(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 955 791 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
23.05.2018 Bulletin 2018/21

(21) Application number: **15171634.7**

(22) Date of filing: **11.06.2015**

(51) Int Cl.:
H01R 12/72 *(2011.01)*
H01R 12/75 *(2011.01)*
H01R 24/50 *(2011.01)*
H01R 13/6594 *(2011.01)*
H01R 13/506 *(2006.01)*

(54) CONNECTOR FOR BEING MOUNTED ON THE EDGE OF A PCB, HAVING A REAR BACK METAL PORTION , WHICH CORRECTS THE CENTRE OF MASS

STECKVERBINDER ZUR MONTAGE AUF DEM RAND EINER LEITERPLATTE, MIT EINEM RÜCKSEITIGEN METALLTEIL, DAS DEN MASSENMITTELPUNKT KORRIGIERT

CONNECTEUR POUR ÊTRE MONTÉ SUR LE BORD D'UN PCB, AYANT UNE ARRIÈRE PARTIE MÉTALLIQUE, QUI CORRIGE LE CENTRE DE MASSE

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **13.06.2014 JP 2014122688**

(43) Date of publication of application:
16.12.2015 Bulletin 2015/51

(73) Proprietor: **Mitsumi Electric Co., Ltd.**
Tama-shi,
Tokyo 206-8567 (JP)

(72) Inventors:
- **Suga, Jotaro**
  Tama-shi, Tokyo 206-8567 (JP)
- **Aoki, Satoshi**
  Tama-shi, Tokyo 206-8567 (JP)
- **Asano, Shinichi**
  Tama-shi, Tokyo 206-8567 (JP)
- **Takagi, Soichi**
  Tama-shi, Tokyo 206-8567 (JP)

(74) Representative: **Epping - Hermann - Fischer**
Patentanwaltsgesellschaft mbH
Schloßschmidstraße 5
80639 München (DE)

(56) References cited:
EP-A1- 0 627 791
EP-A2- 2 525 442
US-A1- 2009 253 298
US-A1- 2012 156 921
US-A1- 2013 178 109

EP 2 955 791 B1

Description

Technical Field

[0001] The present invention relates to a connector that includes an interface part configured to be fitted and connected with a mating connector, and that connects, by the fitting and connecting with the mating connector at the interface part, a cable of another substrate or a cable of another electronic device with a substrate on which it is mounted. In particular, the present invention relates to a connector that is mounted on an end portion of the substrate.

Background Art

[0002] As a connector configured to be provided on a substrate of an electronic device, an electric connector is known in which an interface part to be fitted with a mating connector is projected from an end surface of a substrate and the connector is attached on the substrate with solder. Such an electric connector is disclosed in PTL 1 for example.

[0003] In addition, a connector of a pin-in-paste type is known in which a leg part for raising a connector main body relative to a substrate (specifically, a mounting surface) when a connector is mounted on the substrate. The leg part can provide a gap between the connector and the substrate, whereby flux creeping during reflow is prevented to improve cleanability at the connecting portion.

[0004] A connector configured to be mounted on an end portion of a substrate has an interface part that protrudes from the substrate side. As such, when the connector is mounted on an end portion of the substrate, in the state where reflow is not yet performed in soldering, the connector tends to be unstable depending on the position of the gravity center of the connector, and the connector may be dropped from the end portion of the substrate, or may be displaced from a give position, for example. Disadvantageously, this results in reduction in workability, connection failure and the like at the time of mounting the connector.

[0005] Under such circumstances, conventionally, when a connector is mounted at an end portion of a substrate, the gravity center of the connector is positioned on the substrate side as much as possible, and reflow is performed in a stabilized state to mount the connector by soldering.

EP 2 525 442 A2 describes an electrical connector including a plurality of contact pins. The electrical connector comprises a main body which has some parts that are provided to protrude from the attachment surface.

WO 2011/156314 A2 describes an electrical connector having a limiting element of which a position can be adjusted according to a thichness of a circuit board.

Citation List

Patent Literature

[0006] PTL 1
Japanese Patent Application Laid-Open No. 2013-8670

Summary of Invention

Technical Problem

[0007] In recent years, from the standpoint of downsizing of the electronic part, in a connector that is mounted on an end portion of a substrate, it is desired to reduce a region of the substrate in which the connector is mounted so that the length of the protruding portion of the connector from the end surface of the substrate, that is, the length from the end surface of the substrate to the front end of the connector is greater than the length from the end surface of the substrate to the rear end portion of the connector. This in particular applies to a connector having on its front end side a lock function for holding connection with a mating connector.

[0008] There has been a desire to set the gravity center within the substrate region as much as possible to perform reflow of the connector in a stable state even with the above-mentioned unbalanced structure in which the length from the end surface of the substrate to the front end of the connector is great and the length from the end surface of the substrate to the rear end portion of the connector is limited.

[0009] In addition, there has been a desire to hold the connector such that the gravity center is located at a suitable position even in the case of a connector, which houses a terminal for electrical connection with a mating connector and is mounted on a substrate, is provided with another connecting part of another terminal on a side surface of the connector and has a bilaterally asymmetric shape in the width direction as viewed from the side opposite to the mounting surface.

[0010] An object of the present invention is to provide a connector that can be stably mounted on an end portion of a substrate even when the connector has a bilaterally asymmetric shape.

Solution to problem

[0011] To achieve the above-mentioned object, a connector according to claim 1 is presented.

Advantageous Effects of Invention

[0012] According to the present invention, a connector can be mounted and stably held on an end portion of a substrate even when the connector has a bilaterally asymmetric shape.

Brief Description of Drawings

[0013] The above and other objects and features of the invention will appear more fully hereinafter from a consideration of the following description taken in connection with the accompanying drawing wherein one example is illustrated by way of example, in which;

FIG. 1 is a perspective view illustrating a state where a connector of an embodiment of the present invention is mounted on a substrate;
FIG. 2 is a front view of the connector of the embodiment of the present invention;
FIG. 3 is a rear view of the connector of the embodiment of the present invention;
FIG. 4 is a bottom view of the connector of the embodiment of the present invention;
FIG. 5 is a right side view of the connector of the embodiment of the present invention;
FIG. 6 is a left side view of the connector of the embodiment of the present invention;
FIG. 7 is a sectional view taken along line II-II of FIG. 2;
FIG. 8 is a sectional view taken along line III-III of FIG. 2;
FIG. 9 illustrates a weight part of the connector of the embodiment of the present invention;
FIG. 10 is a bottom view illustrating a positional relationship on a substrate between leg parts and the gravity center of the connector of the embodiment of the present invention; and
FIG. 11 is a side view illustrating a positional relationship on a substrate between leg parts and the gravity center of the connector of the embodiment of the present invention.

Description of Embodiments

[0014] In the following, an embodiment of the present invention will be described in detail with reference to the accompanying drawings.

[0015] FIG. 1 is a perspective view illustrating a state where a connector of an embodiment of the present invention is mounted on a substrate. FIG. 2 is a front view of the connector. FIG. 3 is a rear view of the connector. FIG. 4 is a bottom view of the connector. FIG. 5 is a right side view of the connector. FIG. 6 is a left side view of the connector. It is to be noted that, in the present embodiment, the terms of the front end (front), rear, left, and right directions and the like which are used for describing the configurations and operations of components of the connector are relative directions, not absolute directions. The terms hold true when the orientation of the components of the connector is the same as that illustrated in the drawings, but when the orientation is changed, the terms should be interpreted in accordance with the changed orientation. In the following descriptions, the side of an end of the connector at which the connector is connected to a mating connector is referred to as front end (front) side, the other end opposite to the front end is referred to as rear end, and the surface facing the mounting surface is referred to as bottom surface, thus defining the other directions.

[0016] Connector 100 of the present embodiment is, but not limited to, a connector for data transfer which is used for high-speed data transfer between apparatuses. Connector 100 of the present embodiment is applicable to any connectors which are mounted on an end portion of a substrate.

[0017] Connector 100 of the present embodiment illustrated in FIG. 1 includes connector main body 102 that is mounted on mounting surface 21 of an end portion of substrate 20 (see FIGS. 4 and 5), and interface part (connecting part) 104 that projects from connector main body 102 and is fitted and connected with a mating connector (see FIGS. 4 and 5).

[0018] As illustrated in FIG. 3 to FIG. 6, connector 100 has a shape provided with cutout part 103 that is provided by cutting out the bottom surface side of connector main body 102. Connector main body 102 is attached on an end portion of a substrate positioned at cutout part 103. In this manner, connector 100 is mounted on substrate 20 in the state where interface part 104 protrudes from end surface 22 of substrate 20.

[0019] When interface part 104 is fitted with the interface part of a mating connector connected with another cable or another substrate, interface part 104 is electrically connected with the mating connector. Interface part 104 is disposed such that interface part 104 protrudes from end surface 22 of substrate 20.

[0020] As illustrated in FIG. 2, interface part 104 includes first fitting part 112 having first opening part 112a that opens to the front side (front end side), and second fitting part 114 having second opening part 114a. That is, connector 100 of the present embodiment is electrically connected at the two different parts, first and second fitting parts 112 and 114, with the corresponding parts of the interface part of the mating connector.

[0021] First fitting part 112 and second fitting part 114 are disposed side by side in the lateral direction of connector 100 (the direction that is parallel to mounting surface 21 and extends along end surface 22, or the width direction of connector 100). With this configuration, interface part 104 has an asymmetric shape in the width direction of interface part 104, and connector 100 has a bilaterally asymmetric shape in its entirety.

[0022] In first fitting part 112 and second fitting part 114, first opening part 112a and second opening part 114a open to the outside and are adjacent to each other, with outer housing 110. On the inner periphery surface of first opening part 112a which extends along the direction in which the connector is connected with the mating connector, a key groove corresponding to the fitting shape of the mating connector to be connected is formed. Since first fitting part 112 has an inner periphery surface having a shape corresponding to the fitted part of the

mating connector to be connected, only mating connectors that have a fitted part having a predetermined shape is allowed to be fitted with first fitting part 112.

[0023] First fitting part 112 includes outer housing 110, cylindrical part 122 covered by outer housing 110, and first terminal 130 disposed in cylindrical part 122 and configured to be connected with a mating connector terminal.

[0024] FIG. 7 is a sectional view taken along line II-II of FIG. 2.

[0025] As illustrated in FIG. 7, cylindrical part 122 is integrally connected with an end portion, which is covered by outer housing 110, of shell 120.

[0026] Together with first terminal 130 disposed inside, cylindrical part 122 is disposed in first opening part 112a of outer housing 110 such that it faces the front side (front end side).

[0027] Cylindrical part 122 and shell 120 integrally provided with cylindrical part 122 are composed of a plate member having conductivity, and in this case, cylindrical part 122 and shell 120 are configured by processing a sheet metal.

[0028] Shell 120 has a box-like shape that opens to the bottom surface side, and covers inner housing 140 on which first terminal 130 is fixed. Shell 120 is connected at a front side wall part with cylindrical part 122 such that the inner spaces thereof are continuously provided. It is to be noted that, together with weight part 180 and inner housing 140, shell 120 is provided as a principal part of connector main body 102. As illustrated in FIG. 4, at the lower end of shell 120, four leg parts 121 protruding downward are formed with predetermined spaces therebetween. Leg parts 121 are disposed to surround rear end portion 132 of first terminal 130 disposed in first opening part 112a (see FIG. 2). Leg parts 121 are inserted to respective through holes 224 (see FIG. 11) formed in substrate 20, and are fixed to be grounded through solder.

[0029] Inner housing 140 is formed of a material having an insulation property, and in this case, inner housing 140 is formed of a resin. As illustrated in FIGS. 4, 5 and 7, rear end portion (connecting end) 132 of first terminal 130 that is connected to substrate 20 protrudes downward from the bottom surface of inner housing 140. Rear end portion 132 of first terminal 130 that protrudes from the bottom surface of inner housing 140 is inserted to corresponding through hole 221 (see FIG. 11) formed in substrate 20 and is joined by soldering.

[0030] In addition, connector 100 includes second terminal 150 in addition to first terminal 130, and second terminal 150 is disposed in second opening part 114a.

[0031] FIG. 8 is a sectional view taken along line III-III of FIG. 2.

[0032] As illustrated in FIG. 2 and FIG. 8, second terminal 150 is disposed such that its front end portion serving as the contacting part extends along the fitting direction in second opening part 114a of second fitting part 114. The front end portion of second terminal 150 is disposed parallel to first terminal 130 (end portion) in first opening part 112a.

[0033] As illustrated in FIG. 4, FIG. 6 and FIG. 8, rear end portion 152 of second terminal 150 is disposed to protrude to the bottom surface side as with rear end portion 132 of first terminal 130. Rear end portion 152 is inserted to corresponding through hole 222 (see FIG. 11) formed in substrate 20 and is joined by soldering.

[0034] It is to be noted that the position of connector 100 relative to substrate 20 is set by inserting rear end portion 132 of first terminal 130 to through hole 221, rear end portion 152 of second terminal 150 to through hole 222, and leg parts 121 to through holes 224.

[0035] FIG. 9 illustrates weight part 180 of connector 100.

[0036] In this case, weight part 180 is formed by processing a sheet metal as with shell 120. Weight part 180 is formed by bending a sheet metal to cover the top surface and lateral surfaces of the rear end portion of shell 120 in an inverted U-shape with the top surface 181 and lateral surfaces 182 and 183 in back view. Weight part 180 includes hooks 184 on lateral surfaces 182 and 183 that engage the lateral surfaces of shell 120.

[0037] In weight part 180, top surface 181 and lateral surfaces 182 and 183 are fitted on shell 120, thus restricting the movement in the lateral direction (the width direction of the connector) with respect to shell 120, that is, the direction that is orthogonal to the direction in which the connector is connected with the mating connector, and is parallel to mounting surface 21 of substrate 20. The engagement of hooks 184 and shell 120 restricts the vertical movement of weight part 180 with respect to shell 120. It is to be noted that weight part 180 may be formed by using a sheet metal having the thickness same as that of the sheet metal used as shell 120. In this manner, unlike the configuration of conventional and commonly used connectors in which weight part 180 is formed integrally with shell 120 by aluminum die casting, the position of gravity center G of connector 100 can be set at a position on the rear end side of connector 100 by only processing a sheet metal by bending. That is, it is not necessary to separately manufacture an expensive metal mold to manufacture a die casting, and noise tolerance can be readily achieved by processing an inexpensive sheet metal. Moreover, increase in lifetime of the metal mold itself with use of a press member is achieved, and the connector 100 can be held at an end portion of substrate 20 with gravity center G being stabilized, while achieving cost reduction.

[0038] As illustrated in FIG. 4 to FIG. 9, connector 100 having the above-mentioned configuration includes on its bottom surface (attachment surface) 105 leg part 170 (171 to 174) that protrudes downward. It is to be noted that, in FIG. 4, leg part 170 (171 to 174) is hatched for convenience.

[0039] Leg part 170 includes front end leg parts 171 and 172 (first leg parts 171 and second leg parts 172) and rear end side leg parts (third leg parts) 173 and 174 which are provided at respective positions on bottom sur-

face 105 of connector main body 102 that faces mounting surface 21 when connector 100 is mounted on substrate 20.

[0040] In the present embodiment, four leg parts, front end side leg parts 171 and 172 and rear end side leg parts 173 and 174 are provided. Front end side leg parts 171 and 172 and rear end side leg parts 173 and 174 define a gap between bottom surface 105 and mounting surface 21. Front end side leg parts 171 and 172 are provided on bottom surface 105 at respective position nearer to end surface 22 of substrate 20 relative to rear end side leg parts 173 and 174. It is to be noted that one or both of the two parts, rear end side leg parts 173 and 174, is used as a third leg part.

[0041] FIG. 10 is a bottom view illustrating a positional relationship between the leg parts and the gravity center of the connector on the substrate, and FIG. 11 is a side view illustrating a positional relationship between the leg parts and the gravity center of the connector on the substrate.

[0042] Front end side leg parts 171 and 172 are provided with a space therebetween along the lateral direction of the connector, that is, the direction that is orthogonal to the connecting direction of interface part 104, and extends along mounting surface 21 of substrate 20. Front end side leg parts 171 and 172 are disposed with a space therebetween along end surface 22 at respective positions near end surface 22. It is to be noted that in bottom view, the center between front end side leg parts 171 and 172 is adjacent to the end surface 22, with a space therebetween. In this manner, the position of the gravity center of connector 100 itself can be further separated from end surface 22 of substrate 20.

[0043] In addition, rear end side leg parts 173 and 174 are located at respective positions on the inner side of substrate 20, that is, on the rear end portion side of connector 100 relative to front end side leg parts 171 and 172.

[0044] As illustrated in FIG. 10, in bottom view (as viewed from mounting surface 21 side), the positions of leg parts 171 to 174 are set such that gravity center G of connector 100 is located in triangular regions E1 and E2 defined by straight lines that connect front end side leg parts 171 and 172 and rear end side leg parts 173 or 174. To be more specific, leg parts 171 to 174 are provided on bottom surface 105 such that gravity center G is located in triangular regions E1 and E2 which are defined by connecting the centers of leg parts 171 to 174 in bottom view (centers on which load of connector 100 is exerted) by straight lines (or, the region obtained by connecting the centers of leg parts 171, 172 and 173, and the region obtained by connecting the centers of leg parts 171, 172 and 174).

[0045] In connector 100, gravity center G of connector 100 is located in one or both of triangular region E1 of front end side leg parts 171 and 172 and rear end side leg parts 173, and triangular region E2 of front end side leg parts 171 and 172 and rear end side leg parts 174.

[0046] In addition, as illustrated in FIG. 11, the protrusion length L1 of front end side leg parts 171 and 172 from the bottom surface (bottom surface 105 of connector main body 102) of connector 100 is preferably equal to or greater than protrusion length L2 of rear end side leg parts 173 and 174 from the bottom surface of connector 100. In the present embodiment, L1>L2 is satisfied. Lengths L1 and L2 of leg parts 171 to 174 may be increased on the front end side and reduced on the rear end side by a tolerance from a predetermined length (height of substrate 20) n, for example. Front end side leg parts 171 and 172 are each set to n+0.05 mm, and rear end side leg parts 173 and 174 are each set to n-0.05 mm or the like.

[0047] It is to be noted that connector main body 102 of connector 100 is integrally provided with weight part 180 that is fitted with shell 120.

[0048] According to connector 100 having the above-mentioned configuration, when connector 100 is mounted to substrate 20 by pin-in-paste, first, solder paste is thinly applied to a circuit pattern on mounting surface 21 of substrate 20 with use of masking, and then connector 100 is disposed at a corresponding position. At this time, connector 100 is placed perpendicular to substrate 20, and disposed at a corresponding position.

[0049] In the case of connector 100 disposed on mounting surface 21 of substrate 20, gravity center G of connector 100 is located between front end side leg parts 171 and 172, and rear end side leg parts 173 and 174 (or one of rear end side leg parts 173 and 174) (in region E1 or E2 illustrated in FIG. 11). With this structure, even in the case where connector 100 is of a type having a bilaterally asymmetric shape and is different from a bilaterally symmetric type (having only the first connecting part whose center gravity is located at the center of the connector), connector 100 can be stably held on mounting surface 21 in the state where interface part 104 projects from end surface 22 of substrate 20.

[0050] In addition, in connector 100, the height of front end side leg parts 171 and 172 is greater than that of rear end side leg parts 173 and 174 (one of which may not be provided) (L1>L2). With this configuration, when connector 100 is placed on mounting surface 21 of substrate 20 at a predetermined position, connector 100 itself is slanted rearward rather than frontward (front side). In this manner, gravity center G of connector 100 is located at a position on the inner side of substrate 20 relative to end surface 22 of substrate 20, that is, at a position separated from end surface 22 of substrate 20 in the region of end surface 22 of substrate 20. As a result, connector 100 disposed at an end portion of substrate 20 is more stably held, and in this state, reflow is performed. In this manner, connector 100 is held at an end portion of substrate 20 such that connector 100 is not moved or shifted in front, rear, left and right directions with respect to substrate 20, and thus, connector 100 can be correctly and stably mounted by reflow with solder.

[0051] That is, without increasing the size of connector main body 102 on substrate 20 more than necessary,

gravity center G of connector 100 can be positioned on the rear end portion side of the connector relative to front end side leg parts 171 and 172 in the region of substrate 20.

[0052] In addition, in connector 100 mounted on an end portion of substrate 20 illustrated in FIG. 11, even when connector 100 has a configuration in which length L3 from end surface 22 of substrate 20 to the front end of connector 100 is equal to or greater than that of length L4 from end surface 22 of substrate 20 to the rear end portion of connector 100, gravity center G of connector 100 is located on the rear end side of connector 100 relative to front end side leg parts 171 and 172. In addition, on mounting surface 21, gravity center G is located in regions E1 and E2.

[0053] Thus, when connector 100 is mounted on an end portion of substrate 20, connector 100 can be held such that connector 100 is not moved in front, rear, left and right directions, and substrate 20 itself provided with connector 100 can be downsized.

[0054] While front end side leg parts 171 and 172 of leg part 170 are formed on the bottom surface of inner housing 140 along the end sides separated in the width direction in the present embodiment, this is not limitative, and front end side leg parts 171 and 172 may be provided at an end portion on the end side on the bottom surface of shell 120.

[0055] In addition, while rear end side leg parts 173 and 174 are provided at an end portion on the rear end side on the bottom surface of shell 120, rear end side leg parts 173 and 174 may be formed along the end portion on the rear end side on the bottom surface of shell 120, and along the end sides separated in the width direction on the bottom surface of inner housing 140.

Industrial Applicability

[0056] The connector according to claim 1 is suitable for a connector that is mounted on a substrate of an electronic component to be downsized.

Reference Signs List

[0057]

20 Substrate
21 Mounting surface
22 End surface of substrate
100 Connector
102 Connector main body
103 Cutout part
104 Interface part (connecting part)
105 Bottom surface (attachment surface)
110 Outer housing
112 First fitting part
112a First opening part
114 Second fitting part
114a Second opening part
120 Shell
122 Cylindrical part
130 First terminal
132, 152 Rear end portion
140 Inner housing
150 Second terminal
170 Leg part
171, 172 Front end side leg parts
173, 174 Rear end side leg parts
180 Weight part
181 Top surface
182, 183 Lateral surface
184 Hook
221, 222, 224 Through hole
E1, E2 Triangular region

Claims

1. A connector (100) comprising:

a connector main body (102) including an attachment surface (105) configured to face a mounting surface (21) of a substrate (20), the connector main body (102) being configured to be mounted on the mounting surface (21);
a connecting part (104) provided to protrude from the connector main body, and project from an end surface (22) of the mounting surface (21), the connecting part (104) being configured to be connected to a mating connector;
leg parts (121) inserted into respective though holes (224) formed in the substrate (20); and
connecting ends (132, 152) which are electrically connected to the substrate (20);
characterized in that first (171), second (172) and third (173 or 174) leg parts are provided to protrude from the attachment surface (105), the first, second and third leg parts (171, 172, 173, 174) being configured to abut upon the mounting surface (21) of the substrate (20) and define a gap (L1, L2) between the attachment surface (105) and said mounting surface (21),
wherein the first leg part (171) and the second leg part (172) are provided on the attachment surface (105) on the end surface (22) side of the substrate (20) relative to the third leg parts (173 or 174), wherein a weight part (180) is provided on the rear end portion of the connector main body (102), and the first (171), second (172) and third (173 or 174) leg parts are provided on the attachment surface (105) such that a gravity center (G) of the connector (100) itself is located within regions of the triangle defined by connecting the centers of the said first (171), second (172) and third (173 or 174) leg parts, wherein the connector (100) is provided with a cutout part (103) by cutting out an entirety of the connector

main body (102) at the attachment surface (105) side, so that the connecting part (104) protrudes from the end surface (22) of the substrate (20), and

the first leg part (171) and the second leg part (172) are each provided abutting on the connecting part (104).

2. The connector according to claim 1, wherein a protrusion length (L1) of each of the first (171) and second (172) leg parts is greater than a protrusion length (L2) of each of the third (173, 174) leg parts.

3. The connector according to claim 1 or 2, wherein the connecting part (104) has a shape that is asymmetric in a width direction.

4. The connector according to any of claims 1 to 3, wherein the weight part (180) is configured to adjust the gravity center.

5. The connector according to claim 4, wherein the weight part is formed of a sheet metal.

6. The connector according to any of claims 1 to 5, configured such that a length (L3) from the end surface (22) of the substrate (20) to a front end portion that is an end portion of the connecting part (104) in a protruding direction of the connecting part is equal to or greater than a length (L4) from the end surface (22) of the substrate to a rear end portion of the connector main body (102).

Patentansprüche

1. Verbinder (100), aufweisend:

einen Verbinderhauptkörper (102) umfassend eine Befestigungsfläche (105), die eingerichtet ist, einer Montagefläche (21) eines Substrats (20) zugewandt zu sein, wobei der Verbinderhauptkörper (102) eingerichtet ist, auf der Montagefläche (21) montiert zu werden;

ein Verbindungsstück (104), das vorgesehen ist, um von dem Verbinderhauptkörper abzustehen, und von einer Endfläche (22) der Montagefläche (21) vorzustehen, wobei das Verbindungsstück (104) eingerichtet ist, mit einem Gegenverbinder verbunden zu werden;

Schenkelteile (121), die in jeweilige Durchgangsöffnungen (224) eingeführt werden, die in dem Substrat (20) ausgebildet sind; und

Verbindungsenden (132, 152), die mit dem Substrat (20) elektrisch verbunden sind;

dadurch gekennzeichnet, dass

erste (171), zweite (172) und dritte (173 oder 174) Schenkelteile vorgesehen sind, um von der Befestigungsfläche (105) vorzustehen, wobei die ersten, zweiten und dritten Schenkelteile (171, 172, 173, 174) eingerichtet sind, auf der Montagefläche (21) des Substrats (20) anzuliegen und einen Spalt (L1, L2) zwischen der Befestigungsfläche (105) und dieser Montagefläche (21) zu definieren, wobei das erste Schenkelteil (171) und das zweite Schenkelteil (172) an der Befestigungsfläche (105) bezogen auf das dritte Schenkelteil (173 oder 174) auf der Seite der Endfläche (22) des Substrats (20) vorgesehen sind, wobei ein Gewichtsteil (180) an dem hinteren Endabschnitt des Verbinderhauptkörpers (102) vorgesehen ist, und das erste (171), das zweite (172) und das dritte (173 oder 174) Schenkelteil derart an der Befestigungsfläche (105) vorgesehen sind, dass sich ein Massenschwerpunkt (G) des Verbinders (100) selbst innerhalb der Bereiche des Dreiecks befindet, das durch Verbinden der Mittelpunkte dieser ersten (171), zweiten (172) und dritten (173 oder 174) Schenkelteile definiert wird, wobei der Verbinder (100) mit einem Aussparungsteil (103) durch Aussparen einer Gesamtheit des Verbinderhauptkörpers (102) auf der Seite der Befestigungsfläche (105) vorgesehen ist, so dass das Verbindungsstück (104) von der Endfläche (22) des Substrats (20) vorsteht, und

das erste Schenkelteil (171) und das zweite Schenkelteil (172) jeweils als an dem Verbindungsstück (104) anliegend vorgesehen sind.

2. Verbinder nach Anspruch 1, wobei eine Vorsprungslänge (L1) von jedem der ersten (171) und zweiten (172) Schenkelteile größer als eine Vorsprungslänge (L2) von jedem der dritten (173, 174) Schenkelteile ist.

3. Verbinder nach Anspruch 1 oder 2, wobei das Verbindungsstück (104) eine Form hat, die in einer Breitenrichtung asymmetrisch ist.

4. Verbinder nach einem der Ansprüche 1 bis 3, wobei das Gewichtsteil (180) eingerichtet ist, den Massenschwerpunkt einzustellen.

5. Verbinder nach Anspruch 4, wobei das Gewichtsteil aus einem Metallblech ausgebildet ist.

6. Verbinder nach einem der Ansprüche 1 bis 5, der derart eingerichtet ist, dass eine Länge (L3) von der Endfläche (22) des Substrats (20) zu einem vorderen Endabschnitt, der ein Endabschnitt des Verbindungsstücks (104) in einer Vorsprungsrichtung des Verbindungsstücks ist, größer gleich einer Länge (L4) von der Endfläche (22) des Substrats zu einem hinteren Endabschnitt des Verbinderhauptkörpers

(102) ist.

Revendications

1. Connecteur (100), comprenant :

un corps principal de connecteur (102) incluant une surface de fixation (105) configurée pour faire face à une surface de montage (21) d'un substrat (20), le corps principal de connecteur (102) étant configuré pour être monté sur la surface de montage (21) ;
une pièce de connexion (104) prévue pour faire saillie à partir du corps principal de connecteur, et pour dépasser à partir d'une surface d'extrémité (22) de la surface de montage (21), la pièce de connexion (104) étant configurée pour être connectée à un connecteur homologue ;
des pièces formant pattes (121) introduites dans des trous débouchants respectifs (224) formés dans le substrat (20), et
des extrémités de connexion (132, 152), lesquelles sont connectées par voie électrique au substrat (20) ;
caractérisé en ce que
des première (171), deuxième (172), et troisième (173 ou 174) pièces formant pattes sont prévues pour faire saillie à partir de la surface de fixation (105), les première, deuxième et troisième pièces formant pattes (171, 172, 173, 174) étant configurées pour abouter sur la surface de montage (21) du substrat (20) et définir un entrebâillement (L1, L2) entre la surface de fixation (105) et ladite surface de montage (21),
dans lequel la première pièce formant patte (171) et la deuxième pièce formant patte (172) sont prévues sur la surface de fixation (105) sur le côté de surface d'extrémité (22) du substrat (20) par rapport aux troisièmes pièces formant pattes (173 ou 174), dans lequel une pièce formant poids (180) est prévue sur la portion d'extrémité arrière du corps principal de connecteur (102), et les première (171), deuxième (172), et troisième (173 ou 174) pièces formant pattes sont prévues sur la surface de fixation (105) de telle sorte qu'un centre de gravité (G) du connecteur (100) même se trouve dans les régions du triangle défini en reliant les centres des première (171), deuxième (172), et troisième (173 ou 174) pièces formant pattes,
dans lequel le connecteur (100) est doté d'une pièce de découpe (103) en découpant l'entièreté du corps principal de connecteur (102) sur le côté de surface de fixation (105), de sorte que la pièce de connexion (104) fait saillie à partir de la surface d'extrémité (22) du substrat (20), et que la première pièce formant patte (171) et la deuxième pièce formant patte (172) sont chacune prévues de manière à abouter sur la pièce de connexion (104).

2. Connecteur selon la revendication 1, dans lequel une longueur saillante (L1) de chacune des première (171) et deuxième (172) pièces formant pattes est supérieure à une longueur saillante (L2) de chacune des troisièmes pièces formant pattes (173, 174).

3. Connecteur selon la revendication 1 ou 2, dans lequel la pièce de connexion (104) présente une forme qui est asymétrique dans une direction de largeur.

4. Connecteur selon l'une quelconque des revendications 1 à 3, dans lequel la pièce formant poids (180) est configurée pour ajuster le centre de gravité.

5. Connecteur selon la revendication 4, dans lequel la pièce formant poids est formée d'une tôle.

6. Connecteur selon l'une quelconque des revendications 1 à 5, configuré de telle sorte qu'une longueur (L3) allant de la surface d'extrémité (22) du substrat (20) à une portion d'extrémité avant, laquelle est une portion d'extrémité de la pièce de connexion (104) dans une direction saillante de la pièce de connexion, est supérieure ou égale à une longueur (L4) allant de la surface d'extrémité (22) du substrat à une portion d'extrémité arrière du corps principal de connecteur (102).

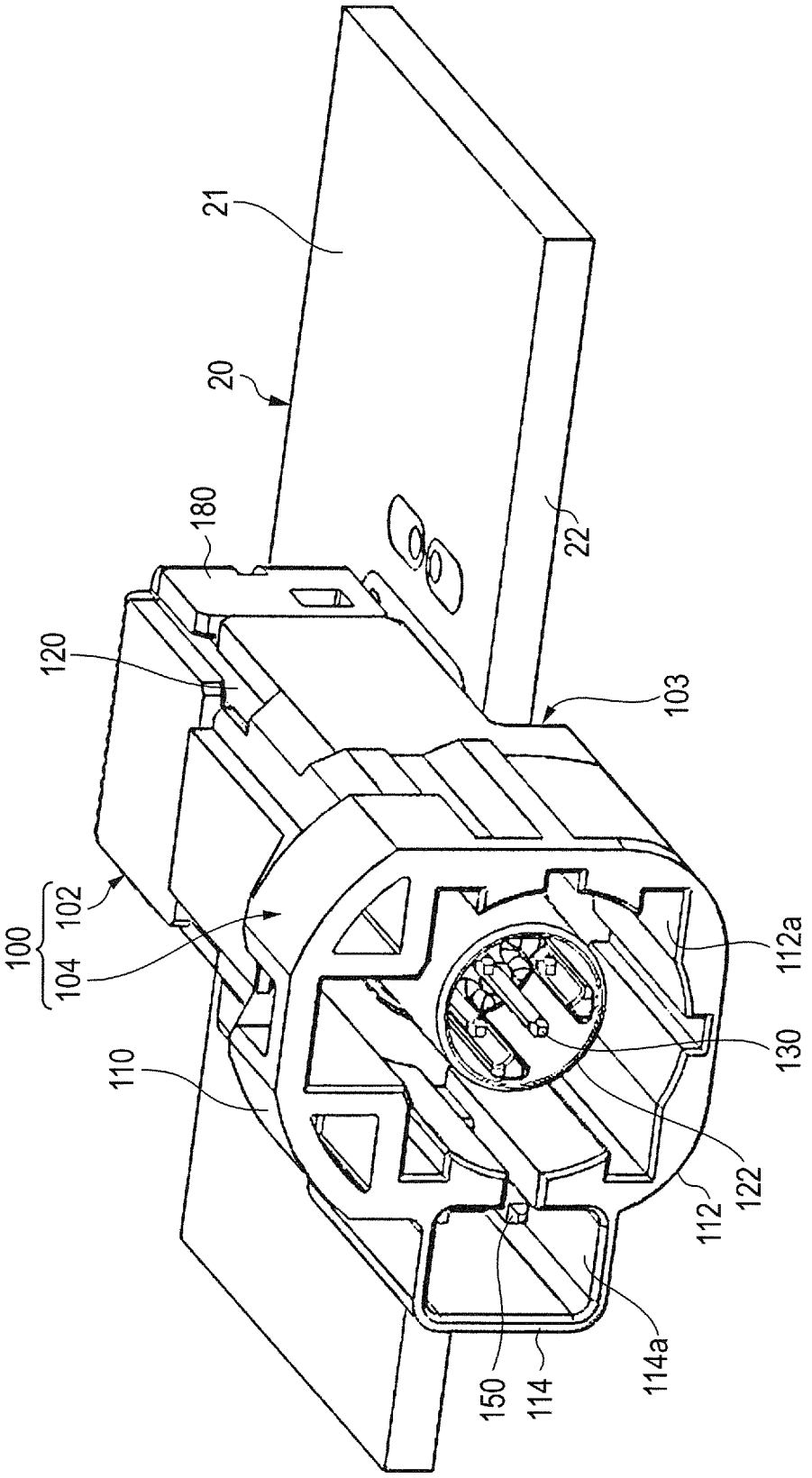
21
20
180
22
120
103
100
102
104
112a
130
110
122
112
114a
150
114

FIG. 1

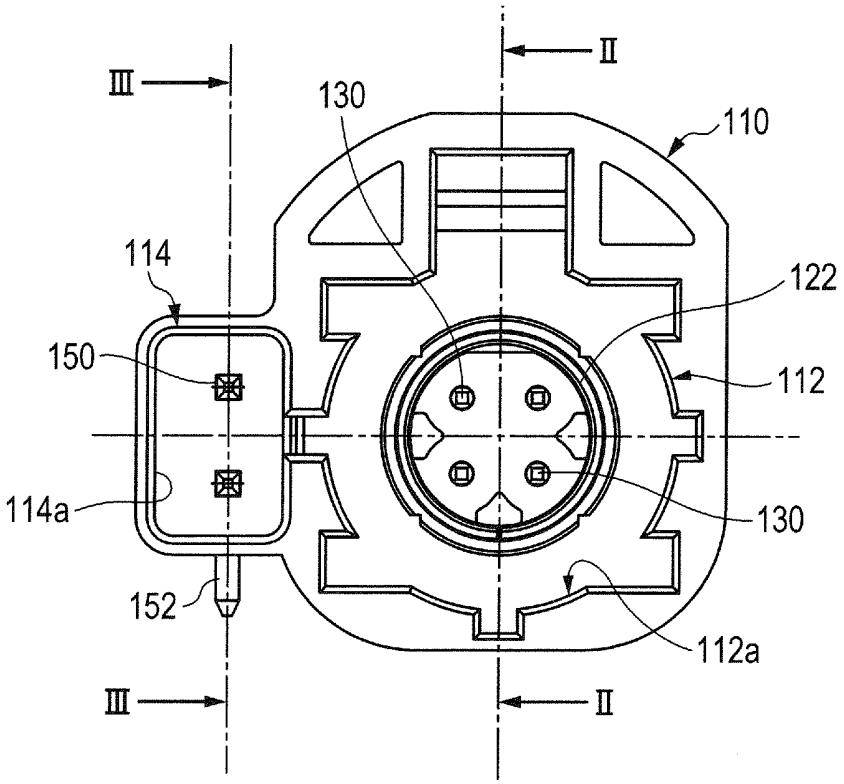
III
II
130
110
114
122
150
112
114a
130
152
112a
III
II

FIG. 2

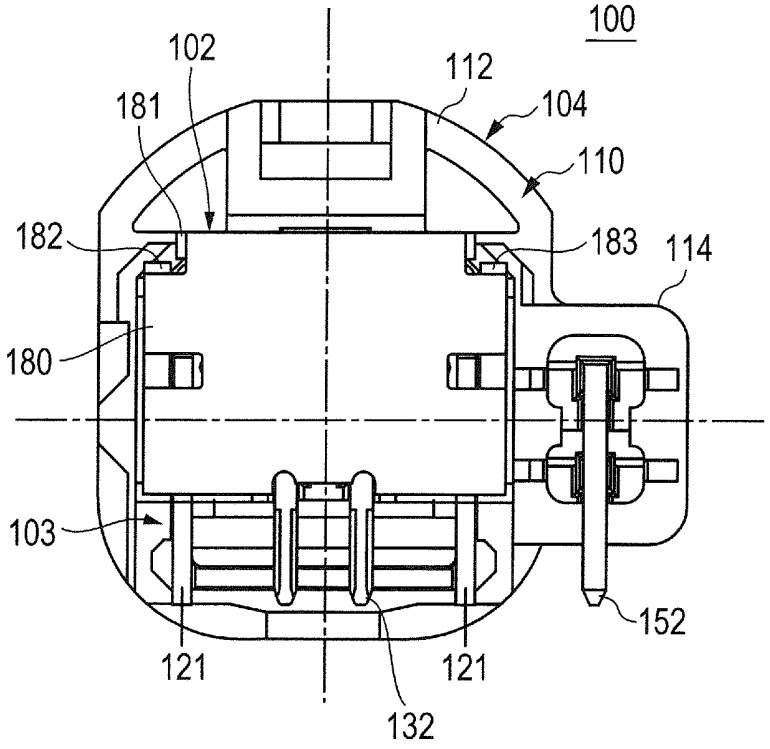
100
102
112
181
104
110
182
183
114
180
103
152
121
121
132

FIG. 3

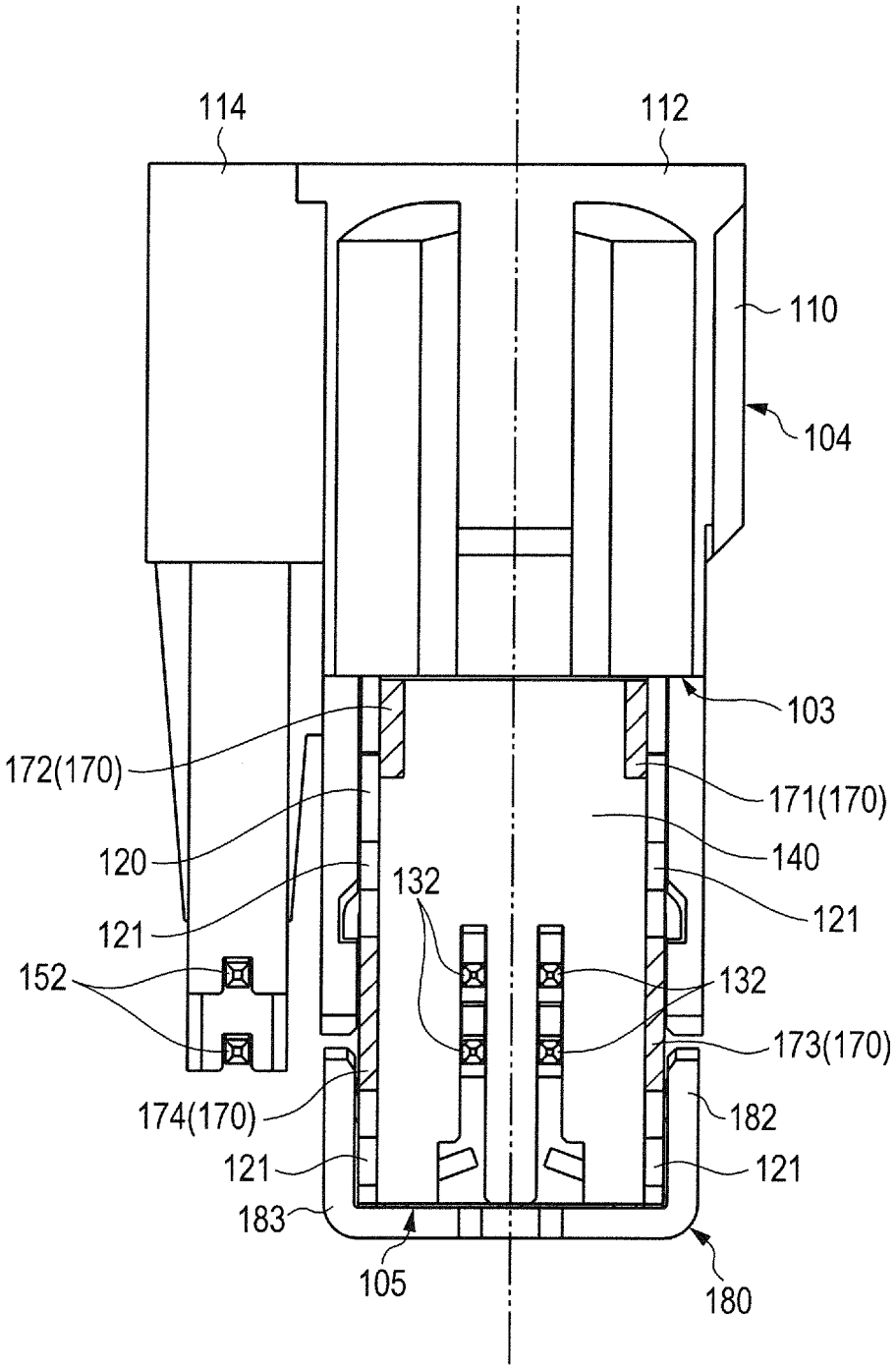
114
112
110
104
103
172(170)
171(170)
120
140
132
121
121
152
132
173(170)
174(170)
182
121
121
183
105
180

FIG. 4

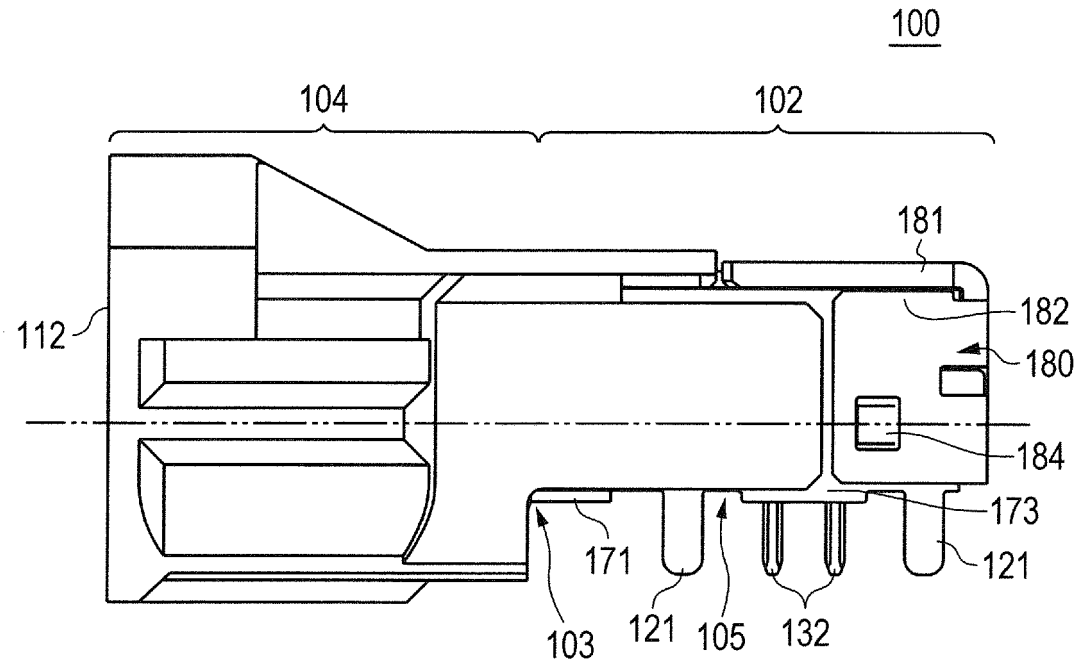
100
104
102
181
112
182
180
184
173
171
121
103
121
105
132

FIG. 5

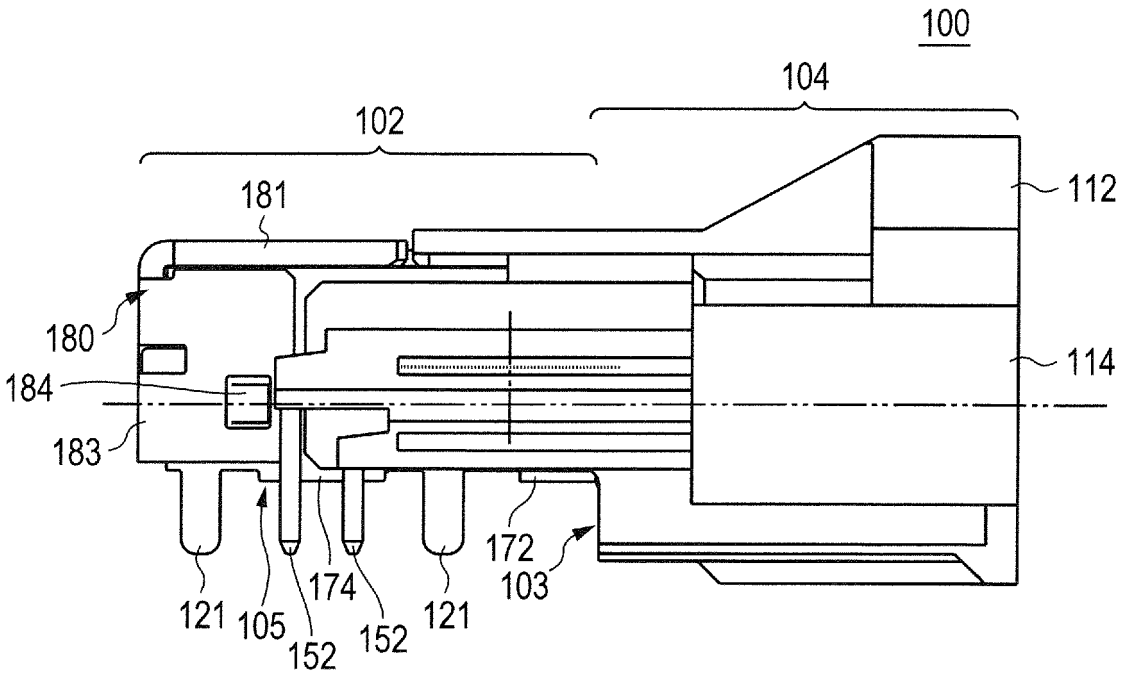
100
104
102
181
112
180
114
184
183
172
103
121
105
152
174
152
121

FIG. 6

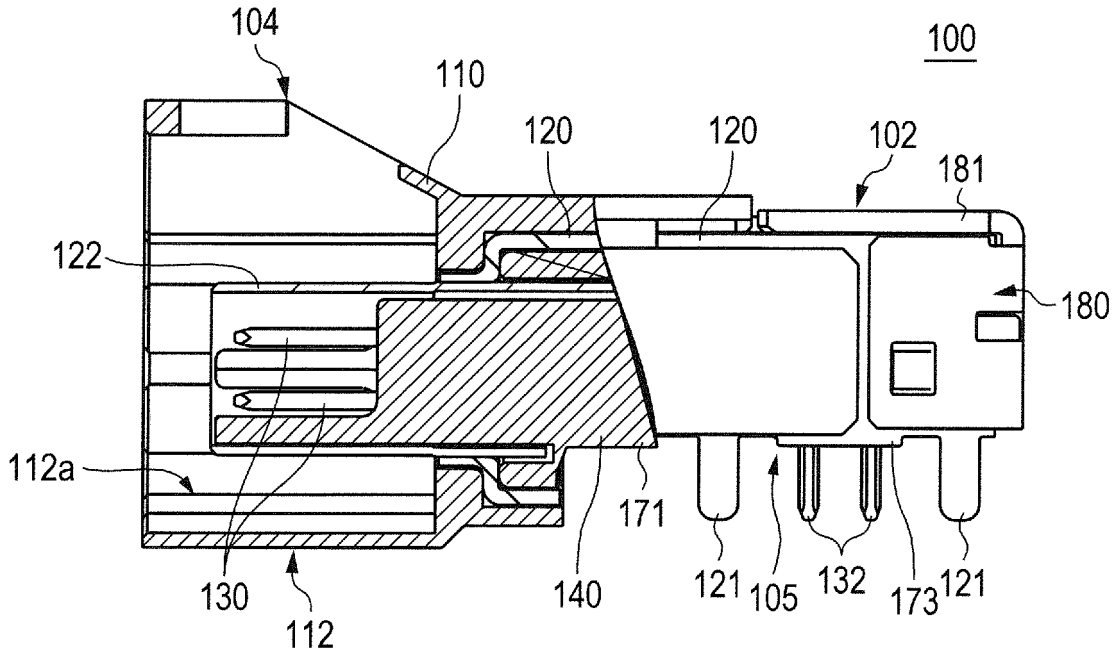
104
110
100
120
120
102
181
122
180
112a
171
130
112
140
121
105
132
173
121

FIG. 7

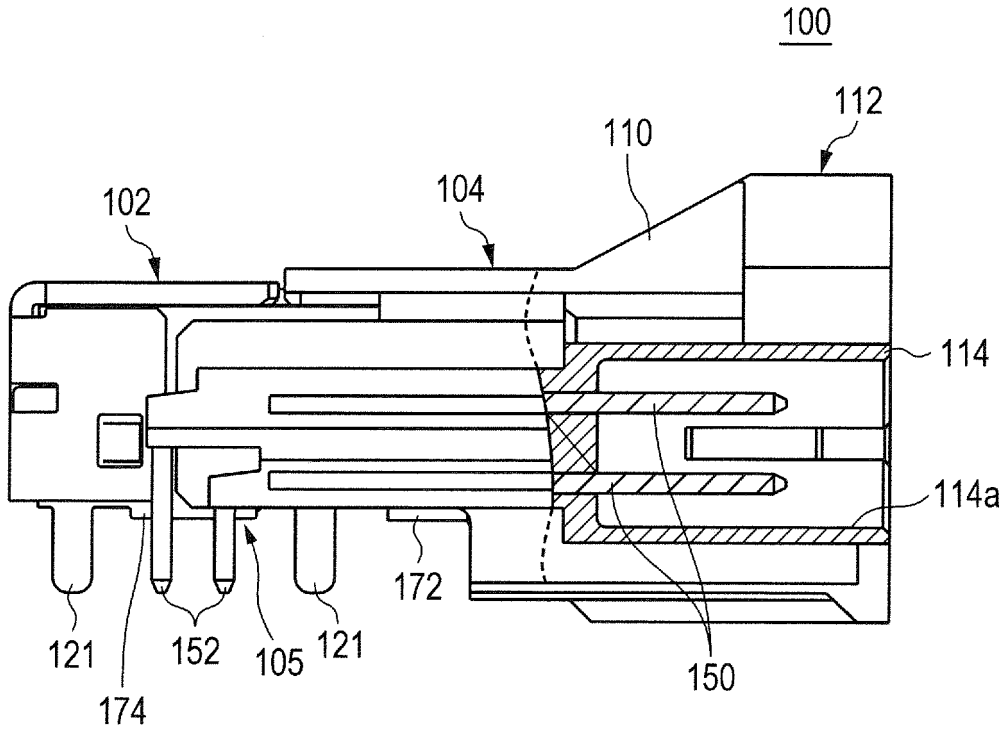
100
112
110
102
104
114
114a
172
121
152
105
121
150
174

FIG. 8

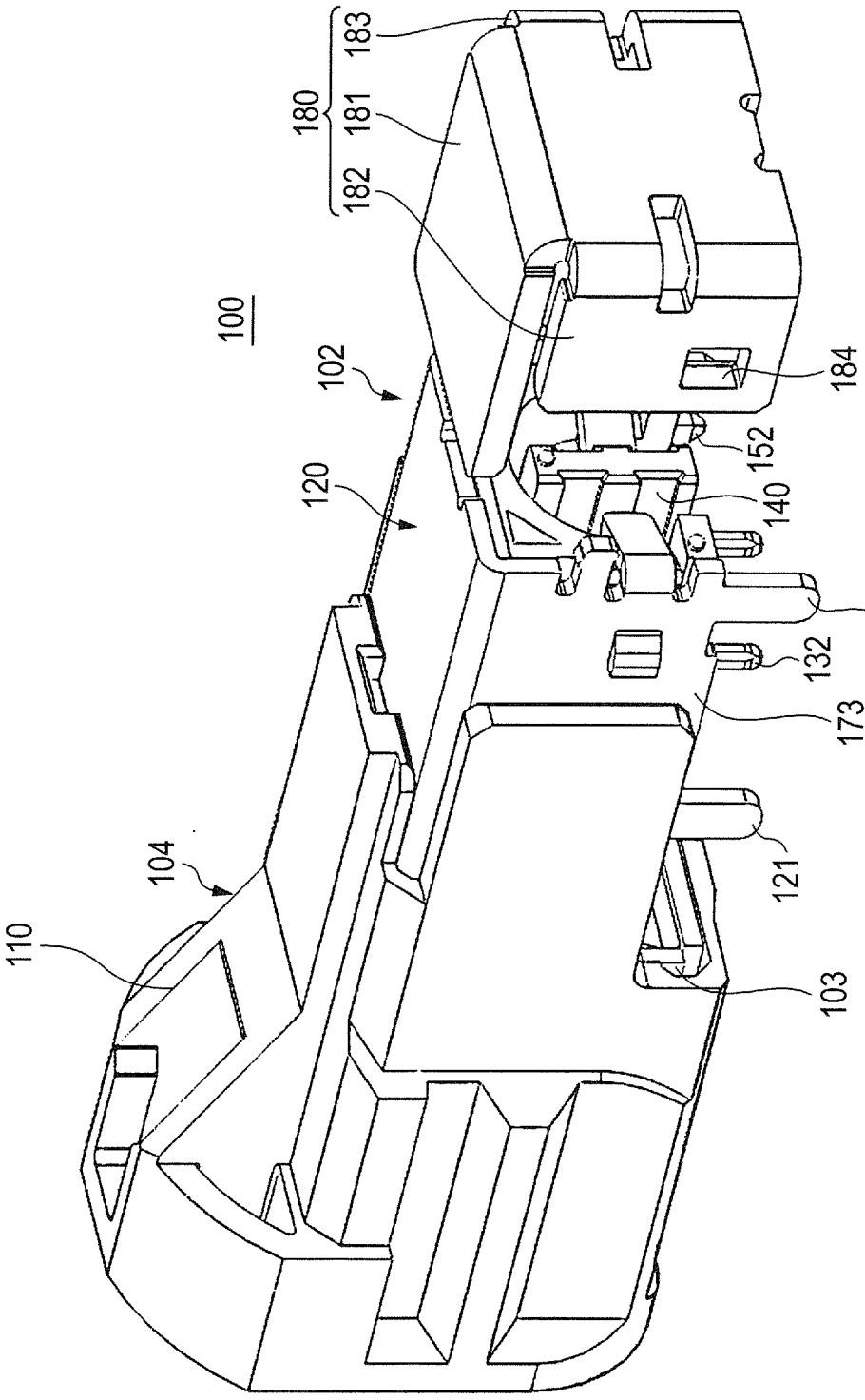
100
102
104
110
120
121
121
132
140
152
173
180
181
182
183
184
103

FIG. 9

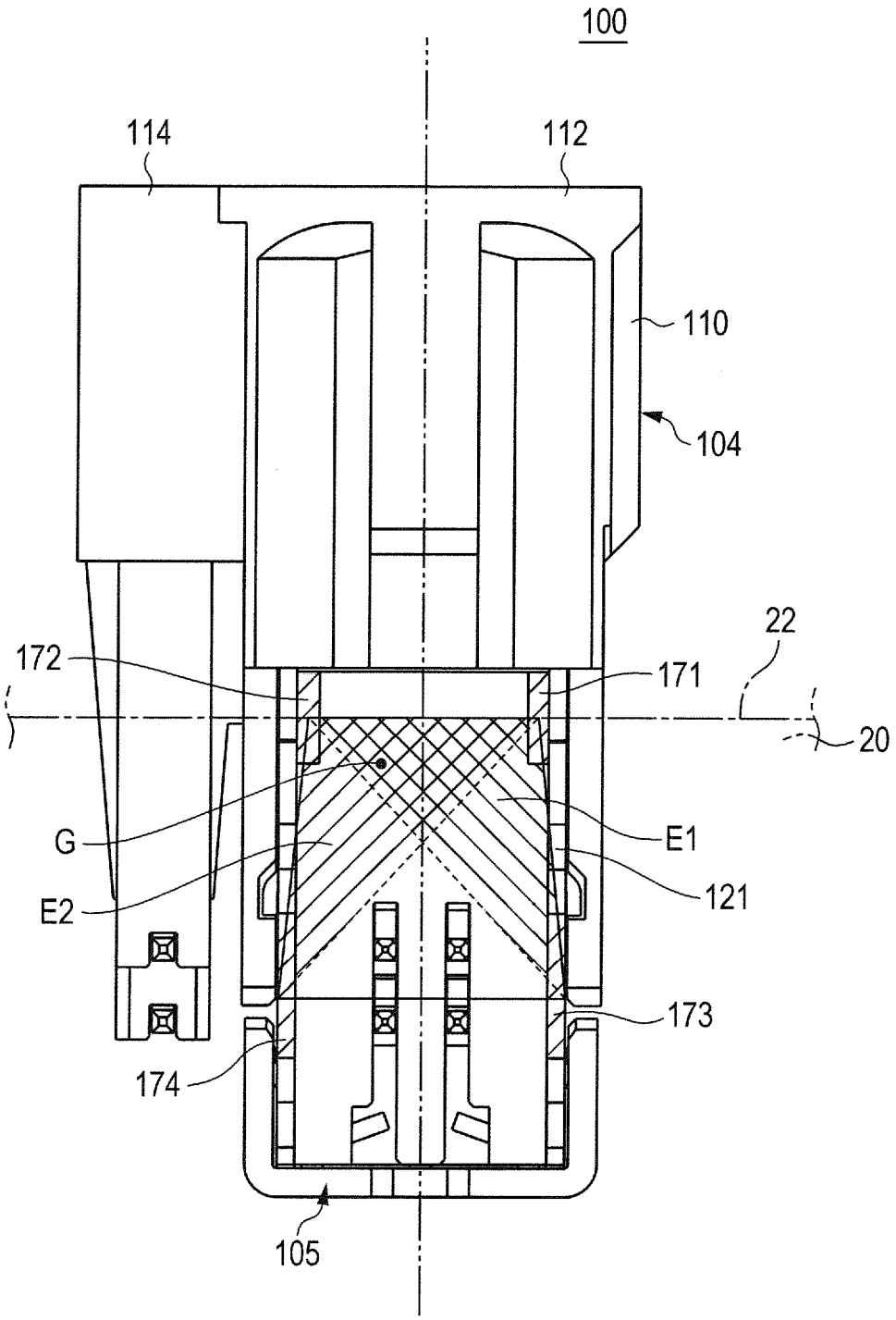

FIG. 10

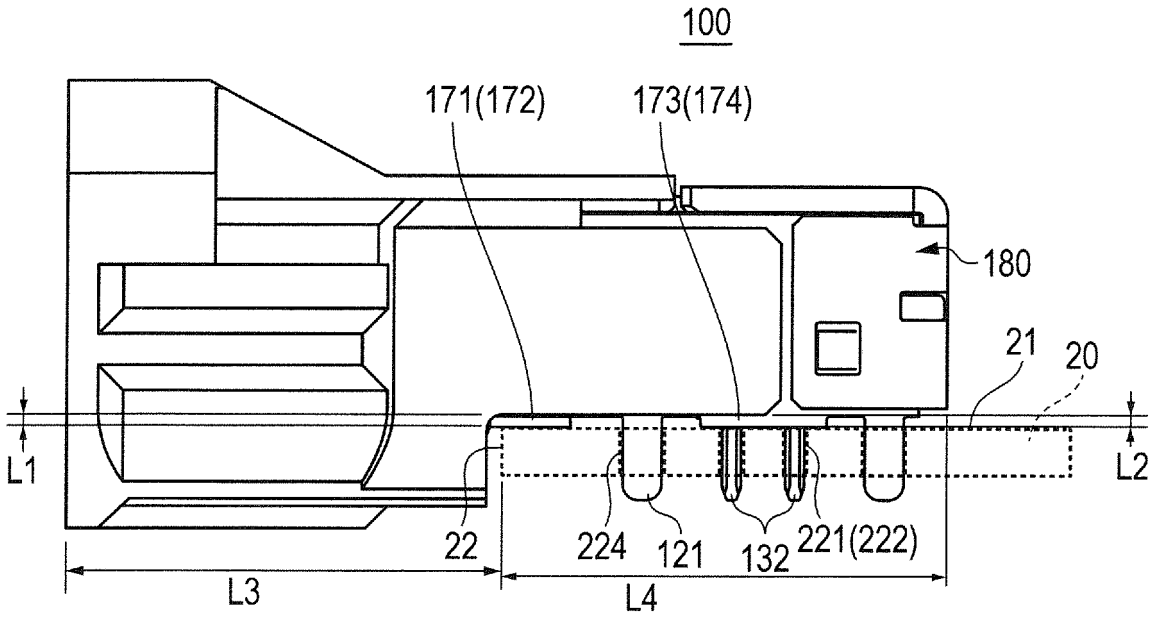

FIG. 11

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 2525442 A2 **[0005]**
- WO 2011156314 A2 **[0005]**
- JP 2013008670 A **[0006]**