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(54) **Electrical connector having a filtering circuit**

(57) An electrical connector includes a dielectric housing (3) having a front open end (30) permitting insertion of an electrical plug (6) thereto. A circuit board (4) is disposed in the dielectric housing (3) and parallel to a bottom wall (311, 34) of the dielectric housing (3), and is mounted with a filtering circuit (41). A conductive terminal unit (5) includes a set of first conductive terminals (51) connected electrically to the electrical plug (6) when the electrical plug (6) is inserted into the front open

end (30) of the dielectric housing (3), and a set of second conductive terminals (52) extending through the bottom wall (34) of the dielectric housing (3). Each first conductive terminal (51) has a first end (511) coupled electrically to the filtering circuit (41), and a second end (512) extending into the front open end (30) of the dielectric housing (3). Each second conductive terminal (52) has a first end (521) coupled electrically to the filtering circuit (41), and a second end (522) disposed outwardly of the dielectric housing (3).

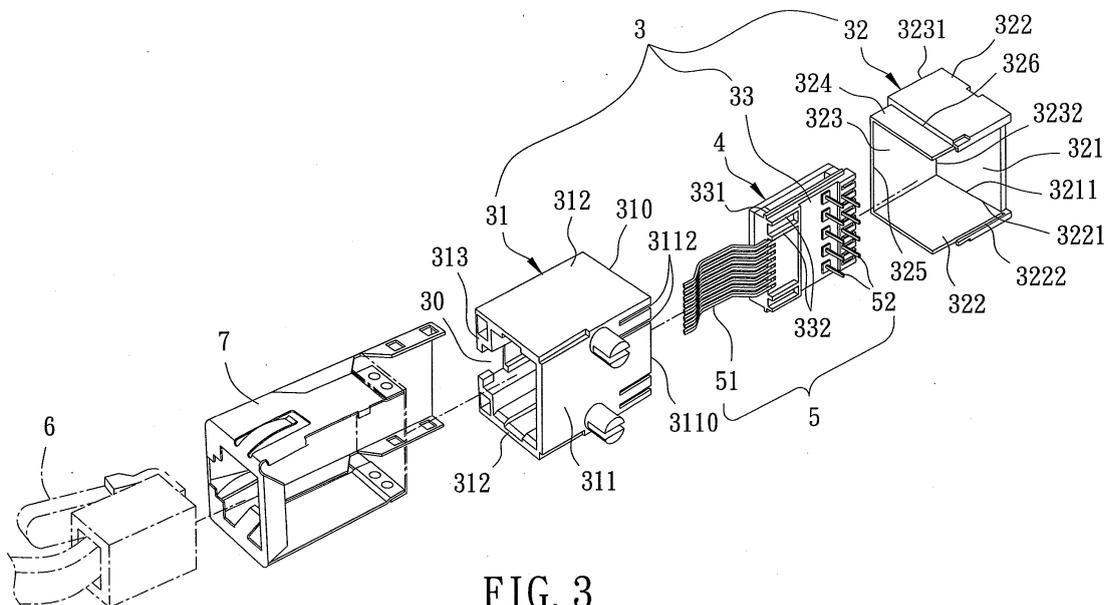


FIG. 3

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Description

[0001] The invention relates to an electrical connector, more particularly to an electrical connector adapted to be coupled electrically to an electrical plug used in telephone or network communications.

[0002] Referring to Figures 1 and 2, a conventional electrical connector for coupling electrically with an electrical plug 17, such as a RJ-45 plug, is shown to include a dielectric housing 11 configured as a rectangular tube, an L-shaped positioning plate 14, a terminal-mounting plate 16, a circuit board 12, a set of first conductive terminals 13, and a set of second conductive terminals 15.

[0003] The dielectric housing 11 has a front open end 111 permitting insertion of the electrical plug 17 thereinto, and a rear open end 112.

[0004] The positioning plate 14 is disposed in the dielectric housing 11, and has a terminal-mounting plate portion 141 disposed parallel and adjacent to a top wall 113 of the dielectric housing 11, and a board-mounting plate portion 142 connected integrally to a rear end 1411 of the terminal-mounting plate portion 141.

[0005] The circuit board 12 is disposed parallel to and in proximity to the board-mounting plate portion 142 of the positioning plate 14, and has a first surface 121 facing the board-mounting plate portion 142, and a second surface 122 opposite to the first surface 121 and mounted with a filtering circuit (not shown).

[0006] The first conductive terminals 13 are embedded in the terminal-mounting plate portion 141 of the positioning plate 14, and are connected electrically to and press against the electrical plug 17 when the electrical plug 17 is inserted into the front open end 111 of the dielectric housing 11. Each first conductive terminal 13 has a first end 131 extending outwardly of a rear end 1411 of the terminal-mounting plate portion 141 of the positioning plate 14 through the circuit board 12, welded to the second surface 122 of the circuit board 12 so as to anchor the circuit board 12 to the board-mounting plate portion 142 of the positioning plate 13, and coupled electrically to the filtering circuit via a printed wiring (not shown), and a second end 132 extending outwardly of a front end 1412 of the terminal-mounting plate portion 141 of the positioning plate 14 and then bent toward the board-mounting plate portion 142 of the positioning plate 14.

[0007] The terminal-mounting plate 16 has a first surface 161 facing the second surface 122 of the circuit board 12, and a second surface 162 adjacent to the first surface 161 and perpendicular to the second surface 122 of the circuit board 12.

[0008] The second conductive terminals 15 are embedded in the terminal-mounting plate 16. Each second conductive terminal 15 has a first end 151 extending outwardly of the first surface 161 of the terminal-mounting plate 16 through the circuit board 12, welded to the first surface 121 of the circuit board 12 so as to anchor the terminal-mounting plate 16 to the circuit board 12, and

coupled electrically to the filtering circuit via a printed wiring, and a second end 152 extending outwardly of the second surface 162 of the terminal-mounting plate 16.

[0009] As such, an assembly of the positioning plate 14, the circuit board 12, the first and second conductive terminals 13, 15, and the terminal-mounting plate 16 is capable of being inserted into the rear end 122 of the dielectric housing 11.

[0010] A metal shielding member 18 is mounted on the dielectric housing 11 for electromagnetic interference shielding.

[0011] The following are some of the drawbacks of the aforesaid conventional electrical connector:

1. Since the filtering circuit occupies a certain area of the second surface 122, and since the circuit board 12 is perpendicular to the top wall 113 of the dielectric housing 11, the thickness of the conventional electrical connector is increased.

2. Since the terminal-mounting plate 16 is anchored to the circuit board 12 by welding the first ends 151 of the second conductive terminals 15 to the circuit board 12, and since the terminal-mounting plate 16 is perpendicular to the circuit board 12, an unexpected force acting on the terminal-mounting plate 16 may result in damage to the second conductive terminals 15. Similarly, since the circuit board 12 is anchored to the board-mounting plate portion 142 of the positioning plate 14 by welding the first ends 131 of the first conductive terminals 13 to the circuit board 12, and since the circuit board 12 is perpendicular to the terminal-mounting plate portion 141 of the positioning plate 14, an unexpected force acting on the circuit board 12 may result in damage to the first conductive terminals 13.

3. The first ends 131, 151 of the first and second conductive terminals 13, 15 are respectively welded to the second and first surfaces 122, 121 of the circuit board 12. As such, assembly of the first and second conductive terminals 13, 15 onto the circuit board 12 is difficult to be performed in a single step.

[0012] Therefore, the object of the present invention is to provide an electrical connector that is thinner and that can eliminate the aforesaid drawbacks of the prior art.

[0013] According to the present invention, there is provided an electrical connector adapted to be coupled electrically to an electrical plug. The electrical connector comprises:

a dielectric housing having a front open end adapted to permit insertion of the electrical plug thereinto, and a bottom wall;

a circuit board disposed in the dielectric housing and parallel to the bottom wall of the dielectric housing, the circuit board being mounted with a filtering circuit; and

a conductive terminal unit including

a set of first conductive terminals each having a first end coupled electrically to the filtering circuit, and a second end extending into the front open end of the dielectric housing, the first conductive terminals being adapted to be in electrical connection with the electrical plug when the electrical plug is inserted into the front open end of the dielectric housing, and
 a set of second conductive terminals extending through the bottom wall of the dielectric housing, each of the second conductive terminals having a first end coupled electrically to the filtering circuit, and a second end disposed outwardly of the dielectric housing.

[0014] Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiment with reference to the accompanying drawings, of which:

Figure 1 is a partly exploded perspective view of a conventional electrical connector;

Figure 2 is an exploded view showing first conductive terminals, a positioning plate, a circuit board, and a terminal-mounting plate mounted with second conductive terminals of the conventional electrical connector;

Figure 3 is a partly exploded perspective view showing the preferred embodiment of an electrical connector according to the present invention;

Figure 4 is a partly sectional schematic view showing the preferred embodiment;

Figure 5 is a schematic sectional view showing a front housing member of the preferred embodiment; and

Figure 6 is an exploded perspective view showing a conductive terminal unit, a circuit board, and a positioning plate of the preferred embodiment.

[0015] Referring to Figures 3 and 4, the preferred embodiment of an electrical connector according to the present invention is shown to be adapted to be coupled electrically to an electrical plug 6 used in telephone or network communications. The electrical connector includes a dielectric housing 3, a circuit board 4, and a conductive terminal unit 5.

[0016] The dielectric housing 3 has a front open end 30 adapted to permit insertion of the electrical plug 6 thereinto, and a bottom wall that will be described in detail in the succeeding paragraphs.

[0017] In this embodiment, the dielectric housing 3 includes a front housing member 31, a rear housing member 32, and a positioning plate 33.

[0018] With further reference to Figure 5, the front housing member 31 is configured as a rectangular tube, and has a bottom wall 311, two side walls 312 extending

respectively and upwardly from two sides 3111 of the bottom wall 311 of the front housing member 31, and a top wall 313 having two sides 3131 connected respectively and integrally to upper ends 3121 of the side walls 312. In this embodiment, the front housing member 31 is formed with a vertical stop plate 314 fixed therein and cooperating with the bottom wall 311, the side walls 312 and the top wall 313 to define a plug-receiving space 316 adapted for receiving the electrical plug 6, as shown in Figure 4. The vertical stop plate 314 has a plurality of vertical slots 3141 formed therethrough. The bottom wall 311 of the front housing member 31 has a plurality of open-ended slots 3112 that are formed therethrough and that extend forwardly from a rear end 3110 thereof, as shown in Figure 3. Furthermore, the bottom wall 311 of the front housing member 31 has a top surface 3113 that is formed with positioning grooves 315.

[0019] The rear housing member 32 has a top wall 323, two side walls 322 extending respectively and downwardly from two opposite sides 3231 of the top wall 323, and a rear wall 321 extending downwardly from a rear end 3232 of the top wall 323 and having two opposite sides 3211 connected respectively and integrally to rear ends 3221 of the side walls 322, as shown in Figure 3.

The rear housing member 32 is connected removably to a rear end 310 of the front housing member 31 to thereby define an opening 34 (see Figure 4) among the bottom wall 311 of the front housing member 31, the side walls 322 of the rear housing member 32, and the rear wall 321 of the rear housing member 32. In this embodiment, the rear housing member 32 has a neck 324 at a front end 325 thereof and press-fitted within the rear end 310 of the front housing member 31, an inverted U-shaped shoulder 326 connected to the neck 324 and abutting against the rear end 310 of the front housing member 31, as shown in Figure 4, and two aligned open-ended guide slots 3222 (only one is shown in Figure 3) formed respectively in inner surfaces of the side walls 322 of the rear housing member 32.

[0020] The positioning plate 33 is fitted within the opening 34, abuts against the stop plate 314 of the front housing member 31, and is connected removably to the front and rear housing members 31, 32, as shown in Figure 4. The positioning plate 33 cooperates with the bottom wall 311 of the front housing member 31 to constitute the bottom wall of the dielectric housing 3. In this embodiment, the positioning plate 33 is formed with a plurality of vertical ribs 332 (see Figure 3) engaging respectively the open-ended slots 3112 in the front housing member 31, and two wings 331 (only one is shown in Figure 3) disposed respectively at opposite sides thereof and received respectively and slidably within the guide slots 3222 in the rear housing member 32 so as to allow for removal from the rear housing member 32.

[0021] The circuit board 4 is disposed in the dielectric housing 3 and parallel to the bottom wall of the dielectric housing 3, and is mounted with a filtering circuit 41. In this embodiment, the circuit board 4 is fixed on the posi-

tioning plate 33, and has a top surface 42 on which the filtering circuit 41 is mounted, as shown in Figure 4.

[0022] With reference to Figures 3, 4 and 6, the conductive terminal unit 5 includes a set of first conductive terminals 51, and a set of second conductive terminals 52. In this embodiment, each first conductive terminal 51 has a first end 511 extending through the positioning plate 33 and the circuit board 4, welded to the top surface 42 of the circuit board 4, and coupled electrically to the filtering circuit 41 via a printed wiring (not shown), and a second end 512 extending into the front open end 30 of the dielectric housing 3 and engaging a corresponding one of the positioning grooves 315 in the bottom wall 311 of the front housing member 31, as shown in Figure 4. The first conductive terminals 51 are adapted to be in electrical connection with the electrical plug 6 when the electrical plug 6 is inserted into the front open end 30 of the dielectric housing 3. In this embodiment, each second conductive terminal 52 extends through the positioning plate 33, and has a first end 521 extending through the circuit board 4, welded to the top surface 42 of the circuit board 4, and coupled electrically to the filtering circuit 41 via a printed wiring (not shown), and a second end 52 disposed outwardly of the positioning plate 33 of the dielectric housing 3, as shown in Figure 4.

[0023] The electrical connector further includes a metal shielding member 7 formed by pressing a metal plate in a known manner and mounted on the dielectric housing 3 for electromagnetic interference shielding, as shown in Figure 4.

[0024] The following are some of the advantages attributed to the electrical connector of the present invention:

1. Since the circuit board 4 mounted with the filtering circuit 41 is mounted on the positioning plate 33 (i.e., a part of the bottom wall of the dielectric housing 3) and is disposed parallel to the bottom wall of the dielectric housing 3, the electrical connector of the present invention can be configured to have a thinner thickness.
2. Since the first and second conductive terminals 51, 52 are positioned on the single positioning plate 33, and since the circuit board 4 is disposed parallel to the positioning plate 33, damage to the first and second conductive terminals 51, 52 and unintentional removal of the same from the circuit board 4 during assembly can be prevented.
3. The first ends 511, 521 of the first and second conductive terminals 51, 52 can be welded to the top surface 42 of the circuit board 4 in a single step, thereby resulting in a simplified fabrication process.

Claims

1. An electrical connector adapted to be coupled electrically to an electrical plug (6), said electrical con-

necter **characterized by:**

a dielectric housing (3) having a front open end (30) adapted to permit insertion of the electrical plug (6) thereto, and a bottom wall;
 a circuit board (4) disposed in said dielectric housing (3) and parallel to said bottom wall of said dielectric housing (3), said circuit board (4) being mounted with a filtering circuit (41); and
 a conductive terminal unit (5) including
 a set of first conductive terminals (51) each having a first end (511) coupled electrically to said filtering circuit (41), and a second end (512) extending into said front open end (30) of said dielectric housing (3), said first conductive terminals (51) being adapted to be in electrical connection with the electrical plug (6) when the electrical plug (6) is inserted into said front open end (30) of said dielectric housing (3), and
 a set of second conductive terminals (52) extending through said bottom wall of said dielectric housing (3), each of said second conductive terminals (52) having a first end (521) coupled electrically to said filtering circuit (41), and a second end (522) disposed outwardly of said dielectric housing (3).

2. The electrical connector as claimed in Claim 1, **characterized in that** said circuit board (4) has a top surface (42), said first ends (511, 521) of said first and second conductive terminals (51, 52) being welded to said top surface (42) of said circuit board (4).

3. The electrical connector as claimed in Claim 1, **characterized in that** said dielectric housing (3) includes:

a front housing member (31) configured as a rectangular tube and having a bottom wall (311), two side walls (312) extending respectively and upwardly from two sides (3111) of said bottom wall (311) of said front housing member (31), and a top wall (313) having two sides (3131) connected respectively and integrally to upper ends (3121) of said side walls (312); and
 a rear housing member (32) having a top wall (323), two side walls (322) extending respectively and downwardly from two opposite sides (3231) of said top wall (323) of said rear housing member (32), and a rear wall (321) extending downwardly from a rear end (3232) of said top wall (323) and having two opposite sides (3211) connected respectively and integrally to rear ends (3221) of said side walls (322) of said rear housing member (32), said rear housing member (32) being connected removably to a rear end (310) of said front housing member (31) to

thereby define an opening (34) among said bottom wall (311) of said front housing member (31), said side walls (322) of said rear housing member (32), and said rear wall (321) of said rear housing member (32); and
 a positioning plate (33) fitted within said opening (34) and connected removably to said front and rear housing members (31, 32), said positioning plate (33) cooperating with said bottom wall (311) of said front housing member (31) to constitute said bottom wall of said dielectric housing (3).

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(3113) that is formed with positioning grooves (315), said second ends (512) of said first conductive terminals (51) engaging respectively said positioning grooves (315).

4. The electrical connector as claimed in Claim 3, further **characterized in that** said rear housing member (32) has a neck (324) at a front end (325) thereof and press-fitted within said rear end (310) of said front housing member (31), an inverted U-shaped shoulder (326) connected to said neck (324) and abutting against said rear end (310) of said front housing member (31), and two aligned open-ended guide slots (3222) formed respectively in inner surfaces of said side walls (322) of said rear housing member (32), said positioning plate (33) being formed with two wings (331) disposed respectively at opposite sides thereof and received respectively and slidably within said guide slots (3222) in said rear housing member (32) so as to allow for removal from said rear housing member (32).

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5. The electrical connector as claimed in Claim 4, further **characterized in that** said bottom wall (311) of said front housing member (31) has a plurality of open-ended slots (3112) that are formed therethrough and that extend forwardly from a rear end (3110) thereof, said positioning plate (33) being formed with a plurality of vertical ribs (332) engaging respectively said open-ended slots (3112) in said front housing member (31).

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6. The electrical connector as claimed in Claim 3, further **characterized in that** said circuit board (4) is fixed on said positioning plate (33), said front housing member (31) being formed with a vertical stop plate (314) fixed therein and abutting against at least one of said positioning plate (33) and said circuit board (4).

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7. The electrical connector as claimed in Claim 6, further **characterized in that** said stop plate (314) has a plurality of vertical slots (3141) formed therethrough, said first conductive terminals (51) extending respectively through said vertical slots (3141) in said stop plate (314).

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8. The electrical connector as claimed in Claim 7, further **characterized in that** said bottom wall (311) of said front housing member (31) has a top surface

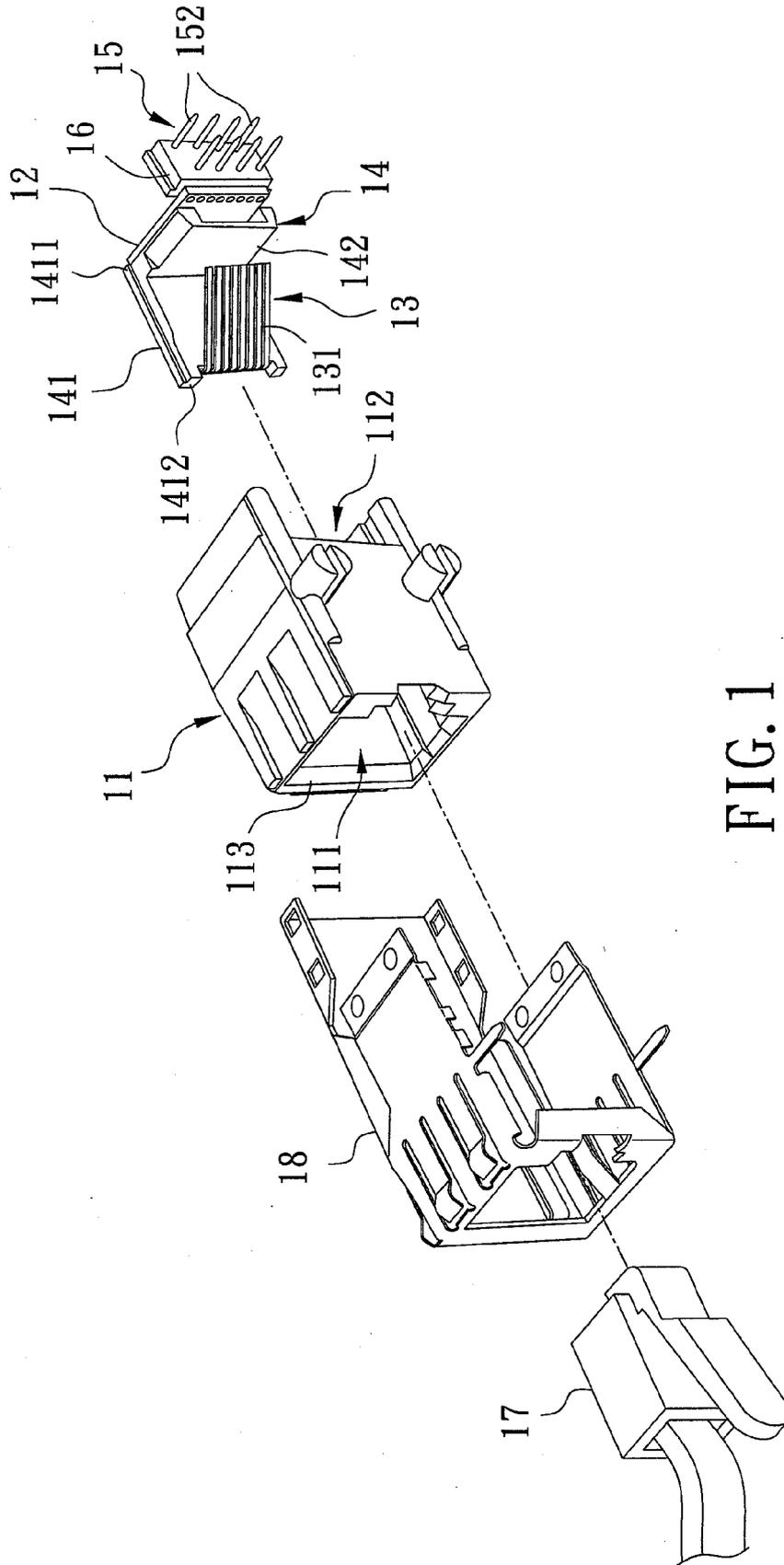


FIG. 1
PRIOR ART

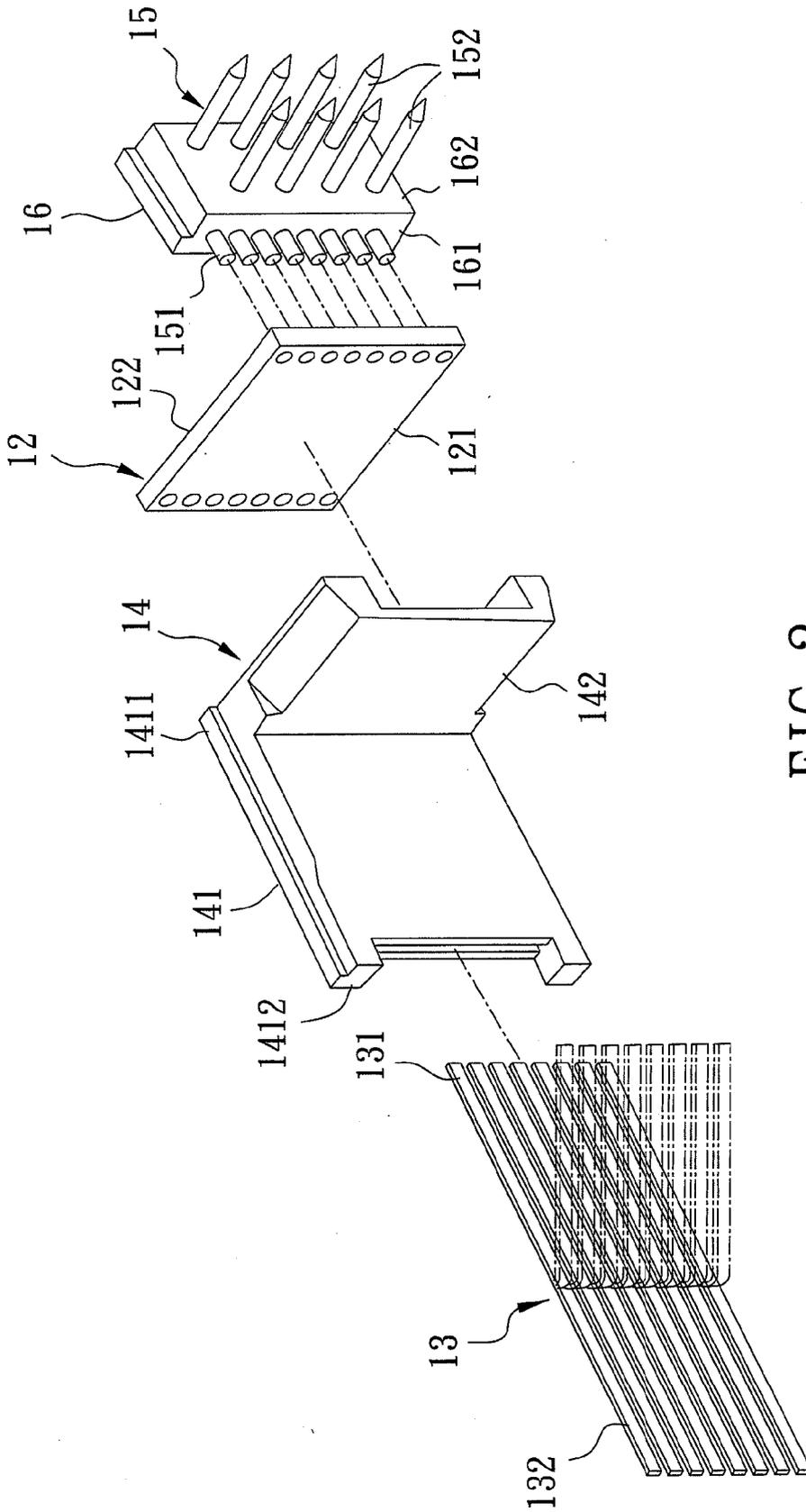


FIG. 2
PRIOR ART

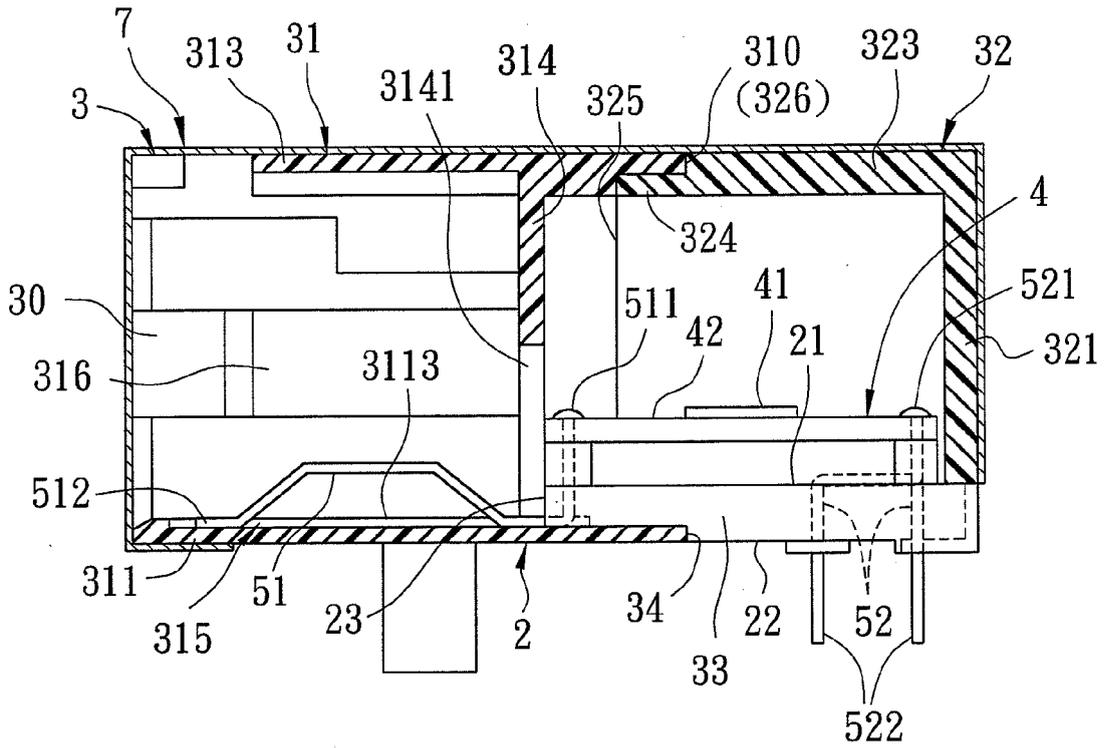


FIG. 4

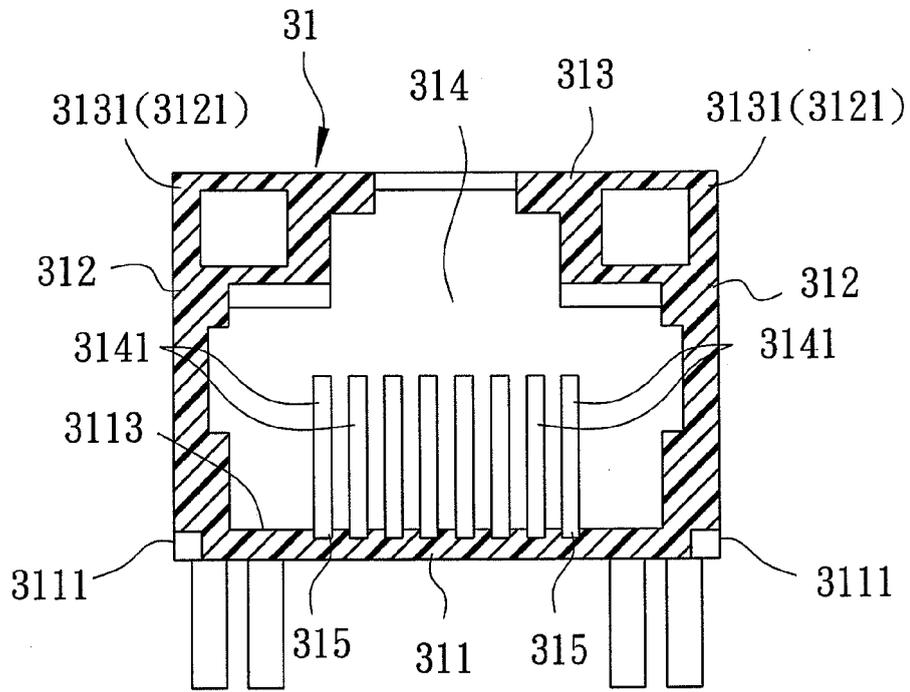


FIG. 5

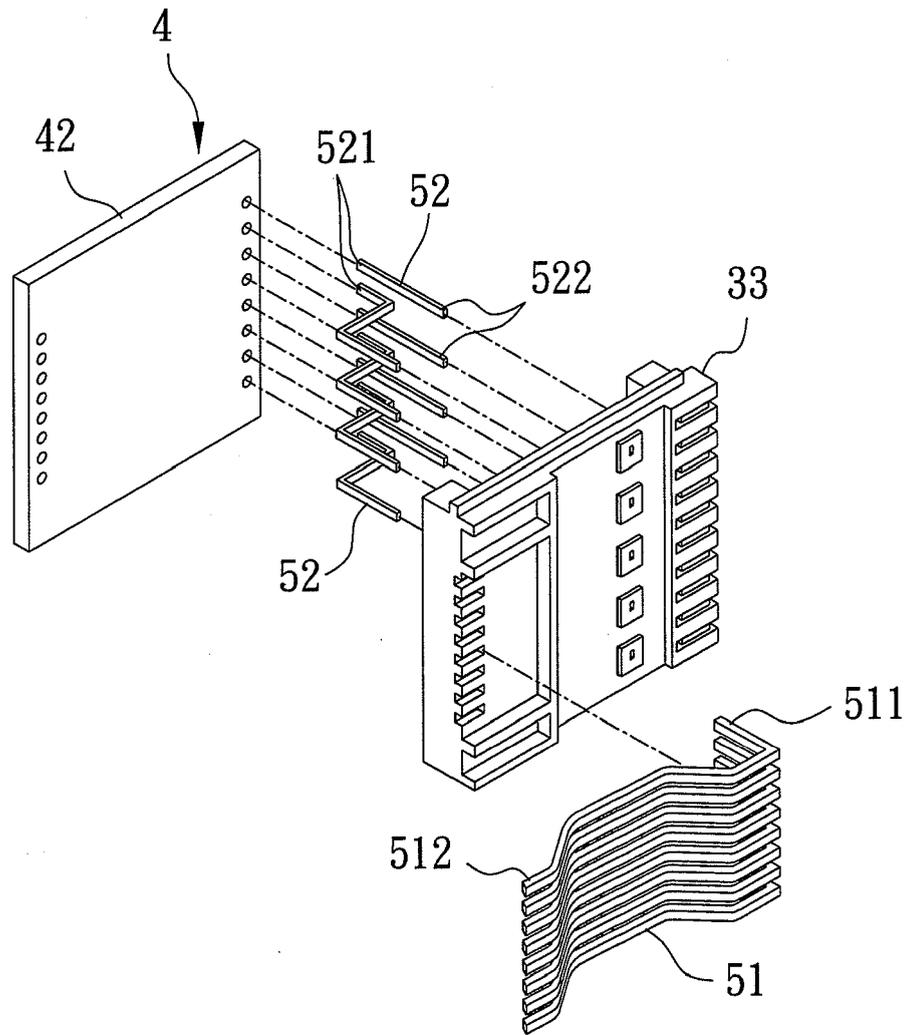


FIG. 6



DOCUMENTS CONSIDERED TO BE RELEVANT				
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Place of search Munich		Date of completion of the search 1 February 2006	Examiner Durand, F	
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ANNEX TO THE EUROPEAN SEARCH REPORT
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