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(54) **Electric connection box and bus bar-mounting structure thereof**

Elektrisches Verbindungsgehäuse und Stromschienenmontageanordnung dafür

Boîtier de connexion électrique et structure de montage de barre omnibus pour ce boîtier

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- **PATENT ABSTRACTS OF JAPAN vol. 2002, no. 08, 5 August 2002 (2002-08-05) & JP 2002 101526 A (YAZAKI CORP), 5 April 2002 (2002-04-05)**

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Description

[0001] This invention relates to an electric connection box in which bus bars, having terminal portions, are inserted into a connection box body to be mounted therein, and also relates to a bus bar-mounting structure of the electric connection box.

[0002] Fig. 7 shows a bus bar-mounting structure of a conventional electric connection box Unexamined Japanese Patent Publication 2002-101526.

[0003] In this structure, a flat plate-like bus bar 82 is mounted in a vertical posture within a synthetic resin-made connection box body 81. The connection box body 81 has a slit-like insertion space 83 which extends upwardly from a lower opening in the connection box body 81. The bus bar 82 includes a plurality of upwardly-extending, juxtaposed tuning fork-like gripping terminals 84, and a pair of upper and lower tab terminals 85.

[0004] The gripping terminals 84 are inserted into a fuse-mounting portion 86 of the connection box body 81, and the upwardly-extending tab terminal 85 is inserted into a fusible link-mounting portion 87, and a flat plate-like bus bar body 88 is retained by elastic retaining lances 89 (formed within the connection box body 81) engaged respectively in holes formed in the bus bar body 88.

[0005] Each of the gripping terminals 84 is connected to a tab terminal of a small-current fuse (not shown) of the blade type, and the upwardly-extending tab terminal 85 is connected to a female terminal of a large-current fusible link (not shown) of the box type, and the downwardly-extending tab terminal 85 is connected to a female terminal of a power cable 90 extending from a battery.

[0006] The gripping terminal 84 has a pair of opposed right and left narrow gripping piece portions 84a disposed in a common plane. Each gripping piece portion 84a has a contact projection formed on its inner edge at its distal end, and the tab terminal (male terminal) of the fuse is inserted between the pair of opposed contact projections, so that the pair of gripping piece portions 84a resiliently grip the tab terminal, thereby connecting the tab terminal to the gripping terminal.

[0007] Insertion holes for respectively receiving the gripping terminals 84 are formed in the fuse-mounting portion 86 of the connection box body 81, and the gripping terminals 84 pass through the respective insertion holes, and are disposed in the fuse-mounting portion 86. One tab terminal of each fuse is inserted in the corresponding gripping terminal 84 to be connected thereto in perpendicularly-intersecting relation thereto. The other tab terminal of the fuse is connected to a bus bar or a wire-connected female terminal.

[0008] The electric connection box 91 comprises the connection box body 81, the bus bar 82, and electrical parts including the fuses and the fusible links, and this electric connection box 91 is fixed, for example, to a vehicle body or the like by lock portions 92 formed on an outer surface of the connection box body 81. The number of the bus bar 82 is not limited to one, and in many case a plurality of bus bars are provided. In some cases, a connector housing is formed integrally with the connection box body 81.

[0009] In the bus bar-mounting structure of the above conventional electric connection box, however, there has been a fear that when the bus bar 82 is inserted into the connection box body 81, the gripping terminal 84 strikes at its distal end against a peripheral edge portion of the terminal insertion hole in the fuse-mounting portion 86, and therefore can not be smoothly inserted thereinto, or is bent or deformed. When the gripping terminal is deformed, there has been a fear that a pressure of contact of the gripping terminal 84 with the tab terminal of the fuse is reduced, so that the electrical contact therebetween is adversely affected.

[0010] In order to smoothly mount the bus bar 82 within the connection box body 81 without any interference or the like, a guide member must be provided at the connection box body 81, and therefore there has been encountered a problem that the structure becomes complicated, so that the cost increases. Particularly when the complicated guide structure is provided at the synthetic resin-made connection box body 81, there have been encountered problems that the structure of a mold for forming the connection box body is complicated, so that its cost increases, and that the efficiency of an operation for removing the molded connection box body 81 from the mold is lowered, so that the productivity is lowered.

[0011] EP1119075 describes an electrical connection box having a first casing part in which is mounted a bus bar laminate, and a second casing part in which a wiring substrate is accommodated. The first casing part has projections to achieve accurate alignment of the bus bar laminate with the wiring substrate.

[0012] In view of the foregoing problems, it is an object of this invention to provide an electric connection box, as well as a bus bar-mounting structure thereof, in which low-strength terminals (such as gripping terminals) and a bus bar can be smoothly and positively inserted into a connection box body without deforming the low-strength terminals.

[0013] The above object has been achieved by an electric connection box with a bus bar including a bus bar mounting structure comprising a plurality of low-strength terminals, insertable into a connection body body, characterised in that the guide portions are provided in a projecting manner respectively at opposite sides of the plurality of low-strength terminals in a direction of juxtaposition of the low-strength terminals; and the guide portions project from the bus bar higher than the low-strength terminals so that said guide portions are inserted respectively into positioning portions of the connection box body before said low-strength terminals are inserted respectively into terminal insertion holes in said connection box body.

[0014] In this construction, when the bus bar is inserted into the body to be mounted therein, first, the guide por-

tions, disposed respectively at the opposite sides of the plurality of low-strength terminals, are inserted respectively into the positioning portions of the connection box body, thereby accurately positioning the low-strength terminals relative to the respective terminal insertion holes in the connection box body, and therefore the low-strength terminals are accurately guided into the respective terminal insertion holes by the guide portions in accordance with the insertion of the bus bar.

[0015] The electric connection box with a bus bar including a bus bar-mounting structure of the electric connection box of a second aspect of the present invention, depending from the first aspect of the present invention, is provided in that one or both of the guide portions are tab terminals, and one or both of the positioning portions are tab terminal insertion holes.

[0016] In this construction, the tab terminal is used as the guide portion for guiding the low-strength terminals into the respective terminal insertion holes, and thus this tab terminal can perform function both the guide function and the connecting function.

[0017] The electric connection box with a bus bar including a bus bar-mounting structure of the electric connection box of a third aspect of the present invention, depending from the second aspect of the present invention, is provided in that one of the guide portions is the tab terminal, and the other guide portion is a tab portion of exclusive use for positioning purposes, and the positioning portion, corresponding to the other guide portion is a tab insertion hole.

[0018] In this construction, the connecting and guiding-purpose tab terminal is disposed at one side of the plurality of low-strength exclusive use for guiding purposes is disposed at the other side thereof, and the low-strength terminals are positioned relative to the respective terminal holes by the tab terminal and the tab portion, and are guided into these terminal insertion holes by the tab terminal and the tab portion.The tab portion is formed at a region where an electrical connection is not necessary. Simultaneously when the bus bar is formed front an electrically-conductive metal sheet by blanking, the tab portion is formed by this blanking operation.

[0019] The electric connection box with a bus bar including a bus bar-mounting structure of the electric connection box of a fourth aspect of the present invention, depending from a second aspect of the present invention, is provided in that one of the guide portions is the tab terminal, and the other guide portion projected plate portion of an insulative nature, and the positioning portion, corresponding to the other guide portion, is a positioning wall provided within the connection box body.

[0020] In this construction, the tab terminal is disposed at one side of the plurality of low-strength terminals, while the insulative projected plate portion is disposed at the other side thereof, for example, the insulative plate portion covers front and rear sides of bus bar bodies except terminal portions to insulate these bus bar bodies from the exterior. When the bus bar is inserted into eh connection box body to be mounted therein, the projected plate portion is inserted in sliding contact with the positioning wall of the connection box body to accurately position the gripping terminals, and if fitted into a channel-shaped groove, thereby preventing the gripping terminals from being displaced in a direction of the thickness of the positioning wall.

[0021] The electric connection box with a bus bar including a bus bar-mounting structure of the electric connection box of the fifth aspect of the present invention, depending from any one of the first to fourth aspect of the present invention, is provided in that second guide portions are provided respectively at opposite ends of the bus bar, and before the guide portions are inserted respectively into the positioning portions of the connection box body, the second guide portions are inserted second positioning portions of the connection box body.

[0022] In this construction, when the bus bar is inserted into the connection box body, first, the second guide portions are inserted respectively into the second positioning portions to effect the initial positioning of the bus bar. Subsequently, the guide ones guide the low-strength terminals into the respective terminal insertion holes in accordance with the insertion of the bus bar.

[0023] The electric connection box with a bus bar including a bus bar-mounting structure of the electric connection box of the sixth aspect of the present invention, depending from the fifth aspect of the present invention, is provided in that the second guide portions is a tab terminal disposed perpendicular to a longitudinal direction of the bus bar, and the other second guide portion is a plate portion of the bus bar.

[0024] In this construction, the tab terminal (the one second guide portion), disposed perpendicular to the bus bar, positions the bus bar in the longitudinal direction thereof, thereby accurately positioning the other tab terminals (guide portions), etc., of the bus bar. The plate portion (the other second guide portion) extends in the longitudinal direction of the bus bar, and the smooth positioning of the bus bar in the longitudinal direction thereof can be effected only by the tab terminal (the one second guide portion) disposed perpendicular to the bus bar (In case the other second guide portion is also disposed perpendicular to the bus bar second guide portion is also disposed perpendicular to the bus bar, it is difficult to insert both to the two second guide portions respectively into the second positioning portions).

[0025] In this first aspect of the present invention, when the guide portions, disposed respectively at the opposite sides of the plurality of the low-strength terminals, are inserted respectively into the positioning portions of the connection box, the positioning of the low-strength terminals relative to the respective terminal insertion holes is accurately effected. Therefore, the low-strength terminals, such as fuse-connecting gripping terminals and wire connecting press-contacting terminals, can be smoothly and positively respective terminal inverted into the respective terminal insertion holes without abutting against

(that is, interfering with) peripheral edges of the terminal insertion holes. Therefore, the bending deformation etc., of the low-strength terminals is positively prevented, and the electrical contact of fuses or wires with the low-strength terminals is positively affected, so that the reliability of electrical connection of the low-strength terminals is enhanced.

[0026] In the second aspect of the present invention, the tab terminal functions as the guide portion and the connecting portion, and therefore it is not necessary to use any separate guide member, so that the structure of the electric connection box is simplified, and besides its cost is reduced.

[0027] In the third aspect of the present invention, the tab portion for exclusive use for positioning purposes, together with the bus bar, is formed by blanking, and the tab portion is provide at the region where an electrical connection is not necessary. With this construction, the guide portion can be formed at a low cost with high positional accuracy.

[0028] In the fourth aspect of the present invention, the low-strength terminals are positioned and guided by the insulative projected plate portion covering the bus bar, and thus the insulative projected plate portion can perform the bus bar-insulating function and the guide function, so that the structure of the electrical connection box is simplified, and besides its cost is reduced.

[0029] In the fifth aspect of the present invention, the bus bar is initially positioned by the second guide portions and the second positioning portions, and therefore the insertion (mounting) of the bus bar into the connection box body can be effected efficiently, and besides the low-strength terminals can be more accurately positioned and guided.

[0030] In the sixth aspect of the present invention, the terminals of the bus bar can be easily and accurately positioned in the longitudinal direction of the bus bar by the tab terminal (the one second guide portion) , disposed perpendicular to the bus bar, and the plate portion (the other second guide portion) extending in the longitudinal direction of the bus bar, and therefore the insertion (mounting) of the bus bar into the connection box body can be effected more efficiently.

[0031] In the accompanying drawings:

Fig. 1 is an exploded, perspective view showing one preferred embodiment of an electric connection box and a bus bar-mounting structure thereof.

Fig. 2 is a perspective view of one example of a bus bar assembly comprising two bus bars.

Fig. 3 is a front-elevational view of one example of a power supply bus bar.

Fig. 4 is a perspective view of one example of an insulating array bus bar.

Fig. 5 is a longitudinal cross-sectional view of a main cover of the electric connection box.

Fig. 6 is a plan view of the main cover as seen from its lower side.

Fig. 7 is an exploded, perspective view of a bus bar-mounting structure of a conventional electric connection box.

[0032] Fig. 1 shows one preferred embodiment of an electric connection box of the present invention and a bus bar-mounting structure thereof.

[0033] The electric connection box 1 comprises a synthetic resin-made main cover (connection box body) 2, a bus bar assembly 3 inserted into the main cover 2 from a lower side thereof to be disposed vertically within this main cover 2, a synthetic resin-made connector block (undercover) 4 which is provided at a lower side of the bus bar assembly 3, and is mounted within the main cover 2, a synthetic resin-made lower cover (not shown) attached to the lower side of the main cover 2, and a synthetic resin-made upper cover attached to the upper side of the main cover 2.

[0034] Fig. 2 is a perspective view of the bus bar assembly 3, and Fig. 3 is a front-elevational view showing a front bus bar 5 of the bus bar assembly 3, and Fig. 4 is a perspective view showing a rear bus bar 6 of the bus bar assembly 3., As shown in these Figures, the bus bar assembly 3 comprises the front-side power supply bus bar 5, and the rear-side insulating array bus bar 6.

[0035] The power supply bus bar 5 is formed by blanking and bending a single electrically-conductive metal sheet, and this bus bar 5 includes a flat plate-like bus bar body 7. A plurality of projecting tab terminals 8 are formed at an upper portion of a right half portion of the bus bar body 7, and are juxtaposed at equal intervals. A plate portion 9 is formed at a right end of the bus bar body 7, and is bent to be disposed perpendicular to the bus bar body 7, and one wide tab terminal (guide portion) 10 is integrally formed at an upper end of the plate portion 9. A plurality of projecting gripping terminals (low-strength terminals) 11 are formed at an upper portion of a left half portion of the bus bar body 7, and are juxtaposed at equal intervals in relatively closely-spaced relation to one another. The bus bar body 7 includes a plate portion (second guide portion) 13 which is inwardly offset a step therefrom through a left stepped portion 12, and extends parallel thereto. One tab terminal (guide portion) 14 is formed in a projecting manner at an upper portion of the plate portion 13, and a hole 15 to which a wire-connected terminal is connected is formed through a left end portion of the plate portion 13. The bus bar body 7 includes a central plate portion 17 which is outwardly offset a step therefrom through stepped portions 16, and is disposed parallel thereto. A tab terminal (guide portion) 18 is formed in a projecting manner at an upper portion of a left end portion of the central plate portion 17. A fusible portion (fuse) 20 is formed integrally with the central plate portion 17, and extends across a central notch 19 formed in the central plate portion 17.

[0036] The wide tab terminal 10 at the right end of the bus bar 5 is disposed at a level (height) much lower than the tab terminals 8 and the gripping terminals 11. As

shown in Fig. 3, distal ends of the tab terminals 14 and 18 are disposed at a level slightly higher a distance L than distal ends of the gripping terminals 11. The proximal ends of the tab terminals 14 and 18 and the proximal ends of the gripping terminals 11 are disposed generally at the same level. The terminals 8 and 11 lie in a plane in which the bus bar body 7 lies, and the terminal 14 lies in a plane in which the plate portion 13 lies, and the terminal 18 lies in a plane in which, the plate portion 17 lies.

[0037] The tab terminals 14 and 18 are disposed adjacent respectively to left and right ends of the plurality of juxtaposed gripping terminals 11 (that is, disposed respectively at the opposite sides of the plurality of gripping terminals 11 in the direction of juxtaposition thereof), and project slightly higher than the gripping terminals 11, and therefore the plurality of gripping terminals 11 are disposed between the pair of tab terminals 14 and 18 which are spaced from each other in the direction of juxtaposition of the gripping terminals 11. Each of the gripping terminals 11 includes a pair of resilient gripping piece portions 11b each having a contact projection 11a as is the case with the conventional gripping terminal.

[0038] In Fig. 1, the tab terminal 10 at the right end of the bus bar 5 is disposed within a connector housing 21 of the main cover 2, and the tab terminals 8 (at the right half portion) are disposed respectively within fusible link-mounting portions 22 of the main cover 2, and the tab terminal 14 (at the left end portion) is disposed within a fusible link-mounting portion 38. The gripping terminals 11 at the left half portion are disposed respectively within fuse-mounting portions 23 of the main cover 2. The tab terminal 18 at the central portion is disposed in a tab insertion hole (positioning portion) 24 in an inner side of an upper wall of the main cover 2, or disposed within a fusible link-mounting portion (not shown). In this embodiment, the tab terminal 18 at the central portion is designed for exclusive use as a guide tab portion, and is inserted into the positioning-purpose tab insertion hole 24. In the case where the fusible link-mounting portion (not shown) is provided at the central portion of the main cover 2, the tab portion 18 serves as the fusible link-connecting terminal, and also serves as the gripping terminal-guiding tab terminal.

[0039] When the bus bar assembly 3 (particularly the power supply bus bar 5) is inserted into the main cover 2 (that is, mounted in the main cover 2), the right-end tab terminal 10 initially effects the positioning of the whole of the bus bar assembly 3, and subsequently the pair of tab terminals 14 and 18, disposed respectively at the opposite sides of the plurality of gripping terminals 11, position the gripping terminals 11 relative to the fuse-mounting portions 23 of the main cover 2, and serves as guide means so as to smoothly insert the gripping terminals 11 into the respective fuse-mounting portions 23 of the main cover 2. The tab terminals 8 at the right half portion assist the tab terminals 14 and 18 in effecting the positioning and guiding operation.

[0040] Whether or not the fusible portion 20 is provided at the central plate portion 17 of the power supply bus bar 5 is suitably determined in accordance with the kind of car, etc. When the provision of the fusible portion 20 is not necessary, the two sections of the plate portion 17 are interconnected by a wide interconnecting portion (not shown). Holes 25 are formed through the plate portion 17, and are disposed respectively at opposite sides of the notch 19. After the fusible portion 20 melts, a post-mounting fuse (not shown) is connected to the bus bar 5 through these holes 25. In this embodiment, holes 26 are formed respectively through a plurality of portions of the bus bar body 7 of the power supply bus bar 5, and projected portions 28, formed on an insulative resin portion 27 of the insulating array bus bar 6 (Fig. 2), are thermally deformed to be fastened respectively to these hole portions 26, thereby fixing the two bus bars 5 and 6 to each other.

[0041] As shown in Fig. 4, the insulating array bus bar 6 comprises a plurality of strip-like bus bar bodies 29, and the insulating resin portion 27 covering the bus bar bodies 29. Tab terminals 30, 32 and 33 to 36 and gripping terminals (low-strength terminals) 31 are formed at upper and lower ends (or edges) of the bus bar bodies 29, and project from the insulating array bus bar 27.

[0042] The plurality of projecting tab terminals 30 are formed at an upper portion of a right half portion of the insulating array bus bar 6, and are juxtaposed at equal intervals. The plurality of projecting gripping terminals 31 are formed at an upper portion of a left half portion of the bus bar 6, and are juxtaposed at equal intervals in relatively closely-spaced relation to one another. The tab terminal (guide portion) 32 is formed in a projecting manner at an upper portion of the left end portion of the bus bar 6. The upper tab terminals 30 and 32 have the same projecting height, and their distal ends are disposed slightly higher than distal ends of the gripping terminals 31. As shown in Fig. 2, the upper tab terminals 30 and 32 are opposed respectively to the tab terminals 8 and 14 of the power supply bus bar 5 in the forward-rearward direction, and the gripping terminals 31 are opposed respectively to the gripping terminals 11 of the power supply bus bar 5 in the forward-rearward direction.

[0043] The left-end tab terminal 32 is disposed in proximity to the left side of the plurality of gripping terminals 31 in juxtaposed relation thereto, and a left end of a rectangular projected plate portion (guide portion) 37 of the insulative resin portion 27 is disposed in proximity to the right side of the plurality of gripping terminals 31, and this projected plate portion 37 is disposed at a level slightly lower than the gripping terminals 31. The left-end tab terminal 32 is disposed within the fusible link-mounting portion 38 provided at the left end portion of the main cover 2, and the central projected plate portion 37 is fitted in a horizontal channel-shaped groove (positioning portion) 39 formed in the inner side of the upper wall of the main cover 2. When the gripping terminals 31 are to be inserted respectively into the fuse-mounting portions 23 of the main cover 2 (Fig. 1), the tab terminal 32 and the

projected plate portion 37 guide and position these gripping terminals 31.

[0044] The plurality of wide tab terminals 33, the wide tab terminals 36, the plurality of narrow tab terminals 34 and the plurality of narrow tab terminals 35 project from the lower end (edge) of the insulating array bus bar 6 (Fig. 4) in generally juxtaposed manner. The tab terminals 33 to 36 are inserted respectively into terminal insertion holes 40 in the connector block 4 (Fig. 1), and are disposed within respective connector housings 41 to form connectors. Connectors of a wire harness are fittingly connected respectively to these connectors from the lower side of the connector block.

[0045] In this embodiment, although the two bus bars 5 and 6 are integrally connected together by the bosses 28 formed on the insulative resin portion 27, the two bus bars do not always need to be fixed to each other, but can be inserted separately in (mounted within) the main cover 2.

[0046] Fig. 5 is a longitudinal cross-sectional view of the main cover 2 taken along the line A-A of Fig. 6, and Fig. 6 is a plan view of the main cover as seen from the lower side thereof. As shown in these Figures, the main cover 2 includes a lower wide opening 42, and a bus bar-receiving space 43 extending from the lower opening 42. The bus bar-receiving space 43 is formed at a front half portion of the main cover 2, and a rear side thereof is defined by a vertical partition wall 44 disposed generally centrally of the thickness of the main cover 2. Relay-receiving spaces 45 are formed respectively at opposite side portions of a rear half portion of the main cover 2. A relay 69 (Fig. 1), together with a relay holder 70, is mounted in the relay receiving space 45.

[0047] The plurality of fusible link-mounting portions 22 are provided at an upper portion of a right half portion of the bus bar-receiving space 43, and are juxtaposed at a predetermined pitch. The plurality of fuse-mounting portions 23 are provided at an upper portion of a left half portion of the bus bar-mounting space 43, and are juxtaposed at a predetermined pitch. The connector housing 21 is provided at the right end portion of the main cover 2, and is disposed at a level lower than the mounting portions 22 and 23. The fusible link-mounting portion 38 (Fig. 6) is provided at the left end portion of the main cover 2, and is disposed at the same level as the fusible link-mounting portions 22 provided at the right half portion.

[0048] Each fusible link-mounting portion 22, 38 has a pair of opposed slit-like bus bar terminal insertion holes (positioning portions) 46, 47 (extending in the longitudinal direction of the main cover) formed in a bottom wall 22a, 38a of its housing (designated by reference numeral 22, 38 for convenience). Each fuse-mounting portion 23 has a pair of slit-like fuse terminal insertion holes 49 (extending in the direction of the thickness of the main cover which is perpendicular to the longitudinal direction) formed in an intermediate wall 23a of its housing (designated by reference numeral 23 for convenience). The fuse-mounting portion 23 also has a pair of opposed slit-like bus bar terminal insertion holes 50 (extending in the longitudinal direction of the main cover) which are formed in the lower side of the intermediate wall 23a, and communicate respectively with the fuse terminal insertion holes 49 in perpendicularly-intersecting relation thereto.

[0049] Each mating pair of opposed wide tab terminals 8 and 30 (Fig. 1) of the bus bar assembly 3 are inserted respectively into the pair of bus bar terminal insertion holes 46 of the corresponding fusible link-mounting portion 22, and are disposed within the housing thereof (that is, within a fusible link-receiving space 22b). Each mating pair of opposed narrow gripping terminals 11 and 31 of the bus bar assembly 3 are inserted respectively into the pair of bus bar terminal insertion holes 50 of the corresponding fuse-mounting portion 23, and are disposed in a lower half portion of the housing thereof. A body portion of a fuse 52 (Fig. 1) is received in an upper half portion of the housing of the fuse-mounting portion 23. The pair of tab terminals 8 and 30 are connected respectively to female terminals (not shown) provided within a box-type fusible link 51 (Fig. 1) , and the pair of gripping terminals 11 and 31 are connected respectively to tab terminals 52a of the fuse 52 in perpendicularly-intersecting relation thereto at the lower side of the intermediate wall 23a of the housing.

[0050] As shown in Fig. 5, the bottom wall 22a of the housing of each fusible link-mounting portion 22 is disposed at a level lower than the intermediate wall 23a of the housing of each fuse-mounting portion 23, and the lower ends of the bus bar terminal insertion holes 46 in the fusible link-mounting portion 22 are disposed at a level equal to or slightly lower than the level of the lower ends of the bus bar terminal insertion holes 50 in the fuse-mounting portion 23.

[0051] A bus bar terminal insertion hole 53 is formed through a bottom wall 21a of the connector housing 21 provided at the right end portion of the main cover 2, and the bus bar terminal insertion hole 53 communicates with a slit-like bus bar insertion gap 55 formed between a pair of positioning walls 54 extending vertically downwardly from the bottom wall 21a. Tapering guide surfaces 55a are formed at a lower end portion of the bus bar insertion gap 55, and lower ends of the guide surfaces 55a (that is, lower ends of the positioning walls 54) are disposed at a level slightly higher than the lower opening 42 of the main cover 2 and the lower end of the partition wall 44.

[0052] As shown in Fig. 6, the pair of positioning walls 54 have an L-shape, and a slightly-wider bus bar terminal insertion gap (which is designated by reference numeral 55 for convenience, and serves as a second guide portion) is formed at a generally central portion of that portion (designated by reference numeral 55 for convenience) of the L-shaped bus bar insertion gap 55 extending in the direction of the thickness of the main cover, and is continuous straight with the bus bar terminal insertion hole 53 (Fig. 5). The wide tab terminal 10 at the right end of the power supply bus bar 5 of the bus bar assembly 3

(Fig. 1) is inserted into the bus bar terminal insertion hole 53 through the bus bar terminal insertion gap. An elongate projection is formed on the surface of the tab terminal 10, and therefore is larger in thickness than the plate portion 9 (Fig. 2) (from which the tab terminal 10 extends) by an amount corresponding to the thickness of this elongate projection.

[0053] The tab terminal 10 and a wire-connected tab terminal (not shown) are inserted into the connector housing 21 to form a connector. For example, a power cable (not shown) , extending from a battery of a vehicle, is connected to this connector or the hole portions formed in the central portion of the bus bar 5. In Fig. 2, the tab terminal 10 is disposed at a level lower than the other terminals (the tab terminals 8, the gripping terminals 11 and so on) of the bus bar 5. However, the lower end of the bus bar terminal insertion gap 55, extending long downwardly from a connector fitting chamber 21b of the connector housing 21, is disposed at a level much lower than the bus bar terminal insertion holes 46 of the fusible link-mounting portions 22 and the bus bar terminal insertion holes 50 of the fuse-mounting portions 23 as shown in Fig. 5. Therefore, when the bus bar assembly 3 is inserted into the main cover 2, first, the distal end of the tab terminal 10 is inserted into the bus bar terminal insertion gap 55.

[0054] Partly because of this arrangement and particularly because of the fact that the tab terminal 10 is disposed perpendicular to the bus bar 5, the positioning of the tab terminals 8, 14, 30 and 32 and gripping terminals 11 and 31 of the bus bar assembly 3 is accurately effected at the time when the tab terminal 10 is inserted into the bus bar terminal insertion gap 55.

[0055] As shown in Fig. 6, one fusible link-mounting portion 38, having the pair of front and rear bus bar terminal insertion holes 47 formed in the bottom wall thereof, is disposed at the left end of the plurality of juxtaposed fuse-mounting portions 23, and the bottom wall of the fusible link-mounting portion 38 is disposed at the same level as the bottom walls of the fusible link-mounting portions 22 (provided at the right half portion of the main cover) , and also is disposed at the level equal to or slightly lower than the lower ends of the housings of the fuse-mounting portions 23 (that is, the lower ends of the bus bar terminal insertion holes 50). As shown in Figs. 3 and 4, the left-end tab terminals 14 and 32 of the bus bars 5 and 6 project slightly higher than the gripping terminals 11 and 31, and therefore the left-end tab terminals 14 and 32 serve as the positioning and guiding portions when inserting the gripping terminals 11 and 31 into the respective fuse-mounting portions 23 of the main cover 2.

[0056] The bottom wall 38a of the left-end fusible link-mounting portion 38 can be disposed lower than the lower ends of the housings of the fuse-mounting portions 23, in which case the tab terminals 14 and 32 may be disposed at the same level as the gripping terminals 11 and 31.

[0057] One terminal insertion hole 24 is provided at the right side of the plurality of fuse-mounting portions 23 of the main cover 2, and is disposed adjacent to the right end of the front row of gripping terminal insertion holes 50. This terminal insertion hole 24 is formed in a rib (projecting wall) 57 extending downwardly from the upper wall of the main cover 2, and the rib 57 projects downwardly to a level equal to or lower than the lower ends of the housings of the fuse-mounting portions 23. The lower end of the terminal insertion hole 24 in the rib 57 is disposed at a level equal to or lower than the lower ends of the bus bar terminal insertion holes 50 of the fuse-mounting portions 23. As shown in Fig. 5, the terminal insertion hole 24 has a closed upper end, and the central tab terminal (tab portion) 18 is inserted into the terminal insertion hole 24 to be disposed at a level generally equal to the level to which each tab terminal 8 of the power supply bus bar 5 is inserted into the corresponding fusible link-mounting portion 22 provided at the right half portion of the main cover.

[0058] As shown in Fig. 3, the central tab terminal 18 of the power supply bus bar 5 projects higher the distance L than the gripping terminals 11, and therefore the central tab terminal 18 at the right side of the plurality of fuse-mounting portions 23 is inserted into the terminal insertion hole 24 earlier than the gripping terminals 11, and serves as the positioning and guiding portion when inserting these gripping terminals 11 into the respective fuse-mounting portions 23 of the main cover 2.

[0059] Thus, the bus bar terminal insertion holes 24 and 47 are disposed respectively at the opposite sides of the plurality of fuse-mounting portions 23 in the direction of juxtaposition thereof, and the tab terminals 14 and 18 of the power supply bus bar 5, disposed respectively at the opposite sides of the plurality of gripping terminals 11, are inserted respectively into the terminal insertion holes 47 and 24 earlier than the gripping terminals 11. Therefore, the plurality of gripping terminals 11 are accurately positioned relative to the respective bus bar terminal insertion holes 50, and are smoothly and positively inserted into the terminal insertion holes 50 without abutting against (that is, interfering with) the lower ends of the terminal insertion holes 50. Therefore, the bending deformation, etc., of the narrow low-strength gripping terminals 11 is positively prevented.

[0060] In Figs. 5 and 6, the channel-shaped groove 39 is formed in the inner surface of the upper wall of the main cover 2, and is disposed adjacent to the right end of the rear row of the griping terminal insertion holes 50, the channel-shaped groove 39 extending horizontally in the longitudinal direction of the main cover 2. A plate-like positioning wall (positioning portion) 58 extends downwardly from the upper wall in contiguous relation to the front side of the channel-shaped groove 39. The central projected plate portion 37 of the insulative resin portion 27 of the insulating array bus bar 6 (Fig. 4) is fitted into the channel-shaped groove 39.

[0061] The positioning wall 58 is provided within the bus bar-receiving space 43 of the main cover 2, and is

disposed generally centrally of the thickness of this bus bar receiving space 43. This positioning wall 58 is inserted into a wide space (gap) 59 between the central portions of the two bus bars 5 and 6 of the bus bar assembly 3 (Fig. 2) so as to position the bus bar assembly 3 to smoothly guide the whole of the bus bar assembly 3 into the main cover 2. An opening 60 (Fig. 1) is formed in a front wall of the main cover 2 in opposed relation to the positioning wall 58. Nuts 61 for thread-fastening the post-mounting fuse (not shown) to the power supply bus bar 5 are held respectively in retaining grooves 62 in the positioning wall 58.

[0062] As shown in Fig. 6, the channel-shaped groove 39 is disposed in contiguous relation to the rear surface of the positioning wall 58, and also is disposed adjacent to the right end of the rear row of the gripping terminal insertion holes 50 of the fuse-mounting portions 23. With this arrangement, when the bus bar assembly 3 begins to be inserted into the main cover 2, the projected plate portion 37 of the insulating array bus bar 6 is inserted along the positioning wall 58, that is, in sliding contact with the positioning wall 58, and at this time, the gripping terminals 31 of the insulating array bus bar 6 are accurately positioned. When or after the projected plate portion 37 is fitted into the channel-shaped groove 39, the gripping terminals 31 are smoothly and positively inserted respectively into the terminal insertion holes 50 of the fuse-mounting portions 23 without displacement. This is due to a synergistic effect obtained by the construction in which the tab terminal insertion hole (positioning portion) 47 of the fusible link-mounting portion 38 is disposed adjacent to the left end of the rear row of gripping terminal insertion holes 50.

[0063] In Fig. 6, two pairs of front and rear positioning walls 63 and 64 for guiding the insertion of the left-end plate portion 13 of the power supply bus bar 5 (Fig. 3) are provided at the left end portion of the main cover 2. A bus bar insertion gap (second guide portion) 65 is formed between the pair of positioning walls 63, while a bus bar insertion gap (second guide portion) 66 is formed between the pair of positioning walls 64. The left-end positioning walls 63 and 64, the right-end positioning walls 54 and the intermediate positioning wall 58 simultaneously effect the initial positioning and guiding of the power supply bus bar 5.

[0064] In the above embodiment, although the two bus bars 5 and 6, integrally fixed to each other, is mounted within the main cover 2, the invention can be applied to the case where the two bus bars are mounted separately within the main cover 2 and also to the case where only one bus bar (the power supply bus bar 5 or the insulating array bus bar 6) is mounted within the main cover 2.

[0065] Instead of the gripping terminals 11 and 31 of the bus bars 5 and 6, wire-connected press-contacting terminals (not shown) can be used. The press-contacting terminal has a pair of right and left press-contacting piece portions, and each of the press-contacting piece portions has a wire sheath-cutting blade formed at a distal end thereof.

Claims

1. An electric connection box (1) with a bus bar (3) including a bus bar mounting structure comprising:

   a plurality of low-strength terminals (11) insertable into a connection box body; **characterised by**
   guide portions (14, 18, 32, 30) provided in a projecting manner respectively at opposite sides of said plurality of low-strength terminals (11) in a direction of juxtaposition of said low-strength terminals (11);
   wherein, the guide portions (14, 18, 32, 30) project from the bus bar (3) higher than the low-strength terminals, so that said guide portions are inserted respectively into positioning portions of said connection box body before said low-strength terminals are inserted respectively into terminal insertion holes in said connection body.

2. An electric connection box (1) with a bus bar (3) including a bus bar mounting structure according to claim 1, wherein at least one of said guide portions (14, 18, 32, 30) is a tab terminal, and at least one of said positioning portions is a tab terminal insertion hole (24).

3. An electric connection box (1) with a bus bar (3) including a bus bar mounting structure according to claim 2, wherein one of said guide portions (14,18, 32,30) is a tab terminal, and the other guide portion (14,18,32,30) is for exclusive use for positioning purposes, and the positioning portion, corresponding to said other guide portion, is a tab insertion hole (24).

4. An electric connection box (1) with a bus bar (3) including a bus bar mounting structure according to claim 2, wherein one of said guide portions (14,18, 32,30) is the tab terminal, and another guide portion (37) is a projected plate portion of an insulative nature, and the positioning portion corresponding to said other guide portion, is a positioning wall provided within said connection box body (1).

5. An electric connection box (1) with a bus bar (3) including a bus bar mounting structure according to any one of claims 1 to 4, further comprising:

   second guide portions provided (10,13) respectively at opposite ends of said bus bar (3),
   wherein before said guide portions (14,18,32,30) are inserted respectively into said positioning portions of said connection box

body, said second guide portions (10,13) are inserted respectively into second positioning portions of said connection box body.

6. An electric connection box (1) with a bus bar (3) including a bus bar mounting structure according to claim 5, wherein one of said second guide portions (10,13) is a tab terminal disposed perpendicular to a longitudinal direction of said bus bar (3), and the other second guide portion (10,13) is a plate portion of said bus bar (3).

Patentansprüche

1. Elektrisches Verbindergehäuse (1) mit einer Stromschiene (3), die eine Stromschienen-Montageanordnung enthält, umfassend:

eine Vielzahl von Anschlüssen (11) geringer Festigkeit, die in einen Verbindergehäusekörper eingefügt werden können; **gekennzeichnet durch**
Führungsabschnitte (14, 18, 32, 30), die hervorragend auf jeweils gegenüberliegenden Seiten der Vielzahl von Anschlüssen (11) geringer Festigkeit in einer Richtung neben den Anschlüssen (11) geringer Festigkeit vorgesehen sind;
wobei die Führungsabschnitte (14, 18, 32, 30) von der Stromschiene (3) höher hervorragen als die Anschlüsse geringer Festigkeit, so dass die Führungsabschnitte jeweils in Positionierungsabschnitte des Verbindergehäusekörpers eingefügt sind, bevor die Anschlüsse geringer Festigkeit jeweils in Anschlusseinfügelöcher in dem Verbinderkörper eingefügt sind.

2. Elektrisches Verbindergehäuse (1) mit einer Stromschiene (3), die eine Stromschienen-Montageanordnung enthält, nach Anspruch 1, bei dem wenigstens einer der Führungsabschnitte (14, 18, 32, 30) ein streifenförmiger Anschluss ist und wenigstens einer der Positionierungsabschnitte ein streifenförmiges Anschlusseinfügeloch (24) ist.

3. Elektrisches Verbindergehäuse (1) mit einer Stromschiene (3), die eine Stromschienen-Montageanordnung enthält, nach Anspruch 2, bei dem einer der Führungsabschnitte (14, 18, 32, 30) ein streifenförmiger Anschluss ist und der andere Führungsabschnitt (14, 18, 32, 30) ausschließlich für Positionierungszwecke bestimmt ist und der Positionierungsabschnitt, der diesem anderen Führungsabschnitt entspricht, ein streifenförmiges Einfügeloch (24) ist.

4. Elektrisches Verbindergehäuse (1) mit einer Stromschiene (3), die eine Stromschienen-Montageanordnung enthält, nach Anspruch 2, bei dem einer der Führungsabschnitte (14, 18, 32, 30) der streifenförmige Anschluss ist und ein weiterer Führungsabschnitt (37) ein hervorragender Plattenabschnitt mit Isoliereigenschaften ist und der Positionierungsabschnitt, der dem anderen Führungsabschnitt entspricht, eine Positionierungswand ist, die in dem Verbindergehäusekörper (1) vorgesehen ist.

5. Elektrisches Verbindergehäuse (1) mit einer Stromschiene (3), die eine Stromschienen-Montageanordnung enthält, nach einem der Ansprüche 1 bis 4, weiterhin enthaltend:

zweite Führungsabschnitte (10, 13), die jeweils an gegenüberliegenden Enden der Stromschiene (3) vorgesehen sind,
wobei, bevor diese Führungsabschnitte (14, 18, 32, 30) jeweils in die Positionierungsabschnitte des Verbindergehäusekörpers eingefügt sind, die zweiten Führungsabschnitte (10, 13) jeweils in zweite Positionierungsabschnitte des Verbindergehäusekörpers eingefügt sind.

6. Elektrisches Verbindergehäuse (1) mit einer Stromschiene (3), die eine Stromschienen-Montageanordnung enthält, nach Anspruch 5, bei dem einer der zweiten Führungsabschnitte (10, 13) ein streifenförmiger Anschluss ist, der senkrecht zu einer Längsrichtung der Stromschiene (3) angeordnet ist, und der andere zweite Führungsabschnitt (10, 13) ein Plattenabschnitt der Stromschiene (3) ist.

Revendications

1. Boîtier de connexion électrique (1) avec une barre omnibus (3) comprenant une structure de montage de barre omnibus, comprenant:

une pluralité de bornes à faible résistance (11) pouvant être insérées dans un corps de boîtier de connexion ; **caractérisé par** :
des parties de guidage (14, 18, 32, 30) prévues en saillie respectivement au niveau des côtés opposés de ladite pluralité de bornes à faible résistance (11) dans une direction de juxtaposition desdites bornes de faible résistance (11) ;
dans lequel, les parties de guidage (14, 18, 32, 30) font saillie de la barre omnibus (3), plus haut que les bornes à faible résistance, de sorte que les parties de guidage sont insérées respectivement dans des parties de positionnement dudit corps de boîtier de connexion avant que lesdites bornes à faible résistance ne soient insérées respectivement dans des trous d'insertion de borne dans ledit corps de connexion.

2. Boîtier de connexion électrique (1) avec une barre

omnibus (3) comprenant une structure de montage de barre omnibus selon la revendication 1, dans lequel au moins l'une desdites parties de guidage (14, 18, 32, 30) est une borne à languette, et au moins l'une desdites parties de positionnement est un trou d'insertion de borne (24).

3. Boîtier de connexion électrique (1) avec une barre omnibus (3) comprenant une structure de montage de barre omnibus selon la revendication 2, dans lequel l'une desdites parties de guidage (14, 18, 32, 30) est une borne à languette et une autre partie de guidage (14, 18, 32, 30) est prévue pour être exclusivement utilisée pour des buts de positionnement, et la partie de positionnement correspondant à ladite autre partie de guidage, est un trou d'insertion de languette (24).

4. Boîtier de connexion électrique (1) avec une barre omnibus (3) comprenant une structure de montage de barre omnibus selon la revendication 2, dans lequel l'une desdites parties de guidage (14, 18, 32, 30) est la borne à languette, et une autre partie de guidage (37) est une partie de plaque en saillie d'une nature isolante, et la partie de positionnement correspondant à ladite autre partie de guidage, est une paroi de positionnement prévue à l'intérieur dudit corps de boîtier de connexion (1).

5. Boîtier de connexion électrique (1) avec une barre omnibus (3) comprenant une structure de montage de barre omnibus selon l'une quelconque des revendications 1 à 4, comprenant en outre :

des deuxièmes parties de guidage (10, 13) respectivement prévues au niveau des extrémités opposées de ladite barre omnibus (3),
dans lequel avant que lesdites parties de guidage (14, 18, 32, 30) ne soient insérées respectivement dans lesdites parties de positionnement dudit corps de boîtier de connexion, lesdites deuxièmes parties de guidage (10, 13) sont respectivement insérées dans les deuxièmes parties de positionnement dudit corps de boîtier de connexion.

6. Boîtier de connexion électrique (1) avec une barre omnibus (3) comprenant une structure de montage de barre omnibus selon la revendication 5, dans lequel l'une desdites deuxièmes parties de guidage (10, 13) est une borne à languette disposée perpendiculairement à une direction longitudinale de ladite barre omnibus (3), et l'autre deuxième partie de guidage (10, 13) est une partie de plaque de ladite barre omnibus (3).

FIG. 1

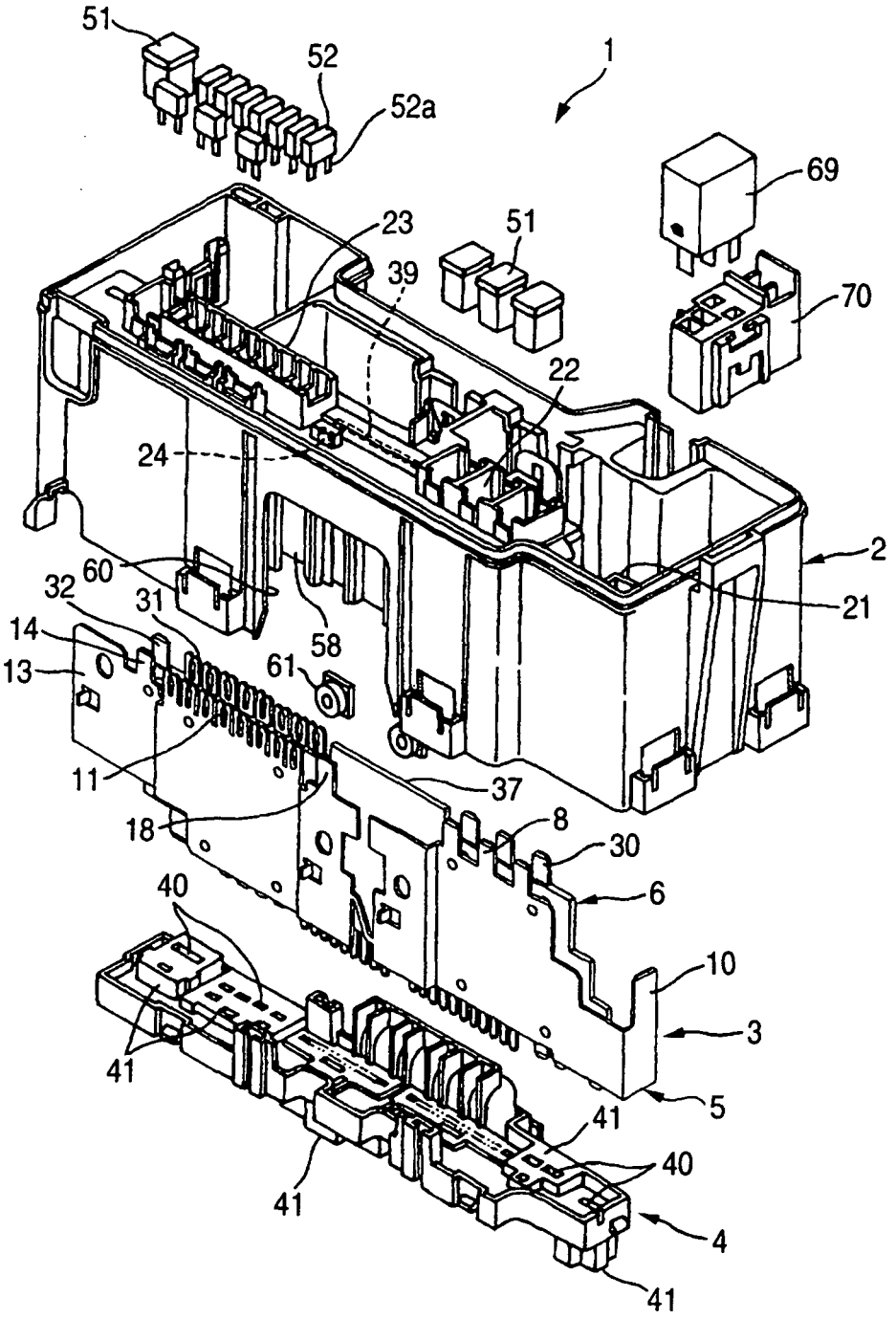
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FIG. 2

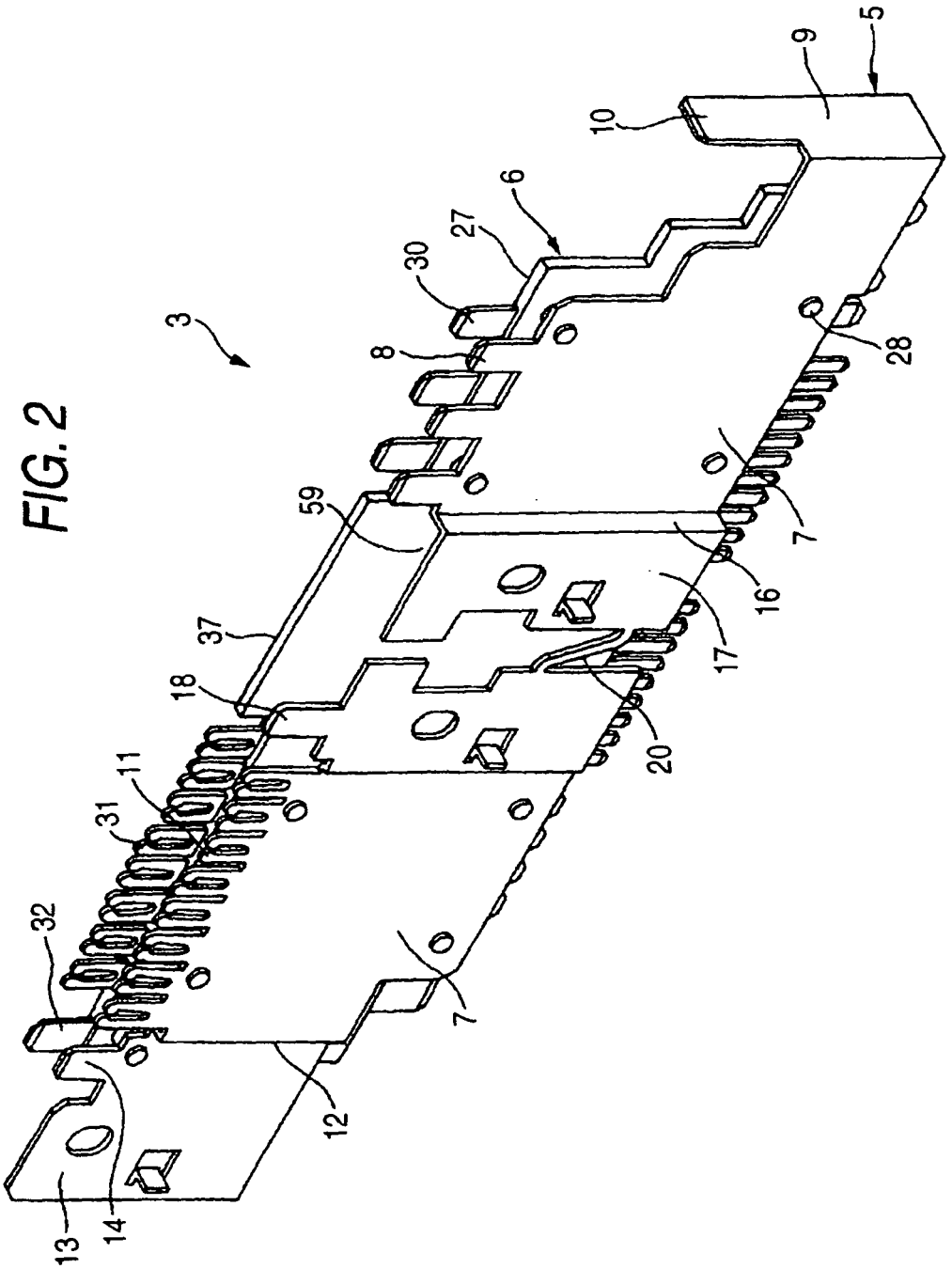

FIG. 3

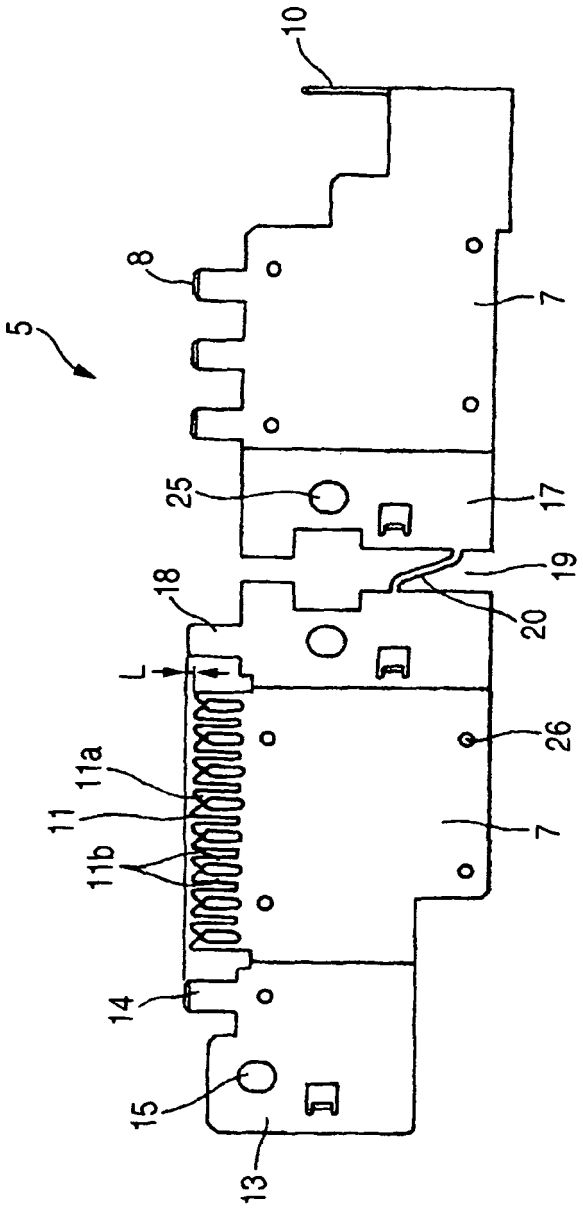

FIG. 4

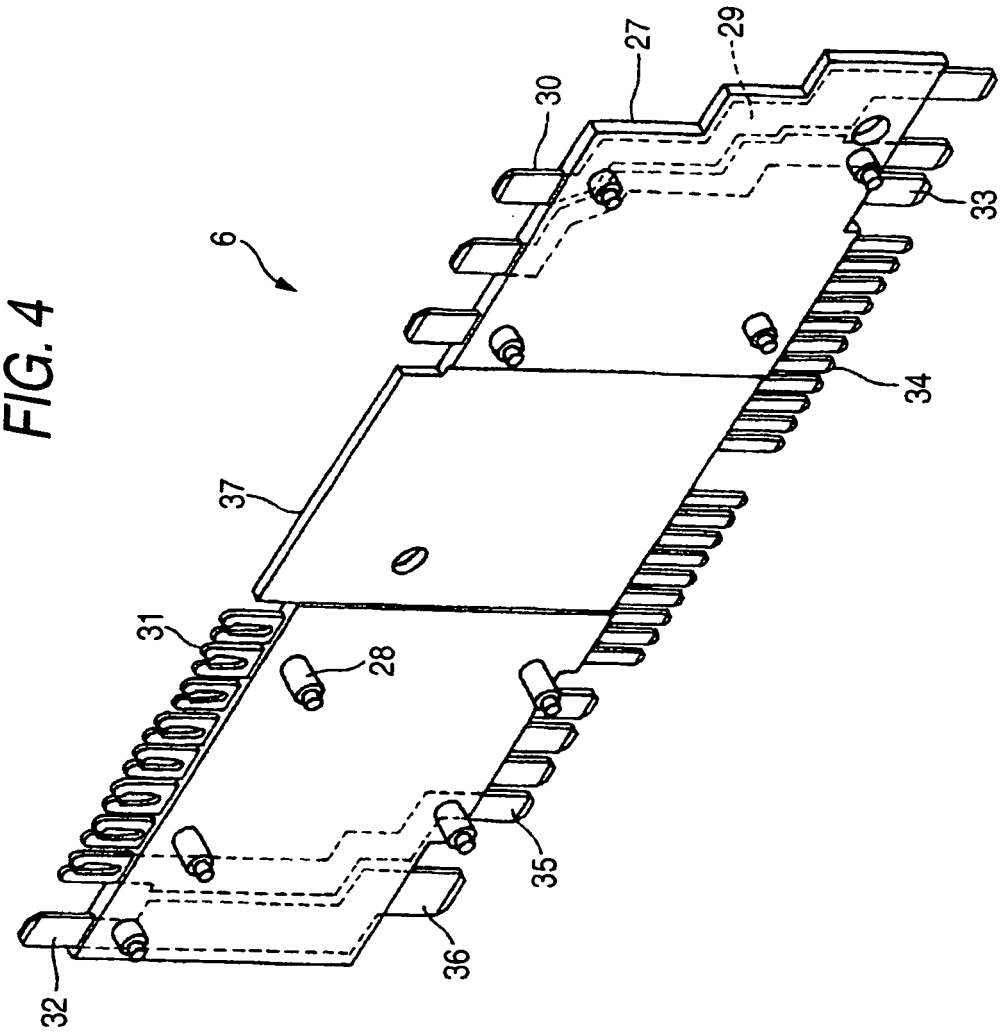

FIG. 5

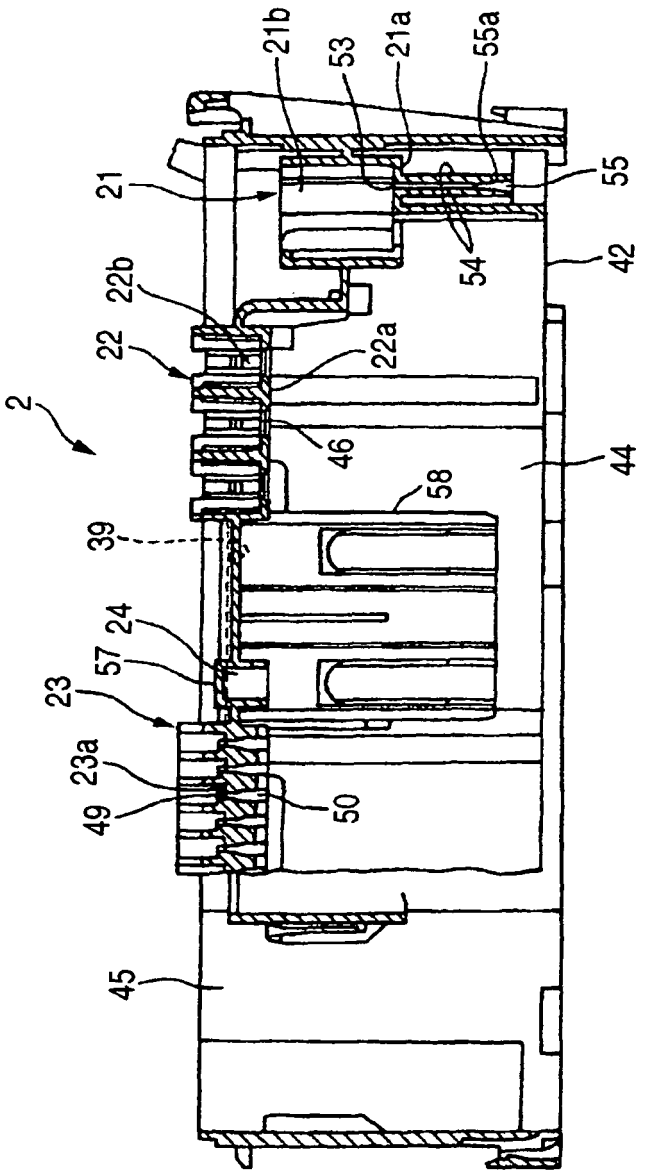
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FIG. 6

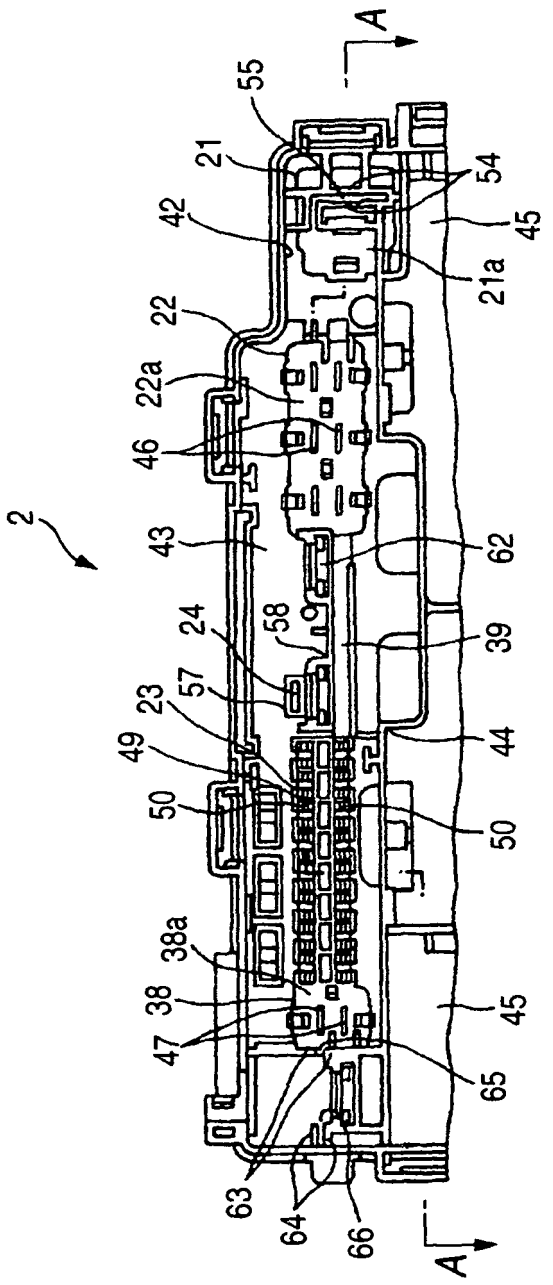
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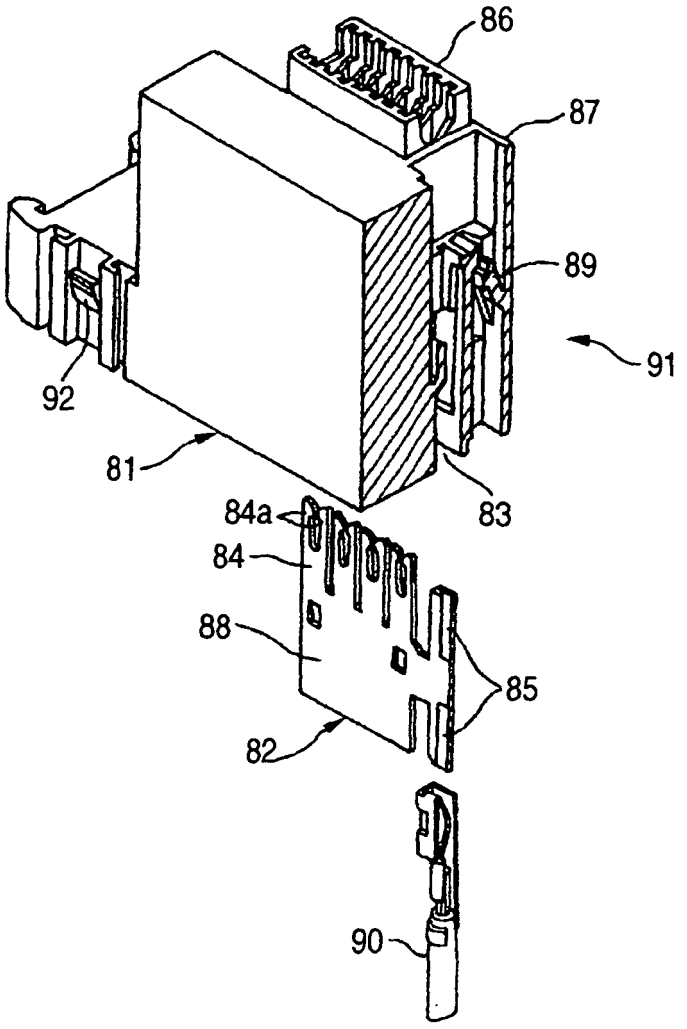
FIG. 7



REFERENCES CITED IN THE DESCRIPTION

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- EP 1119075 A **[0011]**