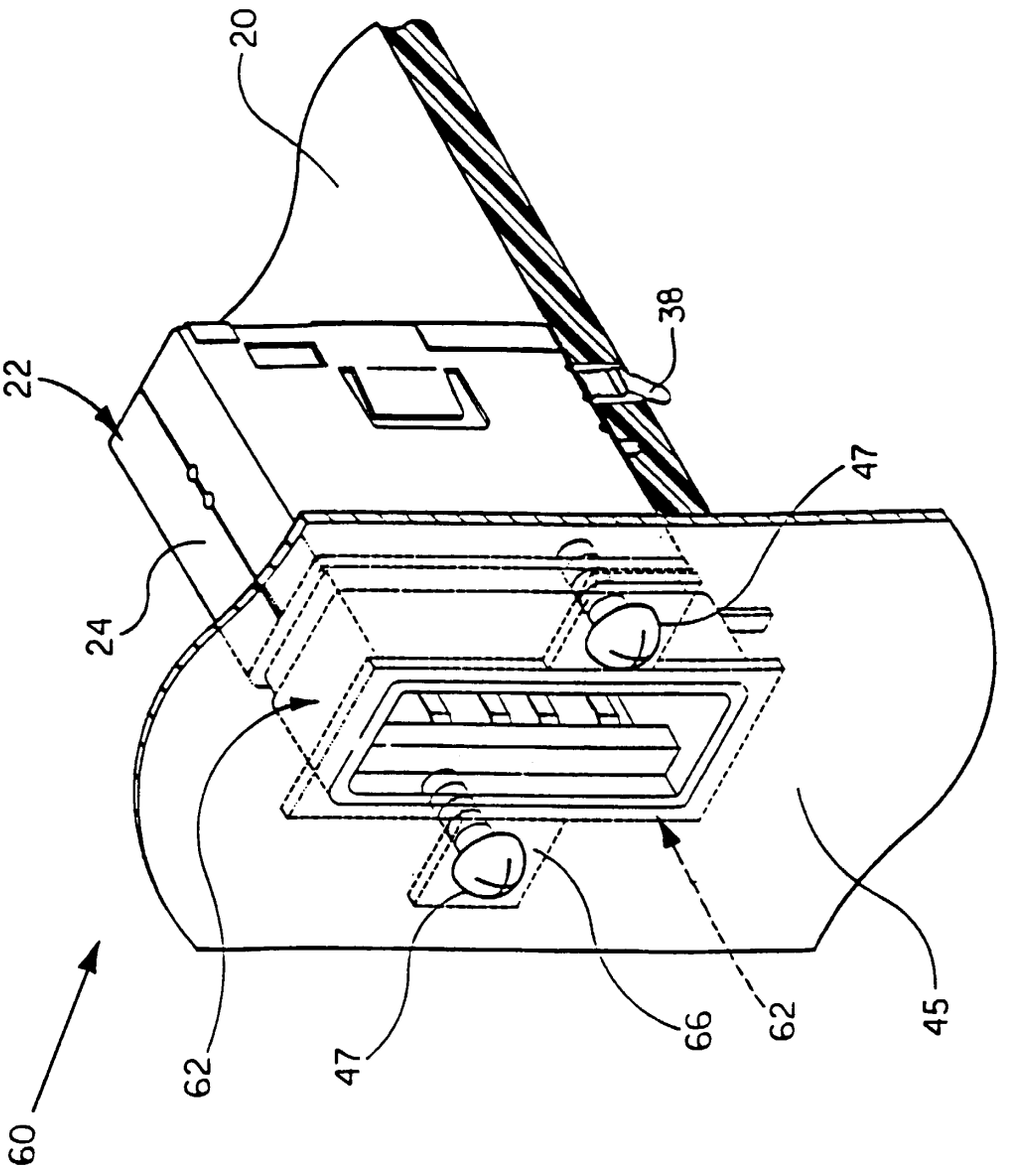

FIG. 6

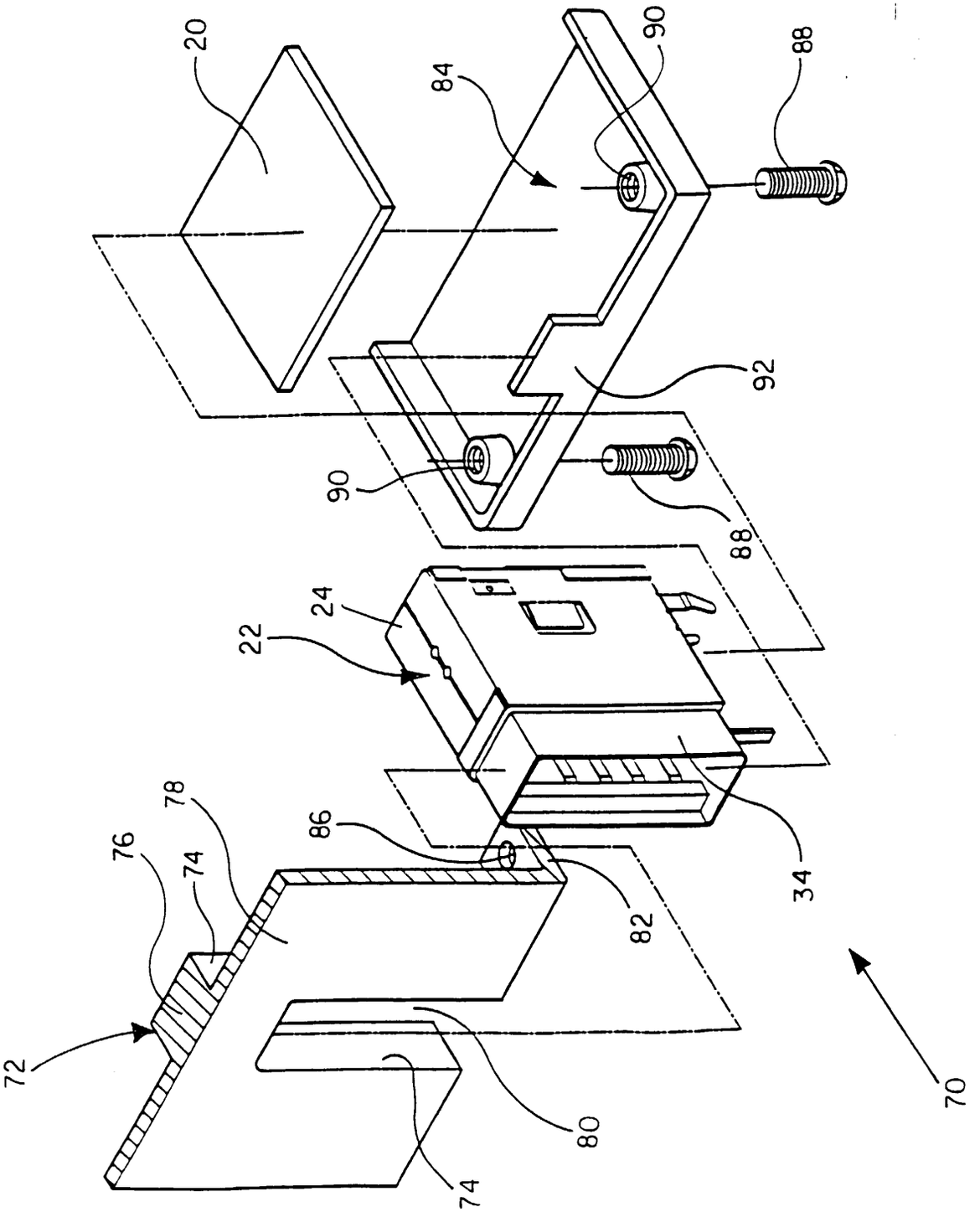

FIG. 7

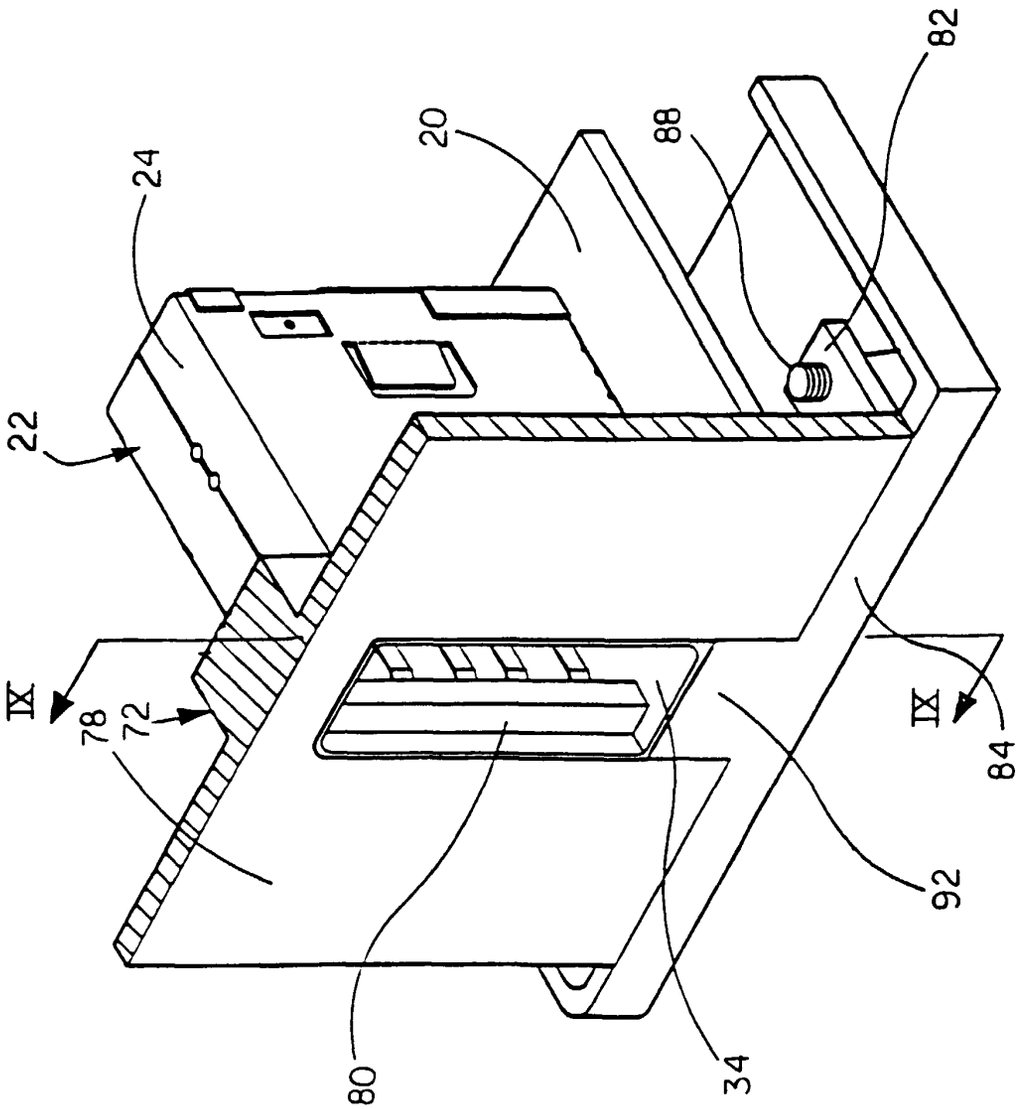

FIG. 8

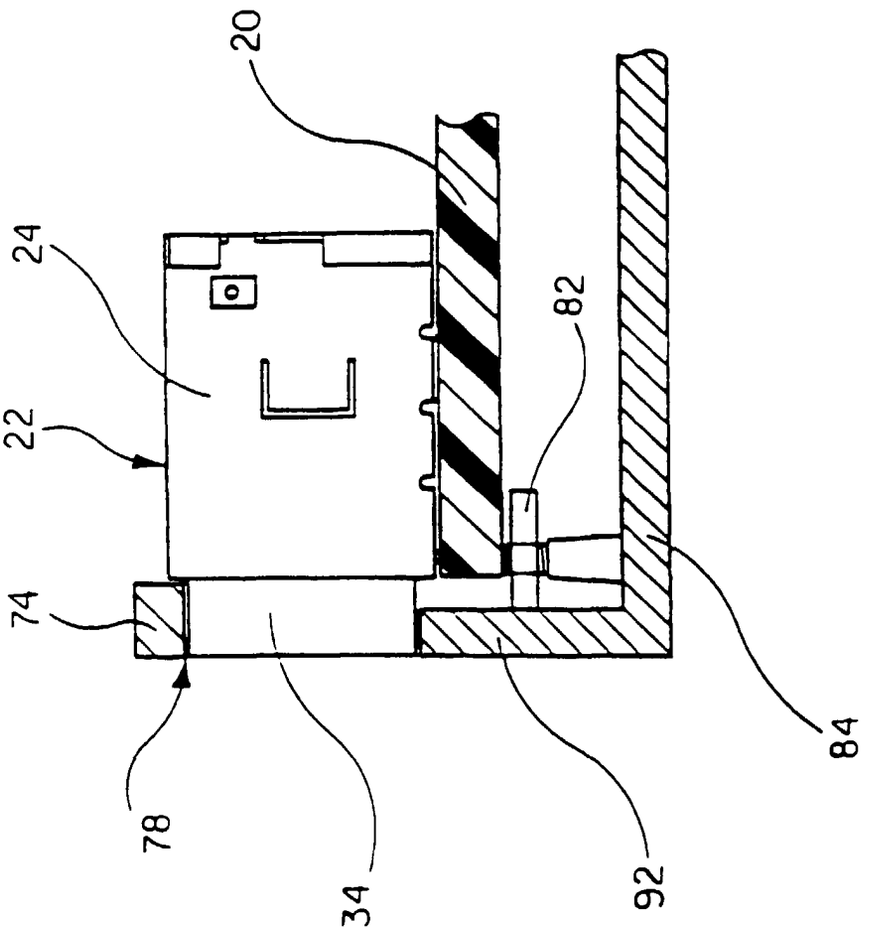

FIG. 9

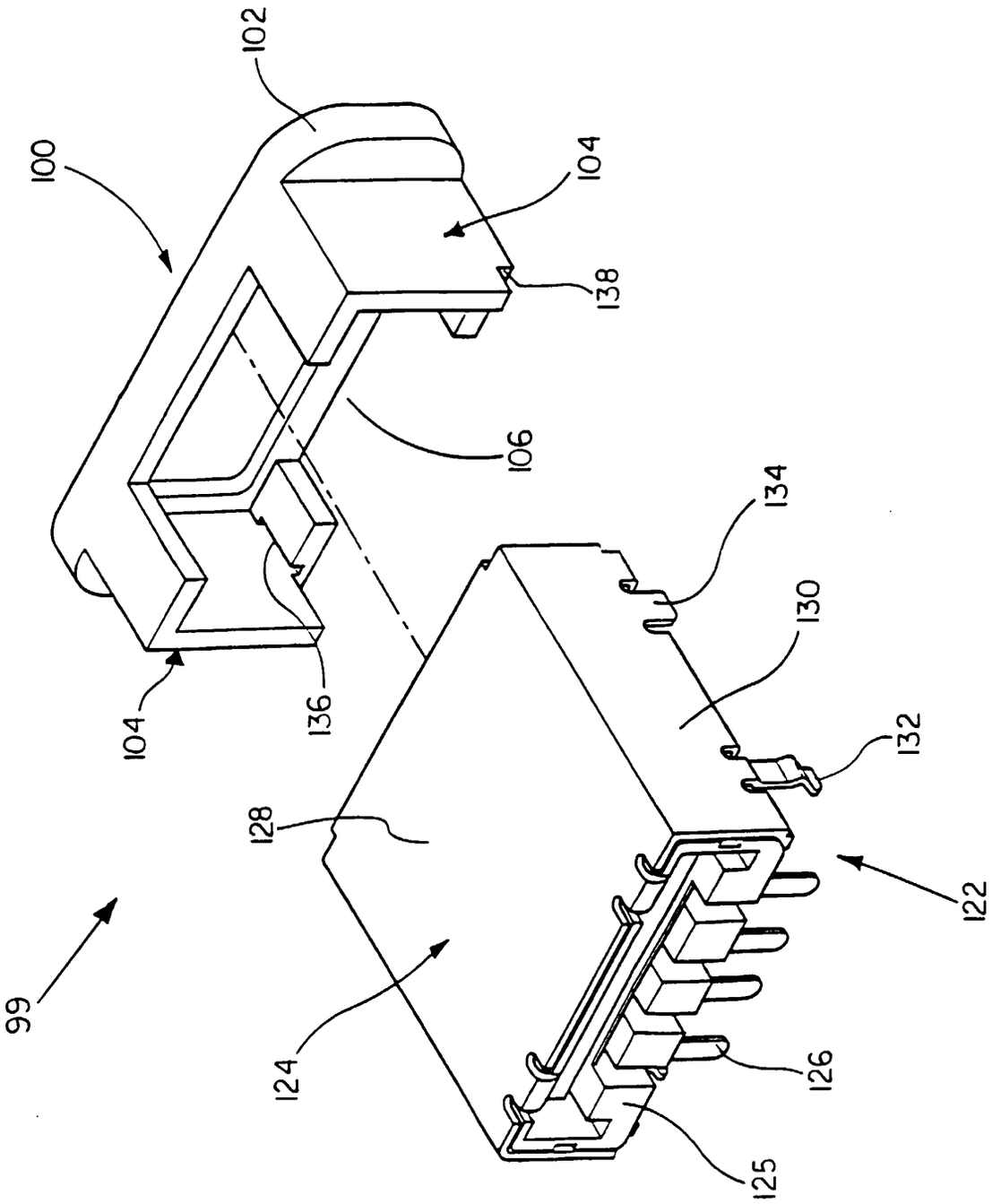

FIG. 10

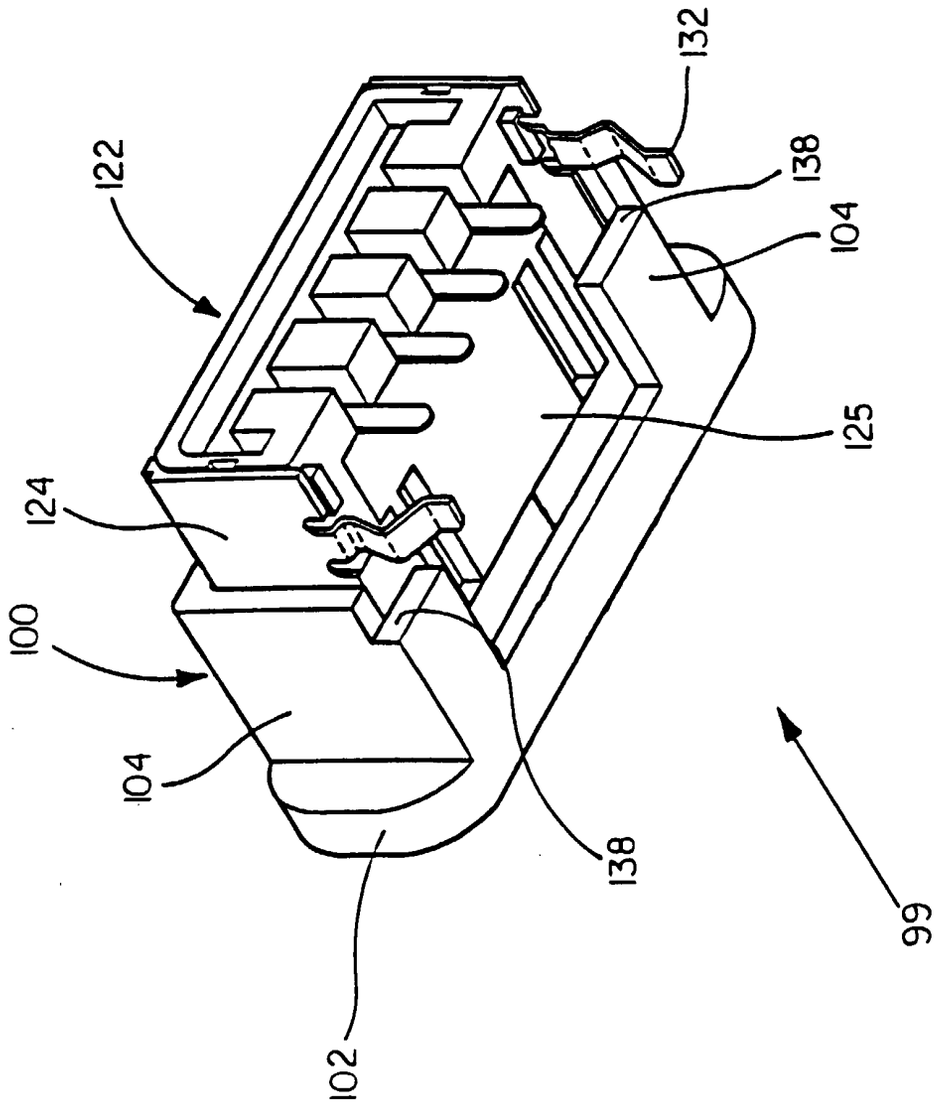

FIG. 11

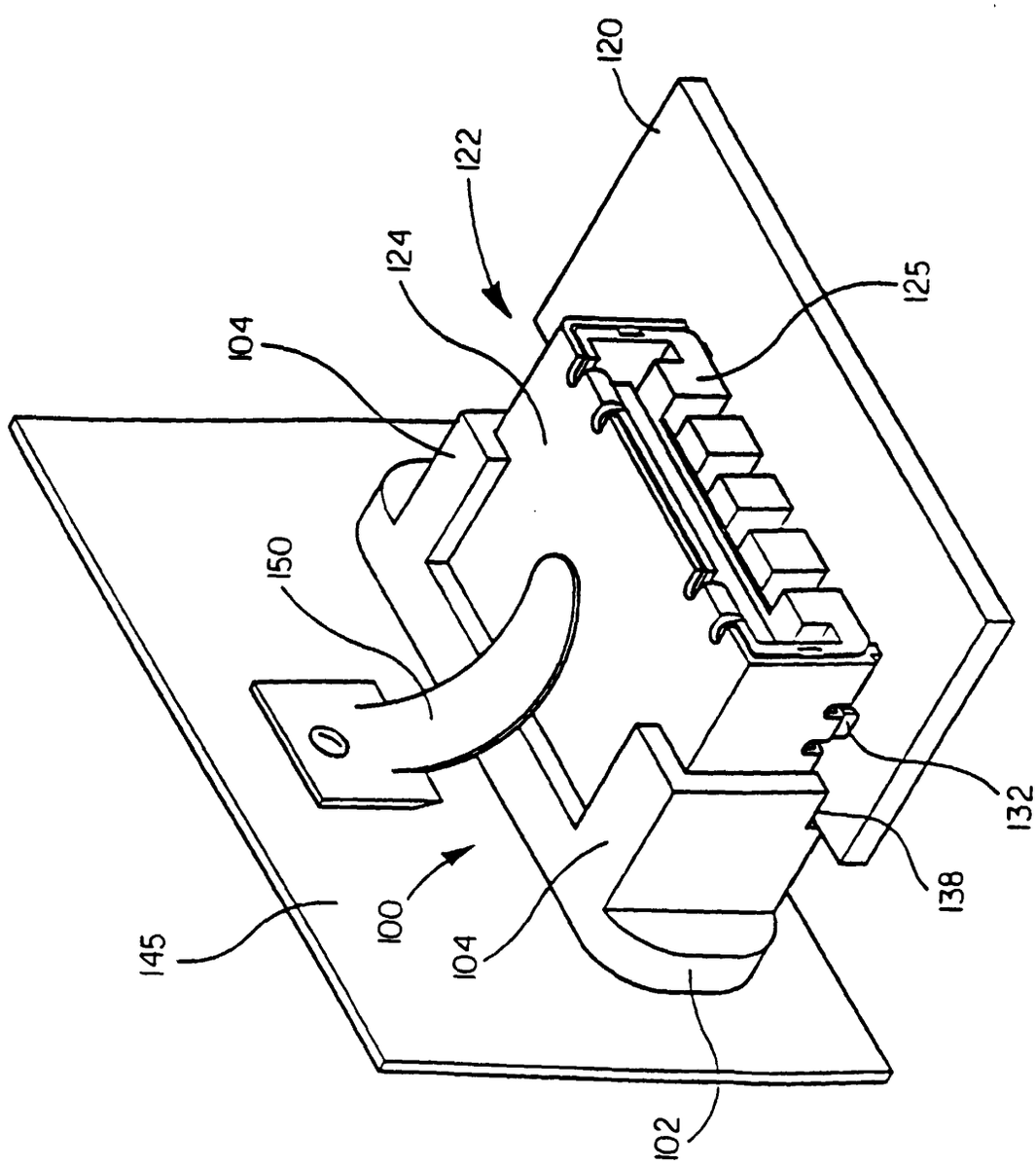

FIG. 12

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 11 7035

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.7)
X Y	US 5 895 289 A (SMITH TRACY LEE) 20 April 1999 (1999-04-20) * abstract; figures 1,2,3B,4 * * column 1, line 61 - column 2, line 48 *	1,4,6 2,3,5,7, 8,10,11, 13	H01R13/74
Y	US 5 254 010 A (DAVIS WAYNE S) 19 October 1993 (1993-10-19) * abstract; figures 7,9 * * column 5, line 30 - column 7, line 8 *	2,3,5,7, 8,10,11, 13	
A	EP 0 637 858 A (SIEMENS AG) 8 February 1995 (1995-02-08) * abstract; figures 2,3 * * column 2, line 44 - column 4, line 42 *	9,12	
A	US 5 865 646 A (ORTEGA JOSE L ET AL) 2 February 1999 (1999-02-02) * abstract; figures 1,2 * * column 2, line 28 - column 3, line 40 *	1,2	TECHNICAL FIELDS SEARCHED (Int.Cl.7) H01R
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	4 February 2000	Serrano Funcia, J

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 11 7035

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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