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- Yamazaki, Noriyoshi, c/o Yazaki Parts Co., Ltd.
Ogasa-gun, Shizuoka (JP)
- Sugiura, Tomohiro, c/o Yazaki Parts Co., Ltd.
Ogasa-gun, Shizuoka (JP)
- Suzuki, Yasuhito, c/o Yazaki Parts Co., Ltd.
Ogasa-gun, Shizuoka (JP)

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(71) Applicant: Yazaki Corporation
Minato-ku, Tokyo (JP)

(72) Inventors:

- Kawamura, Hideki, c/o Yazaki Parts Co., Ltd.
Ogasa-gun, Shizuoka (JP)

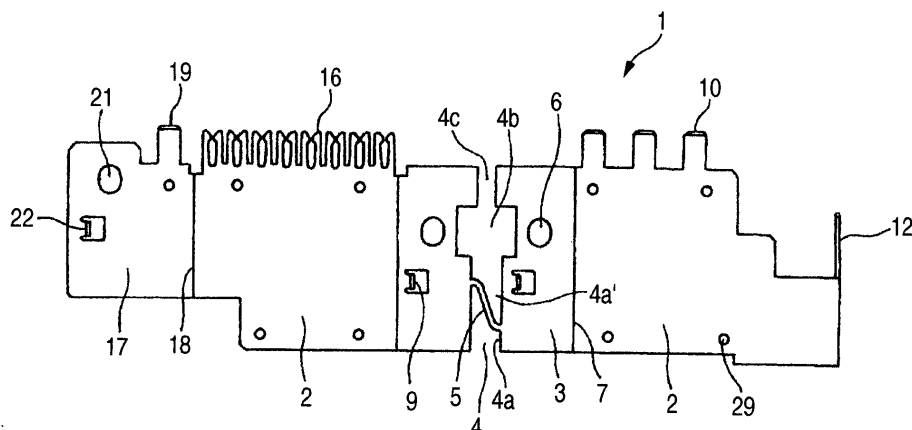
(74) Representative: Brunner, Michael John
Gill Jennings & Every
Broadgate House
7 Eldon Street
London EC2M 7LH (GB)

(54) Bar bus structure, electric connection box provided with same, and bus bar-forming method

(57) There is formed a first bus bar 23 including a plate-like bus bar body 2 including one side portion having connection portions 10 and 12, and the other side portion having connection portions 16, 19 and 21, and a fusible portion 5 and interconnecting portions 24 to 26 which are provided at an intermediate portion of the bus bar body, the one side portion and the other side portion of the bus bar body being interconnected by the fusible portion and the interconnecting portions. The interconnecting portions 24 to 26 are cut off from the first bus bar to thereby provide a second bus bar in which the

one side portion and the other side portion of the bus bar body 2 are interconnected only by the fusible portion 5. The formation of the fusible portion 5 may be omitted, so that the bus bar is used with no fusible portion formed at the intermediate portion of the bus bar body 2. The interconnecting portions 24 and 25 are formed at opposite sides of the fusible portion 5, respectively. The interconnecting portions 25 and 26 are formed at opposite side portions of the bus bar body 2, respectively. There is provided an electric connection box provided with the above bus bar structure.

FIG. 1



Description

[0001] This invention relates to a bus bar structure in which different kinds of bus bars, having a fuse, can be easily formed, and also relates to an electric connection box provided with this bus bar structure and a bus bar-forming method.

[0002] Figs. 7A and 7B show one form of bus bar structure provided within a conventional electric connection box.

[0003] In this structure, of Figs. 7A and 7B as shown in Unexamined Japanese Patent Publication Hei. 5-83828, common bus bars 71 and 72 are used in the bus bar arrangements of Figs. 7A and 7B, and by selectively using different kinds of relay terminals 73 to 78 and also by changing the connecting positions thereof, a circuit arrangement of connection between the bus bars 71 and 72 and fuses 79 is changed.

[0004] In each of the circuit arrangements of Figs. 7A and 7B, the bus bars 71 and 72 are mounted on a horizontal insulating board 80, and the relay terminal 73 is connected to a tab terminal formed at one end of one bus bar 71, and a tab terminal of a lower-layer bus bar projects upwardly through the insulating board 80, and is disposed between the two bus bars 71 and 72, and the relay terminal 75 is connected to this tab terminal.

[0005] In the connection arrangement of Fig. 7A, one tab terminal on a lower-layer bus bar projects upwardly through the insulating board 80, and is disposed adjacent to the relay terminal 73 at the one end of the bus bar 71, and the relay terminal 74 is connected to this tab terminal. An external contact piece portion 76a of the joint relay terminal 76 is connected to an intermediate tab terminal 81 of the other bus bar 72, and the joint relay terminal 76 is connected to a tab terminal projecting upwardly through the insulating board 80 in opposed relation to the intermediate tab terminal 81. One fuse 79 is inserted into the pair of relay terminals 73 and 74 to be connected thereto, while the other fuse 79 is inserted into the pair of relay terminals 75 and 76 to be connected thereto.

[0006] In the connection arrangement of Fig. 7B, the joint relay terminal 76 in the connection arrangement of Fig. 7A is replaced by the relay terminal 78 of the ordinary type, thereby canceling the connection of the joint relay terminal to the intermediate tab terminal 81, while a tab terminal 82 at one end of the other bus bar 72 is connected to the one tab terminal on the lower-layer bus bar by the joint relay terminal 77. One fuse 79 is connected to the pair of relay terminals 73 and 77, while the other fuse 79 is connected to the pair of relay terminals 75 and 78.

[0007] By thus selectively using the two kinds of relay terminals 73 to 78, the two kinds of circuit arrangements can be obtained without cutting the bus bars 71 and 72. The electric connection box, provided with this bus bar structure, is mounted mainly on an automobile.

[0008] However, the use of the relay terminals 73 to

78 of different forms is a prerequisite for the above conventional structure, and besides the fuses 79 which are separate from the bus bars 71 and 72 must be used, and therefore there have been encountered problems that much time and labor are required for the connecting operation and that the cost of the parts is high.

[0009] Furthermore, for example, when it is required to provide two kinds of electric connection boxes designed respectively for a gasoline engine car and a diesel engine car, the provision of fuses is necessary for the circuit for the gasoline engine car, while the provision of fuses is not necessary for the circuit for the diesel engine car. In this case, also, it has been earnestly desired to easily produce bus bars at a low cost.

[0010] With the foregoing in view, it is an object of this invention to provide a bus bar structure in which different forms of circuits, including a fuse, can be easily formed at a low cost, using bus bars, and also to provide an electric connection box provided with the bus bar structure and a bus bar-forming method.

[0011] The first object has been achieved by a bus bar structure of the present invention which is provided in that a plate-like bus bar body includes one side portion having connection portions, and the other side portion having connection portions; and a fusible portion and an interconnecting portion are provided at an intermediate portion of the bus bar body; and the one side portion and the other side portion of the bus bar body are interconnected by the fusible portion and the interconnecting portion.

[0012] With this construction, electric current flows from the connection portions of the one side portion of the bus bar body to the connection portions of the other side portion thereof via the intermediate interconnecting portion, and the fusible portion does not particularly function as a fuse, and the electric current flows from the one side portion of the bus bar body to the other side portion thereof mainly via the interconnecting portion. The interconnecting portion serves also as a reinforcing portion for the bus bar body and as a fusible portion-protecting portion. The bus bar structure of this construction is used, for example, for a diesel engine car. By removing the interconnecting portion by cutting, the bus bar can be used as another type of bus bar.

[0013] According to a second object of the present invention depending from the first aspect of the present invention, the interconnecting portion is larger in width than the fusible portion.

[0014] With this construction, electric current concentrates on the interconnecting portion of a lower resistance, thereby preventing the fusible portion from being melted.

[0015] According to a third object of the present invention depending from the first or second aspect of the present invention, the interconnecting portion is cut off, so that the one side portion and the other side portion of the bus bar body are interconnected only by the fusible portion.

[0016] With this construction, electric current flows from the connection portions of the one side portion of the bus bar body to the connection portions of the other side portion thereof via the intermediate fusible portion, and when an excess current flows, the fusible portion, serving as a fuse, is heated and melted, thereby interrupting the supply of the electric current to the connection portions of the other side portion. This bus bar structure can be easily obtained by cutting and removing the interconnecting portion of the bus bar structure of claim 1 or claim 2. An insert piece for forming the fusible portion and an insert piece for cutting the interconnecting portion are attached to and detached from a die, and by doing so, the bus bar of the first, second and third aspect of the present invention can be formed, using the same die.

[0017] According to a fourth object of the present invention depending from the first aspect of the present invention, the provision of the fusible portion is omitted, so that the bus bar structure is used with no fusible portion formed at the intermediate portion of the bus bar body.

[0018] With this construction, the step of forming the fusible portion by stamping with the use of a punch, a die and the like, is unnecessary, and the bus bar structure is formed into a simplified and low-cost design. When a bus bar, required to have the fusible portion, is to be formed from this bus bar, the fusible portion or the fusible portion and the interconnecting portion are formed by blanking simultaneously with the formation of the bus bar.

[0019] According to a fifth object of the present invention depending from the first or second aspect of the present invention, the interconnecting portions are formed respectively at opposite sides of the fusible portion spaced from each other in a direction generally perpendicular to a direction of spacing of said one and other side portions of said bus bar body from each other.

[0020] With this construction, the fusible portion is safely protected from interference with the exterior by the interconnecting portions provided respectively at the opposite sides of the fusible portion. When the bus bar is used in a vertical posture, preferably, the fusible portion is disposed generally horizontally, and the interconnecting portions are disposed respectively at the upper and lower sides of the fusible portion in generally closely spaced relation thereto.

[0021] According to a sixth object of the present invention depending from the first, second or fifth aspect of the present invention, the interconnecting portions are formed respectively at opposite side portions of the bus bar body spaced from each other in a direction generally perpendicular to a direction of spacing of the one and other side portions of the bus bar body from each other.

[0022] With this construction, the rigidity of the bus bar body is increased by the interconnecting portions, and therefore the bus bar body is prevented from bend-

ing, deformation and the like, and also the mounting ability of the bus bar is enhanced. One of the interconnecting portions, disposed respectively at the opposite sides of the fusible portion, may be defined by one of the interconnecting portions formed respectively at the opposite side portions of the bus bar body.

[0023] According to a seventh object of the present invention, the electric connection box is provided with a bus bar structure as defined in any one of the first to six object of the present invention.

[0024] With this construction, the bus bar is received within the electric connection box, and a power-side circuit is connected to the connection portions of the one side portion of the bus bar body, and electric power is fed from the connection portions of the other side portion to electrical parts (such as fuses), another bus bar, another circuit and so on via the fusible portion or the interconnecting portion.

[0025] An eighth object of the present invention, A bus bar-forming method is provided in that the method comprises the steps of blanking from an electrically-conductive metal sheet a first bus bar which includes a bus bar body including one side portion having connection portions, and the other side portion having connection portions, and a fusible portion and an interconnecting portion which are formed at an intermediate portion of the bus bar body; and cutting the interconnecting portion off from the first bus bar to provide a second bus bar having the fusible portion.

[0026] With this construction, electric current flows from the connection portions of the one side portion of the bus bar body to the connection portions of the other side portion thereof via the intermediate interconnecting portion, and the fusible portion does not particularly function as a fuse, and the electric current flows from the one side portion to the other side portion of the bus bar body mainly via the interconnecting portion. The interconnecting portion also serves as a reinforcing portion for the bus bar body and as a fusible portion-protecting portion. The first bus bar is used, for example, for a diesel engine car. By removing the interconnecting portion by cutting, this bus bar can be used as the second bus bar. In the second bus bar, electric current flows from the connection portions of the one side portion of the bus bar body to the connection portions of the other side portion thereof via the intermediate fusible portion, and when an excess current flows, the fusible portion, serving as a fuse, is heated and melted, thereby interrupting the supply of the electric current to the connection portions of the other side portion. An insert piece for forming the fusible portion and an insert piece for cutting the interconnecting portion are attached to and detached from a die, and by doing so, the first bus bar and the second bus bar can be formed, using the same die.

[0027] According to a ninth object of the present invention depending from the eighth object of the present invention, the first bus bar is formed without forming the

fusible portion.

[0028] With this construction, the step of forming the fusible portion by stamping with the use of a punch, a die and the like is unnecessary, and the bus bar structure is formed into a simplified and low-cost design. When a bus bar, required to have the fusible portion, is to be formed from this bus bar, the fusible portion or the fusible portion and the interconnecting portion are formed by blanking simultaneously with the formation of the bus bar.

[0029] According to the first aspect of the present invention, the interconnecting portion is used as the current-flowing portion of the bus bar body, and by doing so, one form of bus bar can be formed. By cutting and removing the interconnecting portion, another form of bus bar can be easily formed at a low cost.

[0030] According to the second aspect of the present invention, there is provided the bus bar structure in which the fusible portion does not need to function as a fuse, and the melting of the fusible portion is prevented, thereby eliminating the production of the melting residue or the like.

[0031] According to the third aspect of the present invention, merely by effecting the simple operation for cutting the interconnecting portion off from the bus bar structure of the first or second aspect of the present invention, the different form of bus bar can be obtained at a low cost.

[0032] According to the fourth aspect of the present invention, the time and labor for forming the fusible portion are saved, and therefore another form of bus bar can be easily formed at a low cost.

[0033] According to the fifth aspect of the present invention, the fusible portion is safely protected from interference with the exterior by the interconnecting portions provided respectively at the opposite sides of the fusible portion, and therefore the transport and handling of the bus bar can be effected easily.

[0034] According to the sixth aspect of the present invention, the rigidity of the bus bar body is increased by the interconnecting portions, and therefore the bus bar body is prevented from bending, deformation and the like, and besides the ability of the bus bar to be mounted in the electric connection box is enhanced.

[0035] According to the seventh aspect of the present invention, the electric connection boxes, respectively incorporating different kinds of bus bars, can be easily provided at a low cost.

[0036] According to the eighth aspect of the present invention, the interconnecting portion is used as the current-flowing portion of the bus bar body, and by doing so, the first bus bar can be formed, and merely by effecting the simple operation for cutting the interconnecting portion off from the bus bar body, the second bus bar of the different type can be easily formed at a low cost.

[0037] According to the ninth aspect of the present invention, the time and labor for forming the fusible portion

are saved, and therefore the first bus bar can be easily formed at a low cost.

[0038] In the accompanying drawings:-

Fig. 1 is front-elevational view of one preferred embodiment of a bus bar of the present invention.

Fig. 2 a perspective view of the bus bar combined with another bus bar.

Fig. 3 is a front-elevational view of another embodiment of a bus bar of the invention.

Fig. 4 is a front-elevational view of a further embodiment of a bus bar of the invention.

Fig. 5 is a perspective view showing the other bus bar in Fig. 2.

Fig. 6 is an exploded, perspective view of one example of an electric connection box incorporating a bus bar assembly.

Figs. 7A and 7B are an exploded, perspective view showing one form of conventional bus bar structure.

[0039] Fig. 1 shows one preferred embodiment of a bus bar of the present invention, and Fig. 2 is a bus bar assembly formed by combining this bus bar with another bus bar in a unitary manner.

[0040] The bus bar (second bus bar) 1, shown in Fig. 1, is mounted within an electric connection box 20 (Fig. 6) for a gasoline engine car, and serves as a power supply bus bar for supplying electric power to a relay within the electric connection box and a wire harness extending from the electric connection box 20. This bus bar 1 includes a notch 4 formed in a central plate portion 3 of a flat plate-like bus bar body 2 and extending in a direction of a width of this plate portion. A fusible portion 5 (serving as a fuse or a breaking portion) is formed integrally with the plate portion 3, and extends across the notch 4, and is disposed in a plane in which the plate portion 3 is disposed.

[0041] The bus bar body 2 is divided into two sections, that is, a right half portion and a left half portion, by the notch 4, and the right and left half portions are interconnected only by the fusible portion 5. The fusible portion 5 has a narrow width, and is provided at a lower half portion of the central plate portion 3, and extends obliquely downwardly. Opposite end portions of the fusible portion 5 are integrally connected respectively to opposed edges 4a of the notch 4 in generally perpendicular relation thereto, and are disposed in the plane in which the plate portion 3 lies. The notch 4 has a lower half portion serving as a medium-width portion 4a', a central portion serving as a larger-width portion 4b, and an upper portion serving as a smaller-width portion 4c. The notch 4 can be formed into any other suitable shape. The bus bar body 2, including terminal portions 10, 12, 16 and 19, the notch 4 and the fusible portion 5, is formed from a single electrically-conductive metal sheet by blanking such as punching.

[0042] In this embodiment, holes 6 for the connection of an external (post-mounting) fuse (not shown) are pro-

vided respectively at opposite sides of the larger-width central portion 4b. These holes 6 for the external fuse are provided so that the fuse can be mounted on the bus bar 1 without exchanging the bus bar 1 after the fusible portion 5 is melted. The holes 6, serving as the connection portions for the external fuse, function also as connection portions for power wires from an alternator (not shown) and for wire-connected terminals for external connection purposes.

[0043] As shown in Fig. 2, the central plate portion 3 of the bus bar 1 of this embodiment is bulged outwardly from the remainder of the bus bar portion 2 via stepped portions 7, and nuts 8 (Fig. 6) can be received in an internal space of this bulged plate portion 3 so as to cooperate with bolts to fasten the external fuse. In Fig. 1, reference numerals 9 denote projected piece portions for retaining the external connection-purpose wire-connected terminals (eyelet terminals) against rotation.

[0044] The plurality of wide tab terminals (connection portions) 10 are integrally formed in a projected manner at an upper portion of the right half portion of the bus bar 1, and a perpendicularly-bent portion 11 is formed at a right end of the bus bar 1, and the wide tab terminal (connection portion) 12 is integrally formed at a distal end of the bent portion 11. For example, a terminal, connected to a wire extending from a positive electrode of a battery, is connected to the right end wide terminal 12 through a connector, and the upper tab terminals 10 are connected respectively to tab terminals 34 of the other bus bar 14 (Fig. 2) via respective fusible links 13 (Fig. 6). The projecting tab terminals 10 are disposed in a plane in which the flat plate portion of the bus bar body 2 lies, and also the projecting tab terminals 34 are disposed in a plane in which a flat plate portion of a bus bar body of the bus bar 14 lies. In Fig. 1, holes 29 are provided for fixing the bus bar 1 to the other bus bar 14.

[0045] The plurality of tuning fork-like gripping terminals (connection portions) 16 are formed in a projected manner at an upper portion of the left half portion of the bus bar 1, and are arranged at equal intervals. A plate portion 17 at the left end portion of the bus bar body 2 is disposed inwardly of the base plate portion through a stepped portion 18, and the tab terminal (connection portion) 19 and a hole (connection portion) 21 for the connection of a wire-connected wire are provided at this plate portion 17. The projecting terminals 16 are disposed in the plane in which the bus bar body 2 lies, and also the projecting terminal 19 is disposed in a plane in which the plate portion 17 lies. In Fig. 1, reference numeral 22 denotes a projecting piece portion for retaining the wire-connected terminal against rotation.

[0046] Fig. 3 shows another embodiment of a bus bar of the invention which serves as a power supply bus bar 23 for being mounted within an electric connection box for a diesel engine car. This bus bar (first bus bar) 23 is identical to the bus bar 1 of Fig. 1 for a gasoline engine car which is at a stage before the central notch 4 is formed in the bus bar 1 in the process of producing this

bus bar 1, and therefore the bus bar 23 of this embodiment is formed midway during the same producing process.

[0047] A fusible portion 5 is already formed in a central plate portion 3 of the bus bar 23, and left and right half portions of the bus bar 23 are integrally connected together by interconnecting portions 24 and 25 (disposed near respectively to upper and lower ends of the fusible portion 5) and an interconnecting portion 26 disposed at an upper end portion of the plate portion 3. The fusible portion 5 is disposed within a vertically-elongate rectangular hole 27, and a larger-width hole 28 is disposed above the hole 27, and a smaller-width hole 28a extends from an upper edge of the larger-width hole 28. The upper and lower sides (or edges) of the hole 27 are defined respectively by the horizontal interconnecting portions 24 and 25, while the upper and lower sides (or edges) of the hole 28 is defined by the horizontal interconnecting portions 26 and 24. The interconnecting portion 25 at the lower end of the fusible portion 5 serves also as an interconnecting portion at the lower end portion of the plate portion 3. The interconnecting portions 24 to 26 are larger in width than the fusible portion 5, and allow an electric current to flow therethrough in a concentrated manner with a lower resistance than through the fusible portion 5.

[0048] During the transport of the bus bar 23 and during the mounting of the bus bar 23 in the electric connection box, the interconnecting portions 24 and 25, provided respectively at the upper and lower sides of the fusible portion 5, protect the fusible portion 5 from interfering with the exterior. And besides, the rigidity of a bus bar body 2 is increased by the interconnecting portions 25 and 26 provided respectively at the upper and lower ends of the plate portion 3, thereby preventing the bus bar 23 from bending, deformation and the like.

[0049] With respect to the bus bar 1 (Fig. 1) for the gasoline engine car, it is preferred that the interconnecting portions 24 to 26 be removed by cutting immediately before the bus bar 1 is incorporated into the electric connection box so that the fusible portion 5 can be prevented from interfering with the exterior. Preferably, the cutting of the interconnecting portions 24 to 26 is effected by a punch and a die. Cutting lengths of the interconnecting portions 24 to 26 can be suitably determined, and for example, the cutting lengths of the interconnecting portions 24 to 26 are equal to or smaller than the widths of the holes 27 and 28. The bus bar 23 of this embodiment is identical in construction to the above bus bar 1 for the gasoline engine car except that the interconnecting portions 24 to 26 are provided, and therefore identical constituent portions are designated by identical reference numerals, respectively, and explanation thereof is omitted here.

[0050] Fig. 4 shows a bus bar 30 which is identical to the bus bar 23 of Fig. 3 which is at a stage before the fusible portion 5 is formed at the bus bar 23. Instead of the bus bar 23 of Fig. 3, this bus bar 30 can be used as

a bus bar for a diesel engine car.

[0051] With respect to the bus bar 23 of Fig. 3, the fusible portion 5 is formed by a punch simultaneously when the hole 27 is formed, and by omitting the use of this punch (that is, an insert piece), the bus bar 30 of Fig. 4 can be formed. However, it is cumbersome to remove the insert piece, and therefore preferably, the bus bar 23 of Fig. 3, having the fusible portion 5 formed integrally therewith, is used for a diesel engine car, and the bus bar 1 of Fig. 1 for a gasoline engine car is obtained merely by cutting the interconnecting portions 24 to 26 off from the bus bar 23 of Fig. 3. The fusible portion 5 of Fig. 3 does not function as a fuse since the interconnecting portions 24 to 26 flow electric current there-through.

[0052] The bus bar 30 of Fig. 4 is identical in construction to the bus bar 23 of Fig. 3 except that the bus bar 30 is not provided with the fusible portion 5, and therefore identical constituent portions are designated by identical reference numerals, respectively, and explanation thereof is omitted here. the constructions, shown in Figs. 1, 3 and 4, are also effective as a bus bar-forming method.

[0053] Each of the power supply bus bars 1, 23, 30 of the above embodiments is joined to the insulating array bus bar 14 in opposed relation thereto to provide the bus bar assembly 31 as shown in Fig. 2 (The bus bar 1 is shown as a representative example in Fig. 2), and this bus bar assembly 31 is used.

[0054] As shown in Fig. 5, the insulating array bus bar 14 comprises a plurality of strip-like bus bar bodies 32, and an insulative resin portion 33 covering the bus bar bodies 32. Terminal portions 34 to 40 of the bus bar bodies 32 project upwardly and downwardly from the resin portion 33, and the upper terminal portions 34 to 36 are disposed in opposed relation to the upper terminal portions 10, 16 and 19 of the power supply bus bar 1 (Fig. 2), respectively, and the lower terminal portions 37 to 40 project downwardly beyond the power supply bus bar 1.

[0055] In Fig. 5, the terminal portions 34 are tab terminals are for fusible link connecting purposes, and the terminal portions 35 are gripping terminals for fuse connecting purposes, and the terminal portions 37 to 40 are tab terminals for connector connecting purposes. In Fig. 2, projections 41 (Fig. 5) on the insulative resin portion 33 are engaged at their distal ends respectively in the holes 29 in the bus bar body 2 of the power supply bus bar 1, and are thermally fastened thereto, thereby fixing the bus bar 1 to the bus bar 14.

[0056] The power supply bus bar 1 is used in integrally connected relation to the insulating array bus bar 14, but this is merely one example, and the power supply bus bar 1 can be used alone or can be mounted within an electric connection box in parallel relation to another bus bar.

[0057] As shown in Fig. 6, the bus bar assembly 31 is joined to a connector block (under cover) 42 disposed

at the lower side of this bus bar assembly 31, and the lower terminal portions 37 to 40 of the insulating array bus bar 14 are inserted through respective holes 44 to 47 in the connector block 42 into respective connector housings 48 to 51 to thereby form connectors. The connector housings 48 to 51 are formed integrally on a longitudinally-extending horizontal base wall 52 of the connector block 42. The bus bar assembly 31, together with the connector block 42, is mounted within a main cover (connection box body) 53, and is disposed in a vertical posture.

[0058] The wide tab terminals 10 (formed at the upper portion of the right half portion of the bus bar 1), the wide tab terminals 34 (formed at the upper portion of the right half portion of the bus bar 14), the wide tab terminal 19 (formed at the left end portion of the bus bar 1) and the wide tab terminal 36 (formed at the left end portion of the bus bar 14) are disposed within housing mounting (fusible link mounting) portions 54 provided at an upper portion of the main cover 53. The gripping terminals 16 (formed at the upper portion of the left half portion of the bus bar 1) and the gripping terminals 35 (formed at the upper portion of the left half portion of the bus bar 14) are disposed within housing mounting (fuse mounting) portions 55. The large-current fusible links 13 are mounted in the fusible link mounting portions 54, respectively, and small-current fuses 56 are mounted in the fuse mounting portions 55, respectively.

[0059] The wide tab terminal 12, formed at the right end of the power supply bus bar 1, is received in a connector housing 57 within the main cover 53 to form a connector, and for example, the power wire from the battery is connected to this connector via a connector. The central plate portion 3 of the power supply bus bar 1 is located in an opening 60 formed in a central portion of the front side of the main cover 53. A relay 58, together with a relay holder 59, is also mounted in the main cover 53.

[0060] Connectors of the wire harness are connected to the connector block 42 from the lower side thereof, and the wire harness is led out to the exterior through an opening in a lower cover (not shown). An upper cover (not shown) is attached to the upper side of the main cover 53. The main cover 53, the bus bar assembly 31, the connector block 42, the electric parts including the fuses 13 and 56 and the relay 58, the upper cover and the lower cover jointly form the electric connection box 20. The electric connection box 20, shown in Fig. 6, is given merely as one example, and the bus bar 1, 23, 30 can be used alone or in combination with any other suitable bus bar so as to provide an electric connection box having a suitable circuit arrangement.

Claims

1. A bus bar structure comprising:

a plate-like bus bar body, said plate-like bus bar body including:

connecting portions provided on one side portion of said plate-like bus bar and the other side portion of said plate-like bus bar, respectively; and
a fusible portion and an interconnecting portion are provided at an intermediate portion of said bus bar body,

wherein said one side portion and said other side portion of said bus bar body are interconnected by said fusible portion and said interconnecting portion.

2. A bus bar structure according to claim 1, provided in that said interconnecting portion is larger in width than said fusible portion.
3. A bus bar structure according to claim 1 or claim 2, said one side portion and said other side portion of said bus bar body are interconnected only by said fusible portion after cutting said interconnecting portion.
4. A bus bar structure according to claim 1, said intermediate portion of said bus bar body is provided without said fusible portion.
5. A bus bar structure according to claim 1 or claim 2, provided in that said interconnecting portions are formed respectively at opposite sides of said fusible portion spaced from each other in a direction generally perpendicular to a direction of spacing of said one and other side portions of said bus bar body from each other.
6. A bus bar structure according to any one of claims 1, 2 and 5, wherein said interconnecting portions are formed respectively at opposite side portions of said bus bar body spaced from each other in a direction generally perpendicular to a direction of spacing of said one and other side portions of said bus bar body from each other.

7. An electric connection box comprising:

a bus bar structure as defined in any one of claims 1 to 6.

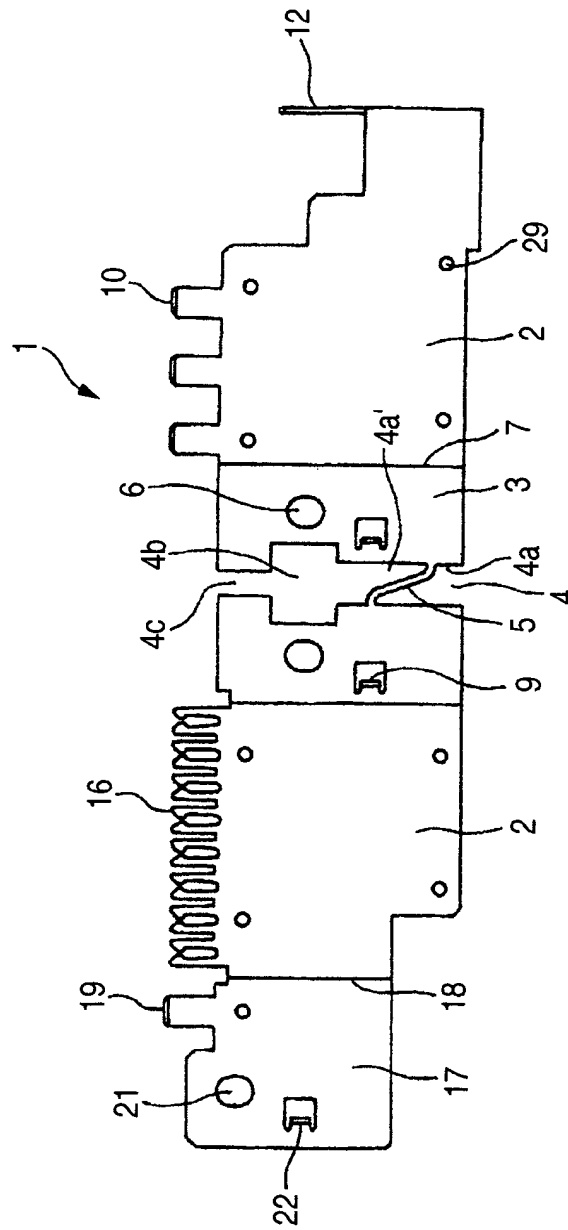
8. A method for forming a bus-bar comprising the steps of:

blanking from an electrically-conductive metal sheet a first bus bar which includes a bus bar body including one side portion having connection portions and the other side portion having

connection portions;
forming a fusible portion and an interconnecting portion at an intermediate portion of said bus bar body to produce a first bus bar; and
cutting said interconnecting portion off from said first bus bar to provide a second bus bar having said fusible portion.

9. A bus bar-forming method according to claim 8, wherein said first bus bar is formed without forming said fusible portion.

FIG. 1



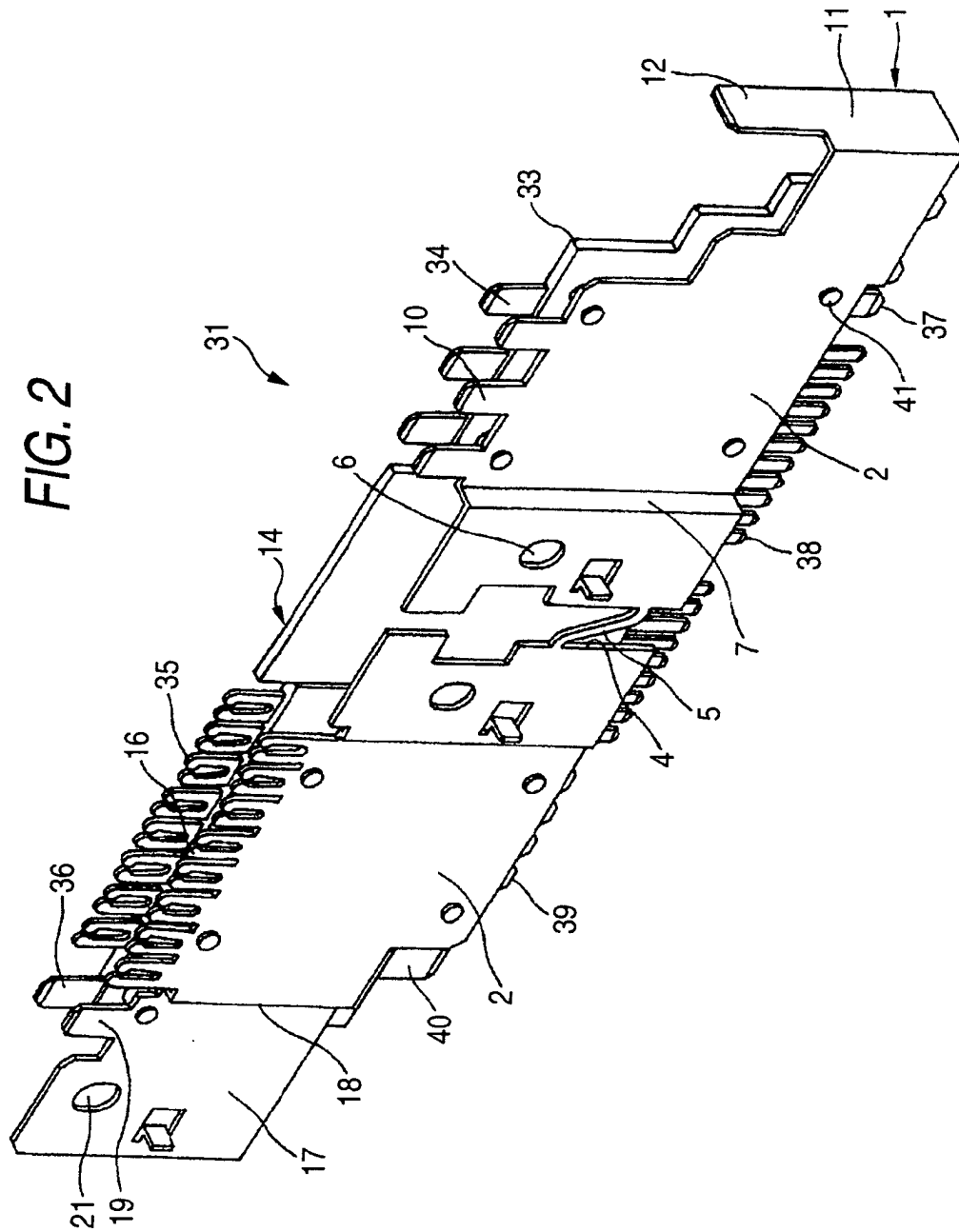


FIG. 3

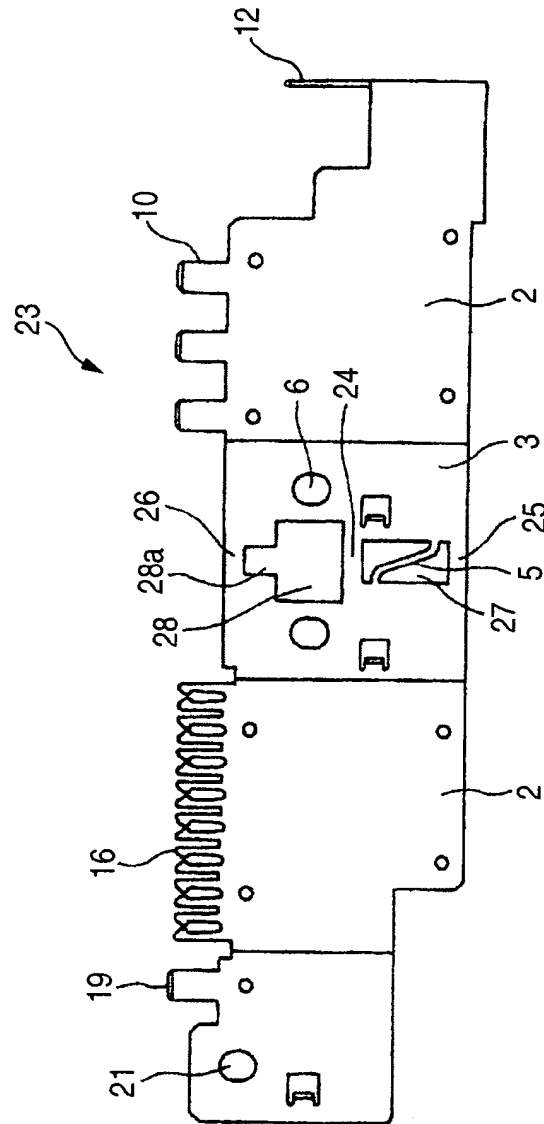
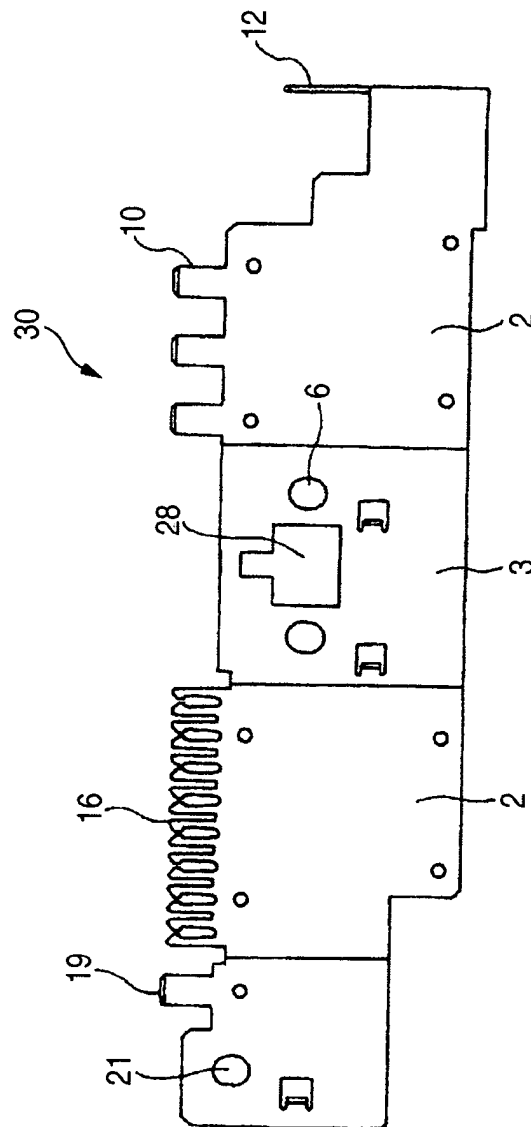


FIG. 4



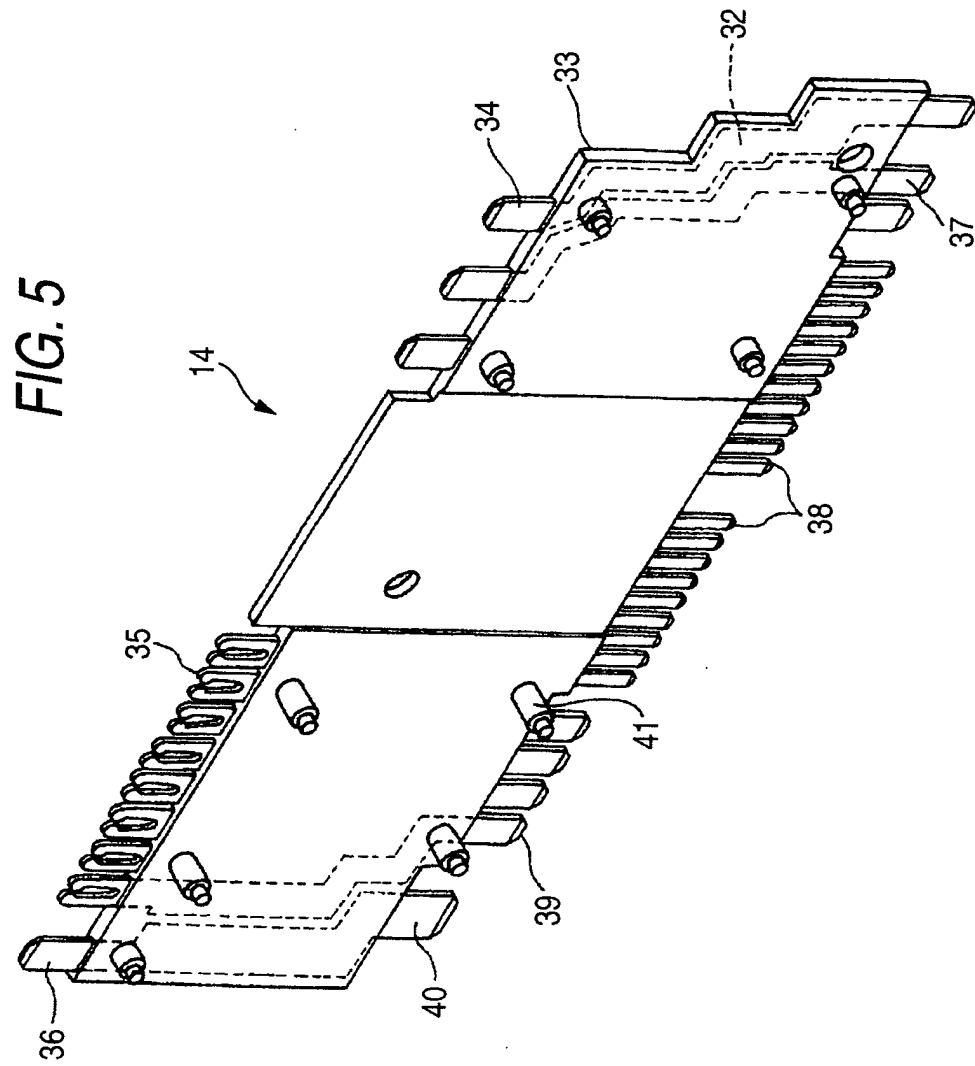


FIG. 6

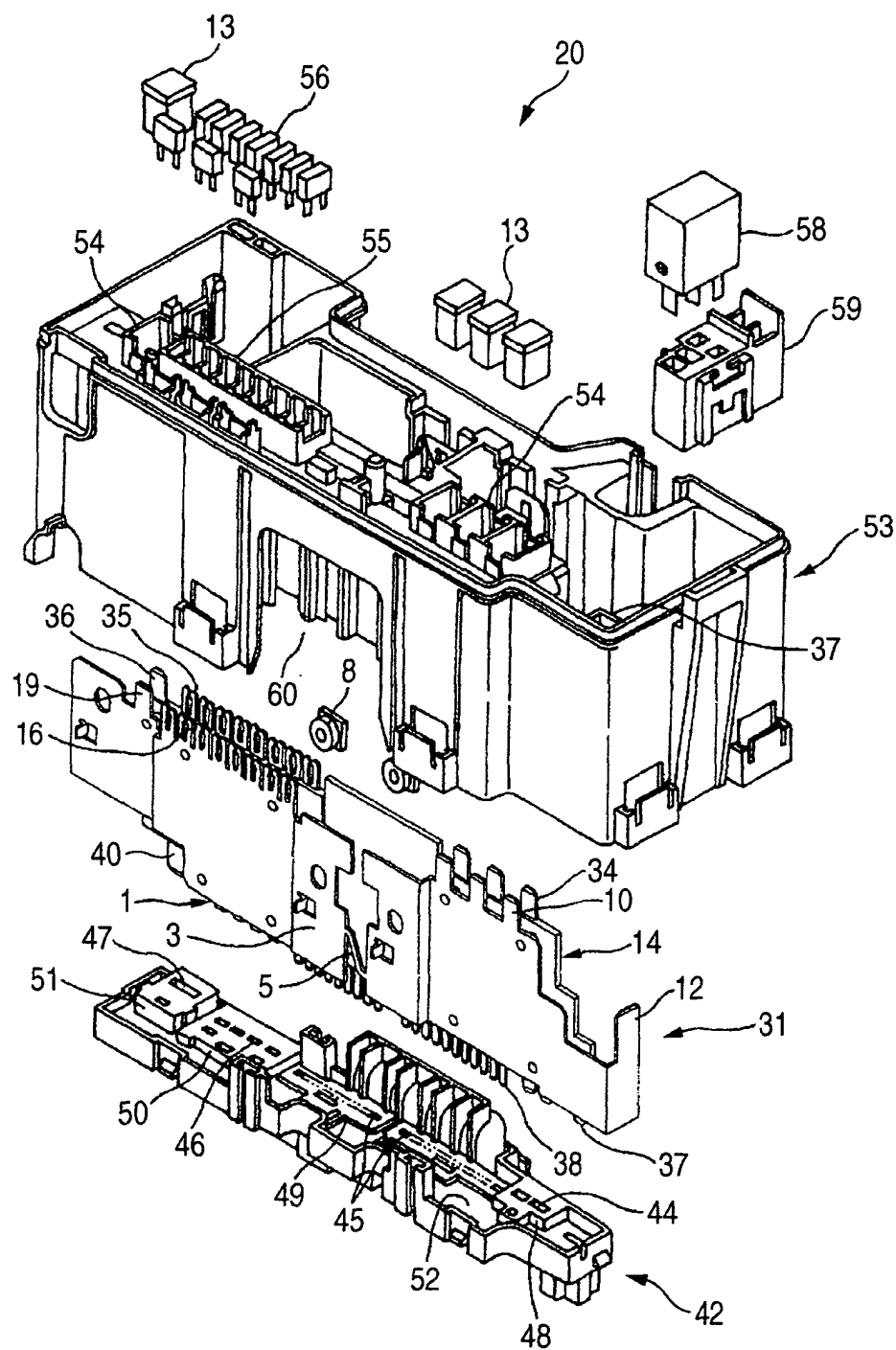


FIG. 7 (a)

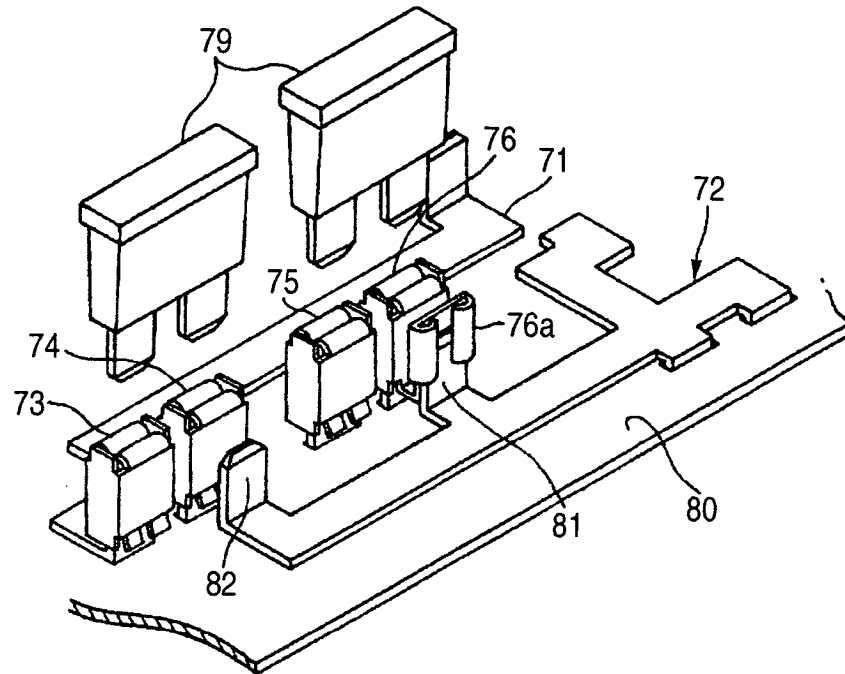
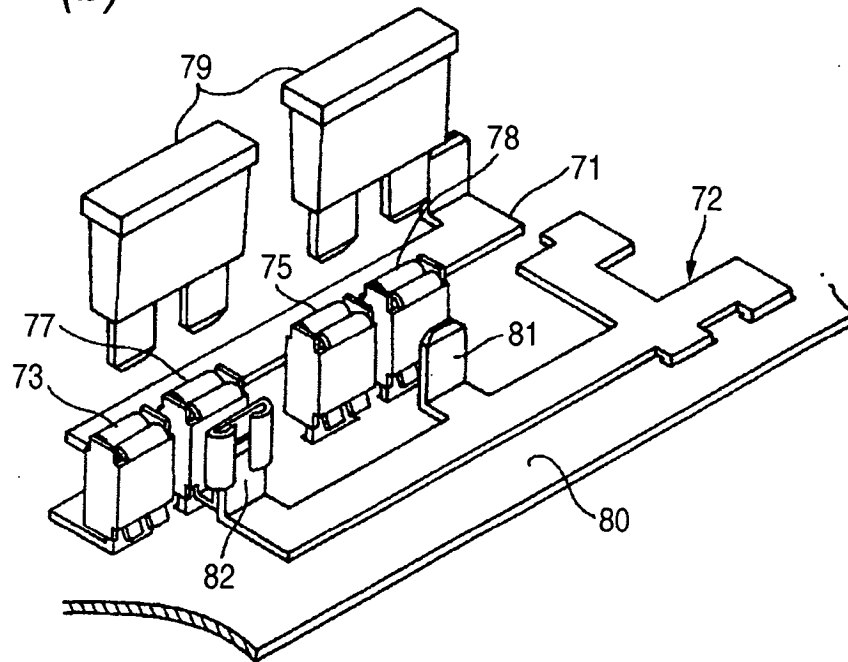


FIG. 7 (b)





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Application Number
EP 04 25 8014

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