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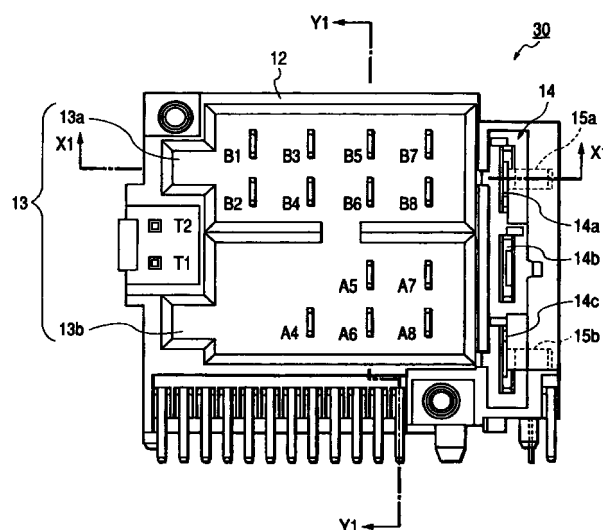
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(54) **Electric connector**

(57) An electric connector 30 is constituted, comprising a first connector 13 including a plurality of signal terminals and mounted on a substrate, a second connector 14 including three connecting pins 14a, 14b and 14c arranged at regular intervals, first and third connecting pins being connected to two signal terminals of the first connector which are to carry out signal switching, and signals to be switched being supplied to the first and third connecting pins through a normally closed type contact portion and directly supplied to the second connecting pin, and an auto fuse 40 including two contact portions arranged at regular intervals such that it is selectively engaged with two continuous connecting pins 15a and 15b on one side or the other side of the second connector, the two contact portions being electrically connected to each other, and serving to open the normally closed type contact portion provided in contact with the first or third connecting pin during the engagement with the second connector.

FIG. 1



EP 1 065 761 A1

Description

BACKGROUND OF INVENTION

Field of invention

[0001] The present invention relates to an electric connector for connecting an audio device for automobiles, for example, and an electric connector having the ISO standard for collectively connecting various signal lines.

Related art

[0002] Conventionally, such an electric connector is constituted as shown in Fig. 9, for example.

[0003] In Fig. 9, an electric connector 1 is mounted on a substrate 2 of an audio device for automobiles through solder dipping, for example, and is used for connecting various signal lines, that is, lines for a power source, an audio signal, ACC (Accessory), BUP (Back Up) and a speaker to the body side.

[0004] To the electric connector 1 thus mounted on the substrate 2 is connected a connector 3 for a speaker connected to the speaker on the body side and a connector 4 for signal lines connected to a power source on the body side. Consequently, the on-vehicle speaker is connected to the audio device for automobiles which is constituted on the substrate 2 and power is supplied to the audio device for automobiles. Moreover, an audio signal is output to an apparatus which is not shown.

[0005] Such an electric connector having the ISO standard has widely been employed for automobile manufactures in various countries, particularly, Europe. Although the connector is unified in common, a connector wiring might be varied depending on the automobile manufactures. In the electric connector having the ISO standard, for example, wirings for a fourth ACC (Accessory) and a seventh BUP (Back Up) are reversed in some cases.

[0006] In order to cope with such a difference in the wirings, conventionally, there has been employed a method in which an adapter 5 for circuit conversion is provided between the electric connector 1 and the connector 4 for signal lines as shown in Fig. 10.

[0007] In the adapter 5 for circuit conversion, connecting terminals which are removable in the middle portion are provided on signal lines 5a and 5b related to the ACC and the BUP and are rearranged if necessary so that the ACC and the BUP can be connected correctly.

[0008] However, if such an adapter 5 for circuit conversion is used for adaptation to the automobile manufactures having different wirings, the number of parts is increased so that a cost is increased. In addition, a work for rearranging the connecting terminals is required so that a workability is deteriorated.

[0009] On the other hand, there has also been

known an electric connector capable of easily rearranging wirings as shown in Figs. 11 to 18, for example.

[0010] In Figs. 11 to 13, an electric connector 10 is a connector for connecting an audio device for automobiles having the ISO standard and comprises a body 12 including a bottom face to be mounted on a substrate 11 (see Fig. 12), a first connector 13 having two sets of 8-pin connectors 13a and 13b constituted in the body 12, a second connector 14 having a set of 5-pin connectors, and a converting connector 20 (see Figs. 15, 17 and 18) to be attached to the second connector 14.

[0011] The body 12 is formed of a mold resin, for example, and a bottom face thereof comes in contact with an upper face of the substrate 11 during substrate mounting.

[0012] The first connector 13 includes two sets of 8-pin connectors 13a and 13b. The connector 13a constitutes a connector for a speaker (for a B-part) and the connector 13b constitutes a connector for an A-part.

[0013] Each of the connectors 13a and 13b has a contact pin 13c penetrating through the bottom face of the body 12 in a vertical direction as shown in Fig. 12.

[0014] The second connector 14 is constituted by a set of 5-pin connectors and has connecting pins 14a for conversion which are arranged at regular intervals and penetrate through the bottom face of the body 12 in the vertical direction as shown in Fig. 12.

[0015] As shown in Fig. 16, the second connector 14 has a fourth connecting pin from the bottom in the drawing connected to a seventh pin 13d of the connector 13b for the A-part of the first connector 13, and has a second connecting pin connected to a fourth pin 13e of the connector 13b for the A-part of the first connector 13 and a third pin 13f to be an unused connecting terminal as an unused pattern. This connection may be carried out through a lead portion provided in the electric connector 10 or a conductive pattern formed on the substrate 11.

[0016] Furthermore, the second connector 14 has a first connecting pin and a fifth connecting pin connected to a connecting terminal for ACC and a BUP connecting terminal of a circuit constituted on the substrate 11, for example.

[0017] The contact pins 13c and 14a are formed of conductors, and their ends extended downward are protruded downward from the bottom face of the body 12, are inserted into a through hole provided on the substrate 11 during the mounting and can be electrically connected through soldering at the lower edge of the through hole, and the other ends are protruded upward in the body 12 and can abut on the contact portion of the corresponding connecting connector 15 and the converting connector 20 (see Fig. 15) when they are to be connected.

[0018] Figs. 17 and 18 show a converting connector 20 for selectively short-circuiting the connecting pin through attachment to the second connector 14.

[0019] The converting connector 20 is constituted

by a body 21 which can be inserted in an upward opened hollow portion of the second connector 14, four inserting portions 22 opened downward in the body 21 in which the upper end of the connecting pin 14a for conversion of the second connector 14 can be fitted, and a contact portion 23 attached to the inside of the inserting portion 22.

[0020] The body 21 includes two projections 21a extended vertically along both side edge portions of a flat side face.

[0021] In the converting connector 20, the contact portions 23 to be attached to the first and second inserting portions 22 are formed integrally with each other and the contact portions 23 to be attached to the third and fourth inserting portions are formed integrally with each other as shown in Fig. 18.

[0022] Consequently, the converting connector 20 is selectively inserted in the hollow portion of the second connector 14 and are attached thereto such that the first contact portion 23 is engaged with the first connecting pin 14a of the second connector 14 or the first contact portion 23 is engaged with the second connecting pin 14a of the second connector 14.

[0023] In that case, when the projection 21a is to be attached to the second connector 14, it is selectively fitted in two sets of concave portions 14b or 14c provided on one side of the hollow portion of the second connector 14 so that the direction of the converting connector 20 is specified and a position in a longitudinal direction (the direction of arrangement of the connecting pins 14a) is controlled (see Figs. 11 and 16).

[0024] According to the electric connector 10 having such a structure, the bottom face of the body 12 is mounted on the upper face of the substrate 11 such that the lower ends of the contact pins 13c and 14a are inserted into a through hole (not shown) provided on the substrate 11 when the electric connector 10 is to be mounted on the substrate 11. The lower end of each contact pin 13c can be soldered at the lower end of the through hole of the substrate 11 by solder dipping, for example, and can be electrically connected to a circuit constituted on the lower face of the substrate 11.

[0025] Consequently, the connecting terminals of the connectors 13a and 13b of the first connector 13 are connected to the connecting terminals of the circuit constituted on the substrate 11 except for the third, fourth and seventh pins of the connector 13b, and the third, fourth and seventh pins 13f, 13e and 13d of the connector 13b are connected to the second and fourth connecting pins 14a of the second connector 14 through a lead portion provided in the electric connector 10 or a conductive pattern formed on the substrate 11.

[0026] Furthermore, the first and fifth connecting pins 14a of the second connector 14 are connected to the connecting terminal for BUP of the circuit constituted on the substrate 11, respectively.

[0027] Moreover, the third, that is, central connecting pin 14a of the second connector is connected to the

ACC terminal of the circuit constituted on the substrate 11, for example.

[0028] Corresponding to the wiring specification of a connecting plug (not shown) on the body side to be connected to the first connector 13 of the electric connector 10 which is determined by automobile manufacturers, the converting connector 20 is selectively attached to the second connector 14 as described above.

[0029] Referring to the fourth pin 13e or seventh pin 13d of the connector 13 for the A-part of the first connector 13, consequently, the ACC and the BUP are selectively connected corresponding to the position of attachment of the converting connector 20.

[0030] More specifically, when the converting connector 20 is attached to the second connector 14 with the projection 21a of the body 21 of the converting connector 20 set to the concave portion 14b of the second converting connector 14 such that the first contact portion 23 of the converting connector 20 is engaged with the first connecting pin 14a of the second connector 20, the first and second connecting pins of the second connector 14 are short-circuited through the first and second contact portions 23 of the converting connector 20. Consequently, the BUP is connected to the fourth pin 13e of the connector 13b for the A-part of the first connector 13.

[0031] At this time, the third and fourth connecting pins of the second connector 14 are short-circuited through the third and fourth contact portions 23 of the converting connector 20. Consequently, the ACC is connected to the seventh pin of the connector 13b for the A-part.

[0032] On the other hand, when the converting connector 20 is attached to the second connector 14 with the projection 21a of the body 21 of the converting connector 20 set to the concave portion 14c of the second converting connector 14 such that the first contact portion 23 of the converting connector 20 is engaged with the second connecting pin 14a of the second connector 20, the fourth and fifth connecting pins of the second connector 14 are short-circuited through the third and fourth contact portions 23 of the converting connector 20. Consequently, the ACC is connected to the seventh connecting pin 13d of the connector 13b for the A-part of the first connector 13.

[0033] At this time, the second and third connecting pins of the second connector 14 are short-circuited through the first and second contact portions 23 of the converting connector 20. Consequently, the central connecting pin of the second connector 14 is connected to the third and fourth connecting pins 13f and 13e which are the unused terminals of the connector 13b for the A-part of the first connector 13.

[0034] Accordingly, the ACC terminal is connected to the central connecting pin of the second connector 14.

[0035] The electric connector 10 thus mounted on

the substrate 11 can be electrically connected in a desirable manner with the insertion of a connecting socket on the body side in the connectors 13a and 13b of the first connector 13.

[0036] The fourth or seventh connecting pin of the connector 13b for the A-part of the first connector 13 can be properly set to the BUP and the ACC corresponding to the automobile manufactures depending on the position of the converting connector 20 attached to the second connector 14. Accordingly, the connecting socket on the body side can be directly connected to the first connector 13 of the electric connector 10 without using an adapter for circuit conversion corresponding to all the automobile manufactures having different wirings.

[0037] Thus, one kind of electric connector 10 can correspond to all the automobile manufactures. Consequently, productivity can be enhanced and a mounting work can easily be carried out.

[0038] In the electric connector 1 having such a structure, however, the wiring is replaced through the selective attachment of the converting connector 20 to the second connector 14. The body 12 including the second connector 14 constituted for replacing the wiring and the converting connector 20 are required. Consequently, there has been a problem in that a cost is increased.

SUMMARY OF INVENTION

[0039] In consideration of the foregoing, it is an object of the present invention to provide an electric connector in which different wirings can easily be replaced with a simple structure at a low cost.

[0040] In order to attain the above-mentioned object, the present invention provides an electric connector comprising a first connector including a plurality of signal terminals and mounted on a substrate, a second connector including three connecting pins arranged at regular intervals, first and third connecting pins being connected to two signal terminals of the first connector which are to carry out signal switching, and signals to be switched being supplied to the first and third connecting pins through a normally closed type contact portion and directly supplied to the second connecting pin, and an auto fuse including two contact portions arranged at regular intervals such that it is selectively engaged with two continuous connecting pins on one side or the other side of the second connector, the two contact portions being electrically connected to each other, and serving to open the normally closed type contact portion provided in contact with the first or third connecting pin during the engagement with the second connector.

[0041] In the electric connector according to the present invention, preferably, the normally closed type contact portion is formed of an elastic material and has an almost U-shape, and is in contact with the first or third connecting pin based on elasticity thereof, and

when the auto fuse is selectively engaged with the second connector, one of the normally closed type contact portions is deformed against the elasticity and is separated from a corresponding connecting pin through the auto fuse.

[0042] In the electric connector according to the present invention, preferably, the first connector and the second connector are formed integrally.

[0043] According to the above-mentioned structure, one of the signal lines to carry out signal switching is connected to the first and third connecting pins of the second connector through the normally closed type contact portion, the other signal line is directly connected to the second connecting pin of the second connector and the first and third connecting pins of the second connector are connected to the corresponding signal terminals of the first connector, respectively.

[0044] When the auto fuse is attached to the second connector such that the two contact portions of the auto fuse are engaged with the first and second connecting pins of the second connector, the first and second connecting pins of the second connector are short-circuited through the two contact portions of the auto fuse and the normally closed type contact portion provided in contact with the first connecting pin is separated from the first connecting pin through the body of the auto fuse.

[0045] Consequently, the signal line to carry out the signal switching is connected through the normally closed type contact portion to one of the signal terminals of the first connector connected to the third connecting pin of the second connector and the other signal line to carry out the signal switching is connected through the contact portion of the auto fuse from the second connecting pin of the second connector to the signal terminal of the first connector connected to the first connecting pin of the second connector.

[0046] On the other hand, when the auto fuse is attached to the second connector such that the two contact portions of the auto fuse are engaged with the second and third connecting pins of the second connector, the second and third connecting pins of the second connector are short-circuited through the two contact portions of the auto fuse and the normally closed type contact portion provided in contact with the third connecting pin is separated from the third connecting pin through the body of the auto fuse.

[0047] Consequently, the signal line to carry out the signal switching is connected through the normally closed type contact portion to one of the signal terminals of the first connector connected to the first connecting pin of the second connector and the other signal line to carry out the signal switching is connected through the contact portion of the auto fuse from the second connecting pin of the second connector to the signal terminal of the first connector connected to the third connecting pin of the second connector.

[0048] Accordingly, in the case in which the two sig-

nal lines are replaced with each other, the position of attachment of the auto fuse to the second connector is shifted. Consequently, it is possible to easily cope with such a difference in the wiring on the corresponding connector side which is to be connected to the first connector.

[0049] The normally closed type contact portions are formed of an elastic material and are almost U-shaped. When the normally closed type contact portions are in contact with the first or third connecting pin based on the elasticity thereof and the auto fuse is selectively engaged with the second connector, any one of the normally closed type contact portions is deformed against the elasticity through the auto fuse and is separated from the corresponding connecting pin. In such a case, the normally closed type contact portion can have a simple structure at a low cost. Thus, the cost of the whole electric connector can be reduced.

[0050] In the case in which the first and second connectors are formed integrally, the connection of the signal line to the first and fifth connecting pins of the second connector can be carried out simultaneously through the mounting of the electric connector on the substrate. Consequently, a mounting work can be carried out easily and quickly.

BRIEF DESCRIPTION OF DRAWINGS

[0051]

Fig. 1 is a plan view showing an electric connector according to an embodiment of the present invention;

Fig. 2 is a sectional view taken along the line X1 - X1 in the electric connector of Fig. 1;

Fig. 3 is a side view showing the electric connector of Fig. 1;

Fig. 4 is a sectional view taken along the line Y1 - Y1 in the electric connector of Fig. 1;

Fig. 5 is a sectional view showing the main part of the electric connector of Fig. 1;

Fig. 6 is a schematic view showing the state of connection of a first connector and a second connector in the electric connector of Fig. 1;

Fig. 7 is a front view showing an auto fuse to be connected to the second connector in the electric connector of Fig. 1;

Fig. 8 is a sectional view showing the auto fuse of Fig. 7;

Fig. 9 is a schematic view showing the state of use according to an example of a conventional electric connector;

Fig. 10 is a schematic view showing the state of use in the case in which a signal line is replaced by the electric connector of Fig. 9;

Fig. 11 is a plan view showing another example of the conventional electric connector;

Fig. 12 is a front view showing the electric connector of Fig. 11;

Fig. 13 is a side view showing the electric connector of Fig. 11;

Fig. 14 is a sectional view taken along the line Y2 - Y2 in the electric connector of Fig. 11;

Fig. 15 is a sectional view taken along the line X2 - X2 in the electric connector of Fig. 11;

Fig. 16 is a schematic enlarged view showing the state of connection of the first connector and the second connector in the electric connector of Fig. 11;

Fig. 17 shows a converting connector to be connected to the second connector in the electric connector of Fig. 11, Fig. 17(A) being a plan view, Fig. 17(B) being a front view, Fig. 17(C) being a side view and Fig. 17(D) being a bottom view; and

Fig. 18 is a sectional view taken along the line Z - Z of the converting connector of Fig. 17.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0052] The present invention will be described below in detail based on an embodiment shown in the drawings.

[0053] Figs. 1 to 8 show the structure of an electric connector according to an embodiment of the present invention.

[0054] For description, corresponding portions to those of Figs. 11 to 15 have the same reference numerals.

[0055] In Figs. 1 to 3, an electric connector 30 is a connector for connecting an audio device for automobiles having the ISO standard (ISO 10487 - 1) and comprises a body 12 including a bottom face to be mounted on a substrate 11 (see Fig. 2), a first connector 13 having two sets of 8 - pin connectors 13a and 13b constituted in the body 12, a second connector 14 having a set of 3 - pin connectors, and an auto fuse 40 (see Figs. 7 and 8) to be attached to the second connector 14.

[0056] The body 12 is formed of a mold resin, for example, and a bottom face thereof comes in contact with an upper face of the substrate 11 during substrate mounting.

[0057] The first connector 13 includes two sets of 8 - pin connectors 13a and 13b. The connector 13a constitutes a connector for a speaker (for a B-part) and the connector 13b constitutes a connector for an A-part.

[0058] Each of the connectors 13a and 13b has a contact pin 13c penetrating through the bottom face of the body 12 in a vertical direction as shown in Fig. 4. (In Fig. 1, the connector 13b has five contact pins (indicated as A4 to A8)).

[0059] The second connector 14 is constituted by a set of 3 - pin connectors having connecting pins 14a, 14b and 14c for conversion which are arranged at regular intervals and penetrate through the bottom face of the body 12 in the vertical direction as shown in Figs. 1

and 5.

[0060] As shown in Fig. 6, the second connector 14 has a top (first) connecting pin 14a in the drawing connected to a fourth (A4) pin 13e of the connector 13b for the A-part of the first connector 13, and has a third connecting pin 14c connected to a seventh pin (A7) 13d of the connector 13b for the A-part of the first connector 13. This connection may be carried out through a lead portion provided in the electric connector 10 or a conductive pattern formed on the substrate 11.

[0061] Furthermore, the second connector 14 has a second connecting pin 14b connected to a BUP output terminal, for example, of the circuit and a signal is output to the substrate on the user side.

[0062] The contact pins 13c, 14a, 14b and 14c are formed of conductors, and their ends extended downward are protruded downward from the bottom face of the body 12 except for the contact pin 14b, are inserted into a through hole provided on the substrate 11 during the mounting and can be electrically connected by soldering at the lower edge of the through hole, and the other ends are protruded upward in the body 12 and can abut on the contact portion of the corresponding connecting connector 15 and the auto fuse 40 (see Fig. 5) when they are to be connected.

[0063] On the other hand, connecting terminals 15a and 15c acting as the normally closed type contact portions are provided adjacently to the first and third connecting pins 14a and 14c of the second connector 14.

[0064] These connecting terminals 15a and 15b are formed of elastic members, and have almost inverse U-shaped sections as shown in Fig. 5. Then, the connecting terminals 15a and 15b have ends penetrating through the body 10 and extended downward and the other ends in contact with the connecting pins 14a and 14c with elasticity.

[0065] The other ends of the connecting terminals 15a and 15c are protruded into the hollow portion 14d of the second connector 14. When the auto fuse 40 is attached to the second connector 14 as will be described below, the other ends of the connecting terminals 15a and 15c are pressed against the elasticity of the connecting terminals 15a and 15b through the body of the auto fuse 40 entering the hollow portion 14d and are thereby separated from the connecting pins 14a and 14c of the second connector 14.

[0066] Moreover, the ends of the connecting terminals 15a and 15c are protruded downward from the bottom face of the body 12, are inserted into a through hole provided on the substrate 11 during mounting and are electrically connected by soldering at the lower edge of the through hole. Consequently, the ends are connected to a connecting terminal for ACC, for example, of the circuit constituted on the substrate 11.

[0067] Figs. 7 and 8 show the auto fuse 40 for selectively short-circuiting the connecting pin through attachment to the second connector 14.

[0068] The auto fuse 40 itself has a known structure

and is put on the market, and is constituted by a body 41 which can be inserted in an upward opened hollow portion 14d of the second connector 14 and two contact portions 42 and 43 which are protruded downward to abut on the upper end of the converting connecting pin 14a of the second connector 14 in the body 41.

[0069] The body 41 is formed of an insulating material. In addition, when being inserted into the hollow portion 14d of the second connector 14, the body 41 presses the ends of the connecting terminals 15a and 15c which are protruded into the hollow portion 14, thereby separating them from the connecting pins 14a and 14c.

[0070] Moreover, the contact portions 42 and 43 of the auto fuse 40 are electrically connected to each other or are constituted integrally as shown in Fig. 8.

[0071] Consequently, the auto fuse 40 is selectively inserted in the hollow portion 14d of the second connector 14 and is attached thereto such that the two contact portions 42 and 43 are engaged with the first and second connecting pins 14a and 14b of the second connector 14 or the second and third contact portions 14b and 14c of the second connector 14.

[0072] The electric connector 30 according to the embodiment of the present invention has the above-mentioned structure. During mounting on the substrate 11, the bottom face of the body 12 is mounted on the upper face of the substrate 11 such that the lower ends of the contact pins 13c, 14a and 14c are inserted into through holes (not shown) provided on the substrate 11 when the electric connector 30 is to be mounted on the substrate 11. The lower ends of the contact pins 13c, 14a and 14c can be soldered at the lower end of the through hole of the substrate 11 by solder dipping, for example, and can be electrically connected to a circuit constituted on the lower face of the substrate 11.

[0073] Consequently, the connecting terminals of the connectors 13a and 13b of the first connector 13 are connected to the connecting terminals of the circuit constituted on the substrate 11 except for the fourth and seventh pins of the connector 13b, and the fourth and seventh pins 13e and 13d of the connector 13b are connected to the first and third connecting pins 14a and 14c of the second connector 14 through a lead portion provided in the electric connector 30 or a conductive pattern formed on the substrate 11.

[0074] Furthermore, the second connecting pin 14b of the second connector 14 is connected to the BUP output terminal of the circuit constituted on a substrate (not shown) such as a car audio apparatus, respectively.

[0075] Moreover, the ends of the connecting terminals 15a and 15b are connected to the connecting terminal for ACC, for example, of the circuit constituted on the substrate 11.

[0076] Corresponding to the wiring specification of a connecting socket on the body side to be connected to the first connector 13 of the electric connector 30 which is determined by automobile manufacturers, the auto

fuse 40 is selectively attached to the second connector 14 as described above.

[0077] Referring to the fourth pin 13e or seventh pin 13d of the connector 13 for the A-part of the first connector 13, consequently, the BUP and the ACC are selectively connected corresponding to the position of attachment of the auto fuse 40.

[0078] More specifically, when the body 41 of the auto fuse 40 is inserted in the hollow portion 14d of the second converting connector 14 and the auto fuse 40 is attached to the second connector 14 such that the two contact portions 42 and 43 of the auto fuse 40 are engaged with the first and second connecting pins 14a and 14b of the second connector 14, the body 41 of the auto fuse 40 presses the other end of the connecting terminal 15a to be separated from the first connecting pin 14a and the first and second connecting pins 14a and 14b of the second connector 14 are short-circuited through the two contact portions 42 and 43 of the auto fuse 40. At this time, the connecting terminal 15b is not pressed by the body 41 of the auto fuse 40 and is maintained in contact with the third connecting pin 14c.

[0079] Consequently, the ACC is connected through the connecting terminal 15b to the seventh pin 13d of the connector 13b for the A-part of the first connector 13, and the BUP output is connected through the auto fuse 40 to the fourth pin 13e of the connector 13b for the A-part of the first connector 13.

[0080] On the other hand, when the body 41 of the auto fuse 40 is inserted in the hollow portion 14d of the second converting connector 14 and the auto fuse 40 is attached to the second connector 14 such that the two contact portions 42 and 43 of the auto fuse 40 are engaged with the second and third connecting pins 14b and 14c of the second connector 14, the body 41 of the auto fuse 40 presses the other end of the connecting terminal 15b to be separated from the third connecting pin 14c and the second and third connecting pins 14b and 14c of the second connector 14 are short-circuited through the two contact portions 42 and 43 of the auto fuse 40. At this time, the connecting terminal 15a is not pressed by the body 41 of the auto fuse 40 and is maintained in contact with the first connecting pin 14a.

[0081] Consequently, the BUP output is connected through the auto fuse 40 to the seventh pin 13d of the connector 13b for the A-part of the first connector 13, and the ACC is connected through the connecting terminal 15a to the fourth pin 13e of the connector 13b for the A-part of the first connector 13.

[0082] The electric connector 30 thus mounted on the substrate 11 can be electrically connected in a desirable manner with the insertion of a connecting socket on the body side in the connectors 13a and 13b of the first connector 13.

[0083] The fourth or seventh connecting pin of the connector 13b for the A-part of the first connector 13 can be properly set to the BUP and the ACC corresponding to the automobile manufactures depending on

the position of the auto fuse 40 attached to the second connector 14. Accordingly, the connecting plug on the body side can be directly connected to the first connector 13 of the electric connector 30 without using an adapter for circuit conversion corresponding to all the automobile manufactures having different wirings.

[0084] In this case, the auto fuse put on the market is used as the converting connector for replacing the wiring. Consequently, the cost of the whole electric connector 30 can be reduced.

[0085] Thus, one kind of electric connector 30 can correspond to all the automobile manufactures. Consequently, productivity can be enhanced and a mounting work can easily be carried out.

[0086] While the connector having the ISO standard for connecting the audio device for automobiles has been described in the above-mentioned embodiment, it is apparent that the present invention can be applied to an electric connector which requires the replacement for wiring in various apparatuses.

[0087] According to the present invention, as described above, one of the signal lines to carry out signal switching is connected to the first and third connecting pins of the second connector through the normally closed type contact portion, the other signal line is directly connected to the second connecting pin of the second connector and the first and third connecting pins of the second connector are connected to the corresponding signal terminal of the first connector, respectively.

[0088] The auto fuse is attached to the second connector such that the two contact portions of the auto fuse are engaged with the first and second connecting pins of the second connector or the second and third connecting pins of the second connector. Consequently, the first and second connecting pins or the second and third connecting pins of the second connector are selectively short-circuited through the two contact portions of the auto fuse and the normally closed type contact portion provided in contact with the first or third connecting pin is separated from the first or third connecting pin through the body of the auto fuse.

[0089] Consequently, one of the signal lines to carry out the signal switching or the other signal line is connected through the auto fuse to one of the signal terminals of the first connector connected to the third connecting pin of the second connector and the other signal line to carry out the signal switching is connected through the auto fuse or the normally closed type contact portion to the other signal terminal of the first connector connected to the first connecting pin of the second connector.

[0090] Accordingly, in the case in which the two signal lines are replaced with each other, the position of attachment of the auto fuse to the second connector is shifted. Consequently, it is possible to easily cope with such a difference in the wiring on the corresponding connector side which is to be connected to the first con-

nector.

[0091] According to the present invention, thus, it is possible to provide a very excellent electric connector capable of easily replacing different wirings.

5

Claims

1. An electric connector comprising:

a first connector including a plurality of signal terminals and mounted on a substrate; 10

a second connector including three connecting pins arranged at regular intervals, first and third connecting pins being connected to two signal terminals of the first connector which are to 15
carry out signal switching, and signals to be switched being supplied to the first and third connecting pins through a normally closed type contact portion and directly supplied to the second connecting pin; and 20

an auto fuse including two contact portions arranged at regular intervals such that the auto fuse is selectively engaged with two continuous connecting pins on one side or the other side of the second connector, the two contact portions 25
being electrically connected to each other, and serving to open the normally closed type contact portion provided in contact with the first or third connecting pin during the engagement with the second connector. 30

2. The electric connector according to claim 1, wherein the normally closed type contact portion is formed of an elastic material and has an almost U-shape, and is in contact with one of the first and 35
third connecting pin based on elasticity thereof, and when the auto fuse is selectively engaged with the second connector, one of the normally closed type contact portions is deformed against the elasticity and is separated from a corresponding connecting 40
pin through the auto fuse.

3. The electric connector according to claim 1, wherein the first connector and the second connector are formed integrally. 45

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FIG. 1

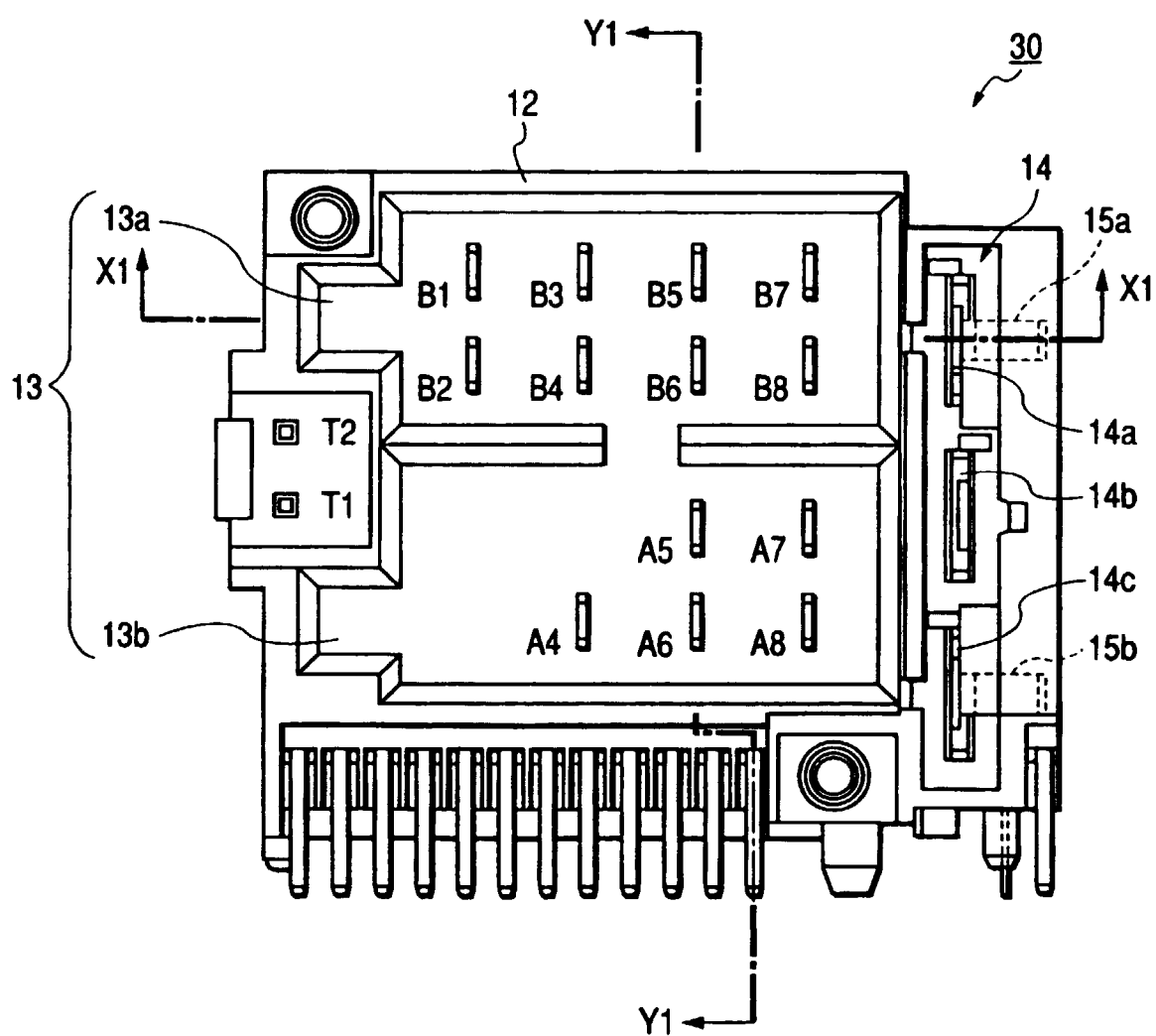


FIG. 2

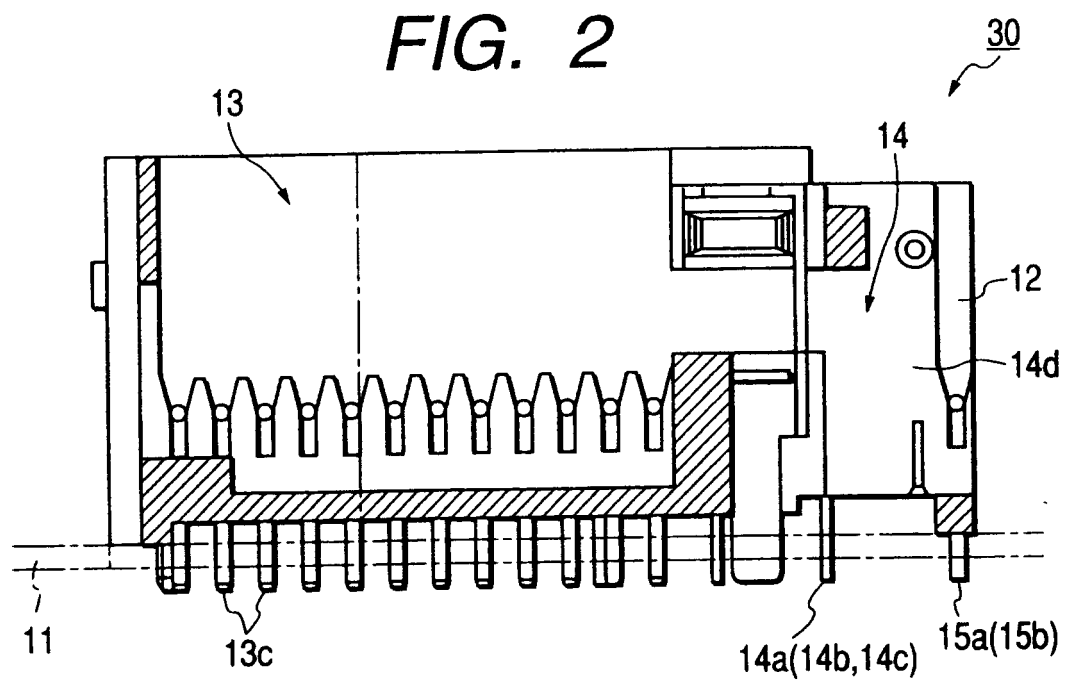
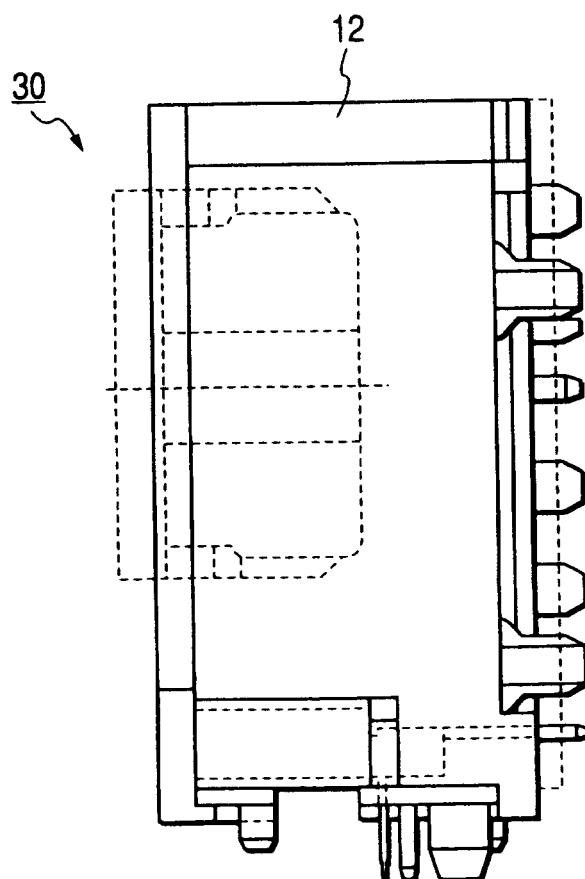


FIG. 3



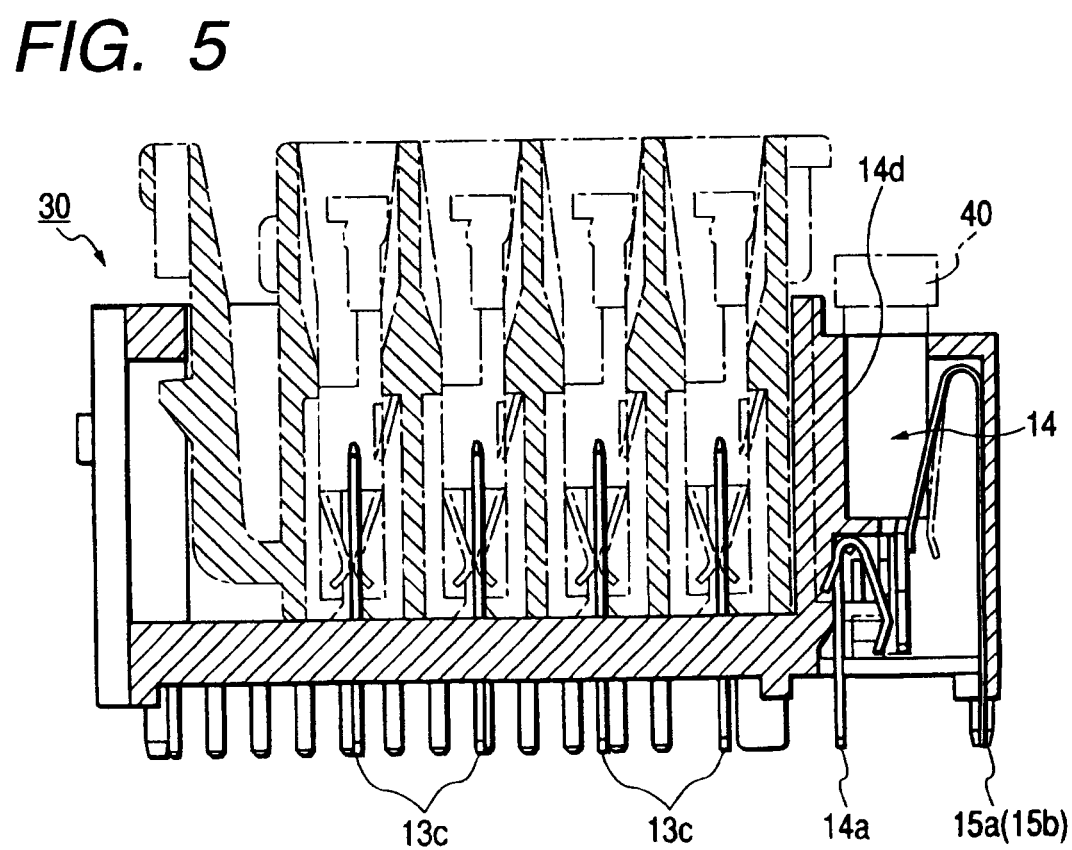
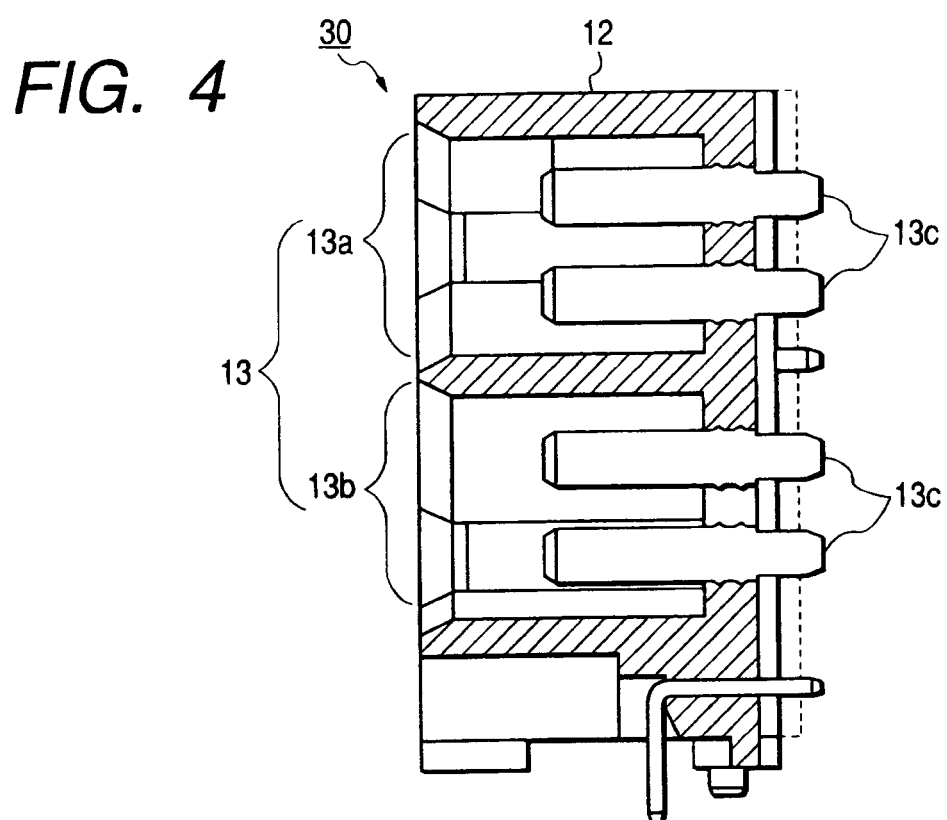


FIG. 6

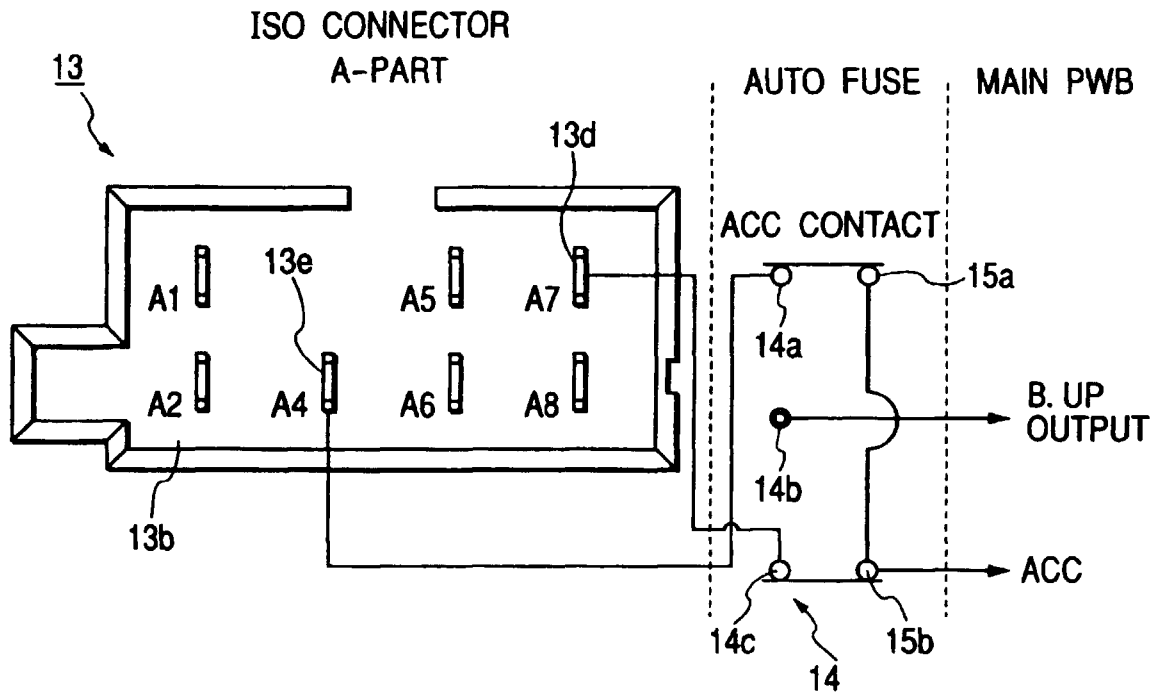


FIG. 7

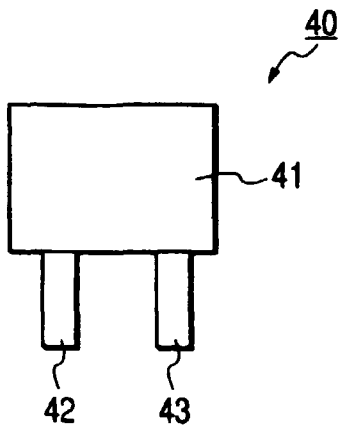


FIG. 8

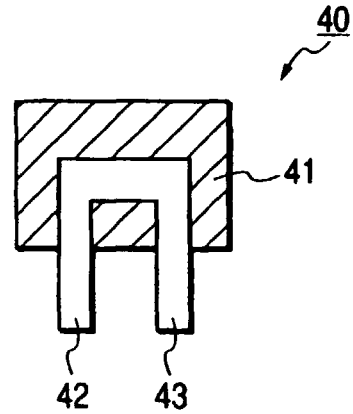


FIG. 9

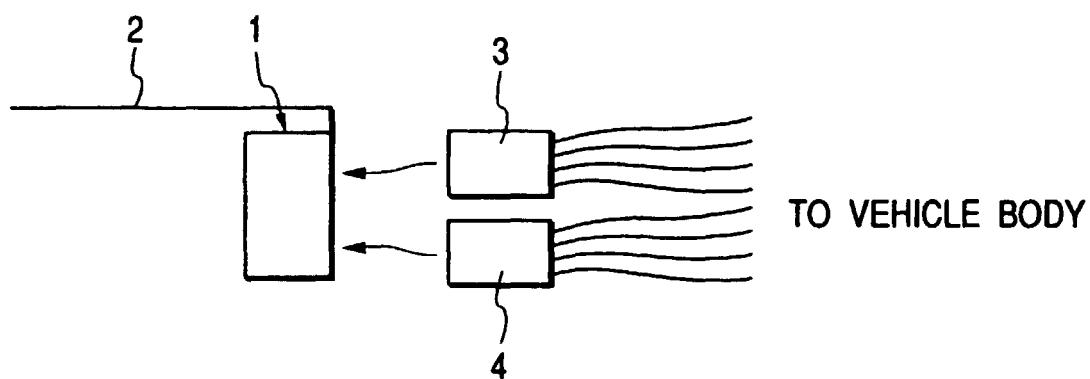


FIG. 10

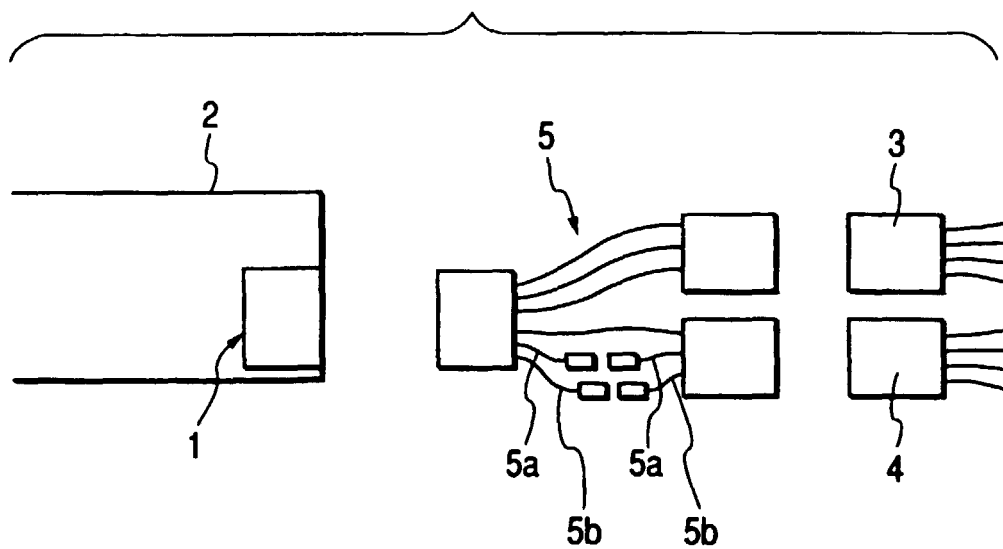


FIG. 11

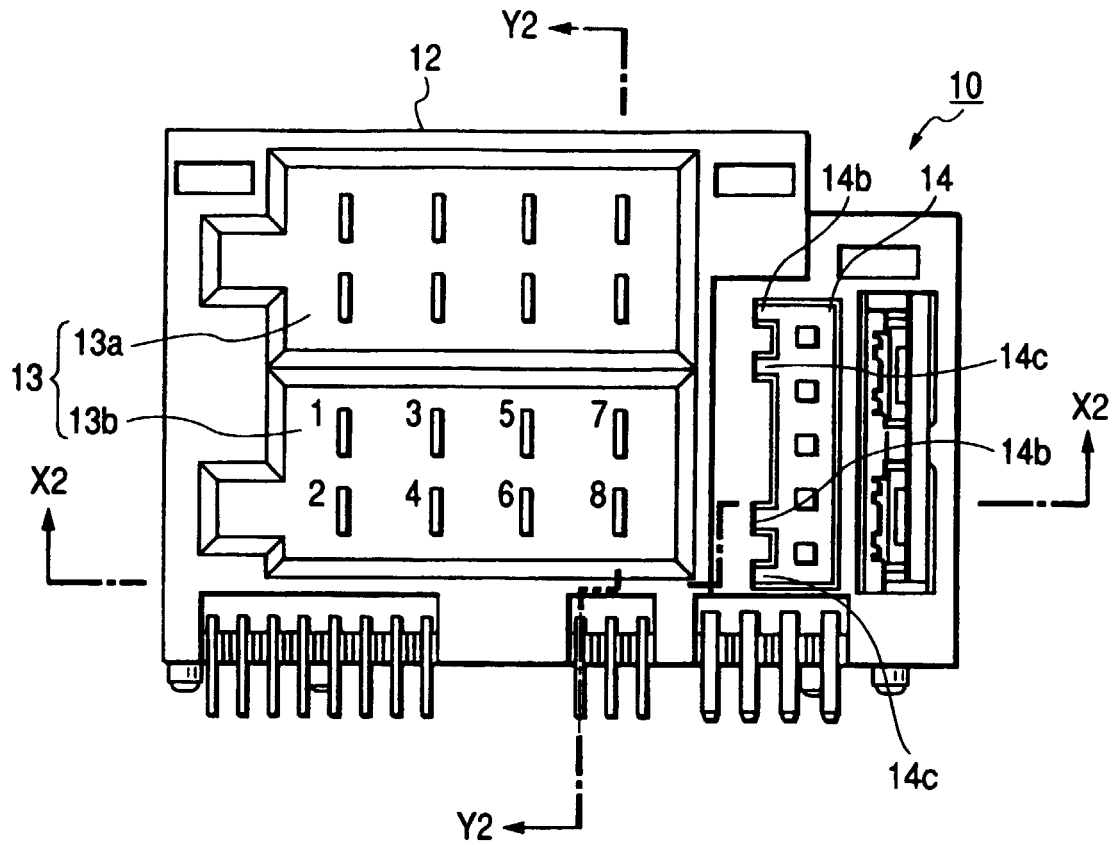


FIG. 12

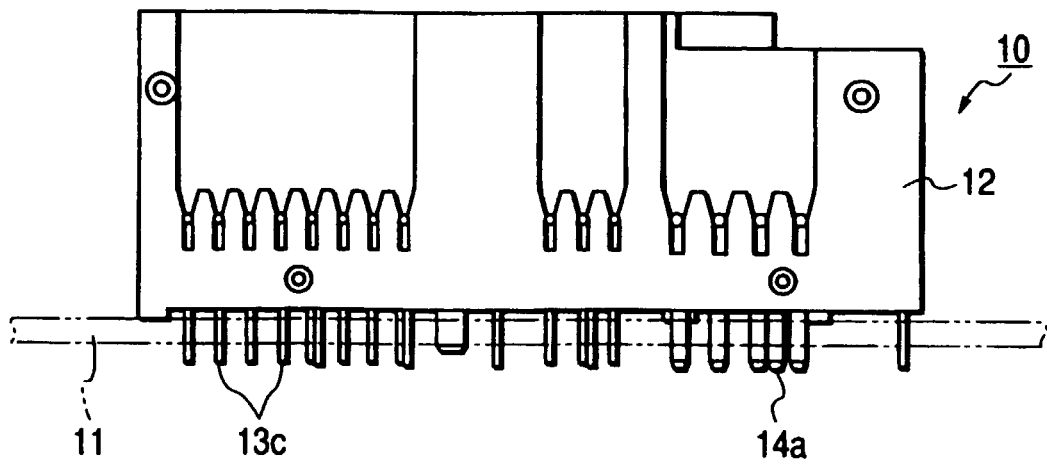


FIG. 13

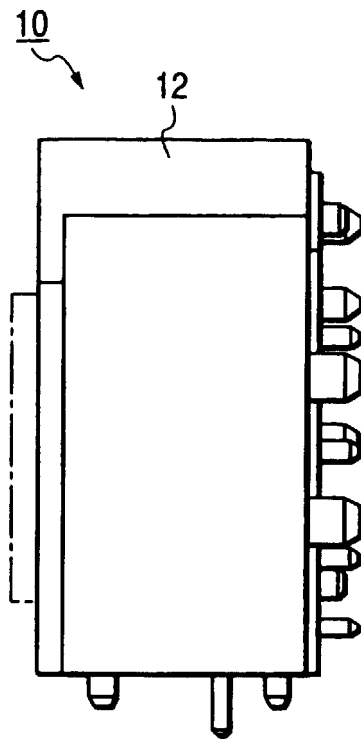


FIG. 14

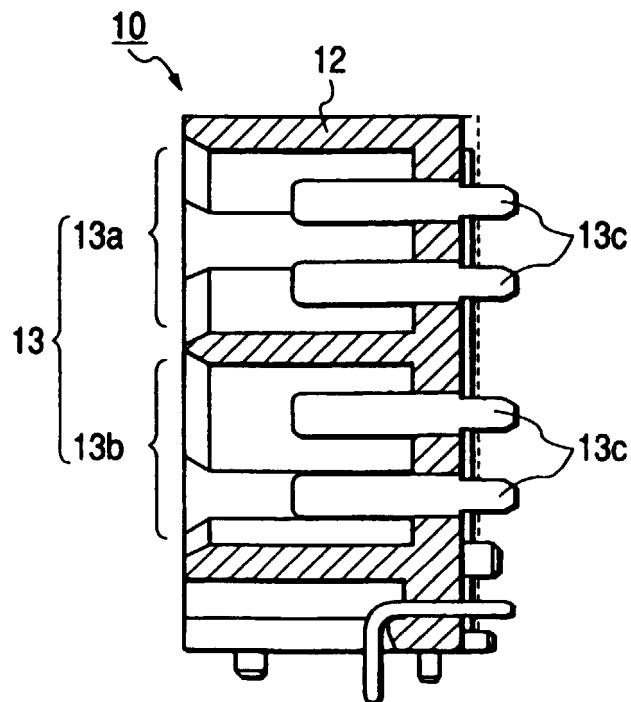


FIG. 15

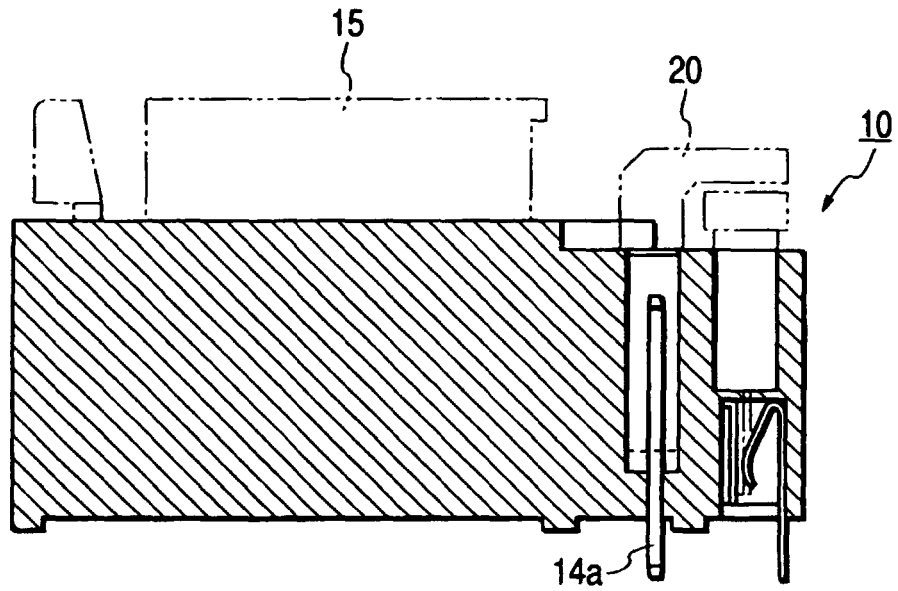


FIG. 16

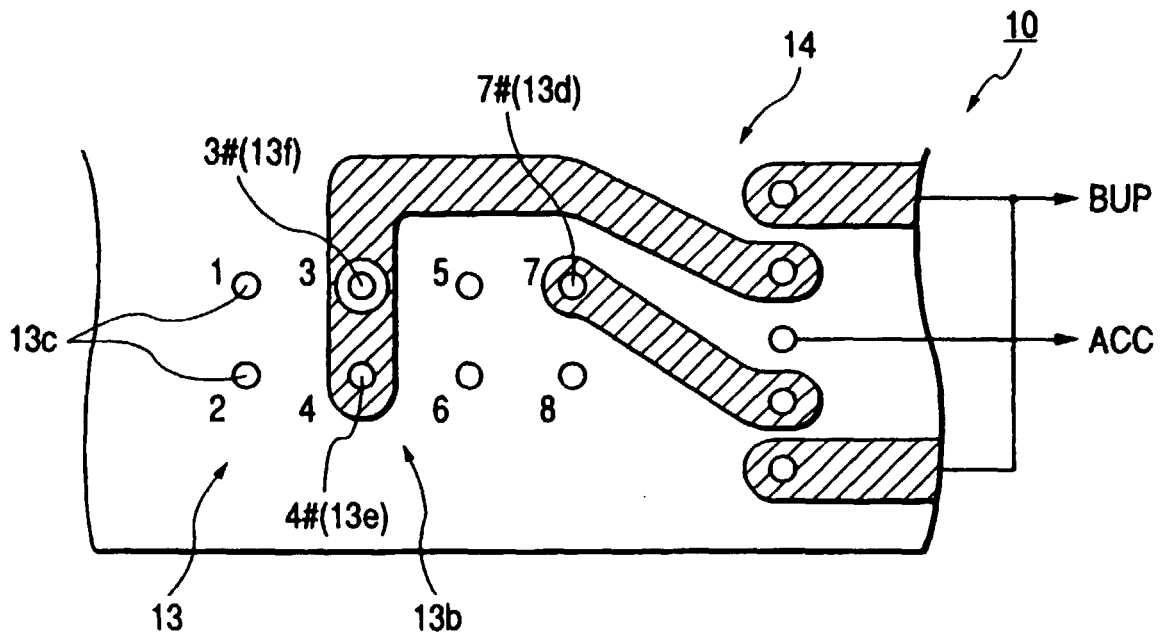


FIG. 17(A)

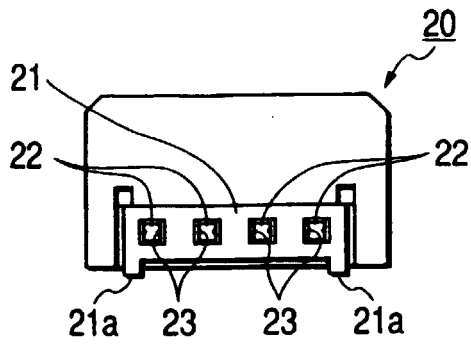


FIG. 17(B)

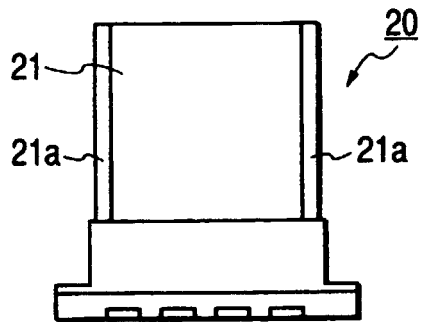


FIG. 17(D)

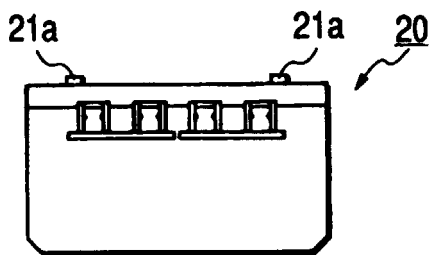


FIG. 17(C)

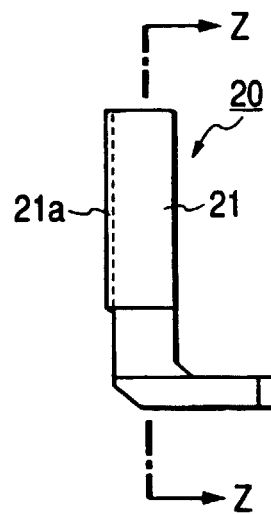
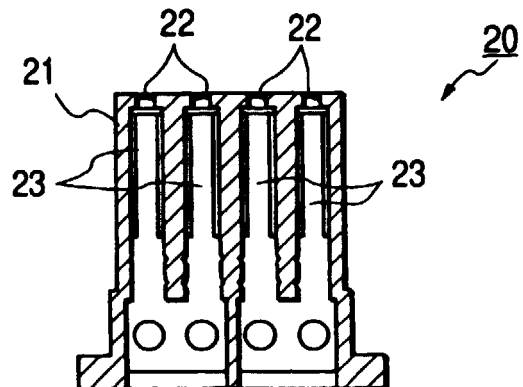


FIG. 18





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 00 11 3934

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 November 2000	Examiner Waern, G
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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