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

(11) **EP 4 521 561 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
12.03.2025 Bulletin 2025/11

(21) Application number: **23854268.2**

(22) Date of filing: **07.08.2023**

(51) International Patent Classification (IPC):
H01R 13/02 *(2006.01)* ***H01R 13/40*** *(2006.01)*
H01R 24/00 *(2011.01)*

(52) Cooperative Patent Classification (CPC):
H01R 12/73; H01R 12/57; H01R 12/716; H01R 13/02; H01R 13/40; H01R 24/00;
H01R 13/6594

(86) International application number:
PCT/CN2023/111393

(87) International publication number:
WO 2024/037365 (22.02.2024 Gazette 2024/08)

(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 ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **17.08.2022 CN 202210987879**

(71) Applicant: **Huawei Technologies Co., Ltd.**
Shenzhen, Guangdong 518129 (CN)

(72) Inventors:
- **GUO, Zhiyue**
  Shenzhen, Guangdong 518129 (CN)
- **HU, Suining**
  Shenzhen, Guangdong 518129 (CN)
- **SU, Tien Chieh**
  Shenzhen, Guangdong 518129 (CN)
- **XIA, Huihe**
  Shenzhen, Guangdong 518129 (CN)
- **JIAO, Long**
  Shenzhen, Guangdong 518129 (CN)

(74) Representative: **Maiwald GmbH**
Engineering
Elisenhof
Elisenstrasse 3
80335 München (DE)

(54) CONNECTOR ASSEMBLY, FIRST CONNECTOR, SECOND CONNECTOR, DEVICE MODULE, AND ELECTRONIC DEVICE

(57) A connector assembly, a first connector, a second connector, a component module, and an electronic device are provided. The connector assembly includes the first connector and the second connector that are mated. A first electrode terminal is disposed at a middle position of an insulation body of the first connector or the second connector, and second electrode terminals are respectively disposed at two ends of the insulation body of the connector, where signal terminals are respectively disposed between the first electrode terminal and one second electrode terminal and between the first electrode terminal and the other second electrode terminal. In addition, contact portions of the first electrode terminals, contact portions of the second electrode terminals, and contact portions of the signal terminals are all disposed in a rotational symmetry manner, and rotational symmetry axes of the contact portions of the first electrode terminals, the contact portions of the second electrode terminals, and the contact portions of the signal terminals overlap. In this way, assembly and embedding between mated connectors are not restricted by an assembly direction. When the mated connectors are embedded in a 0° direction or a 180° direction, the power supply terminal and the signal terminal can be effectively connected, so that a short-circuiting risk is avoided. When the first connector or the second connector is assembled with a corresponding component, structure costs or process costs for preventing incorrect assembly can be reduced, and assembly efficiency of a production line can be improved.

EP 4 521 561 A1

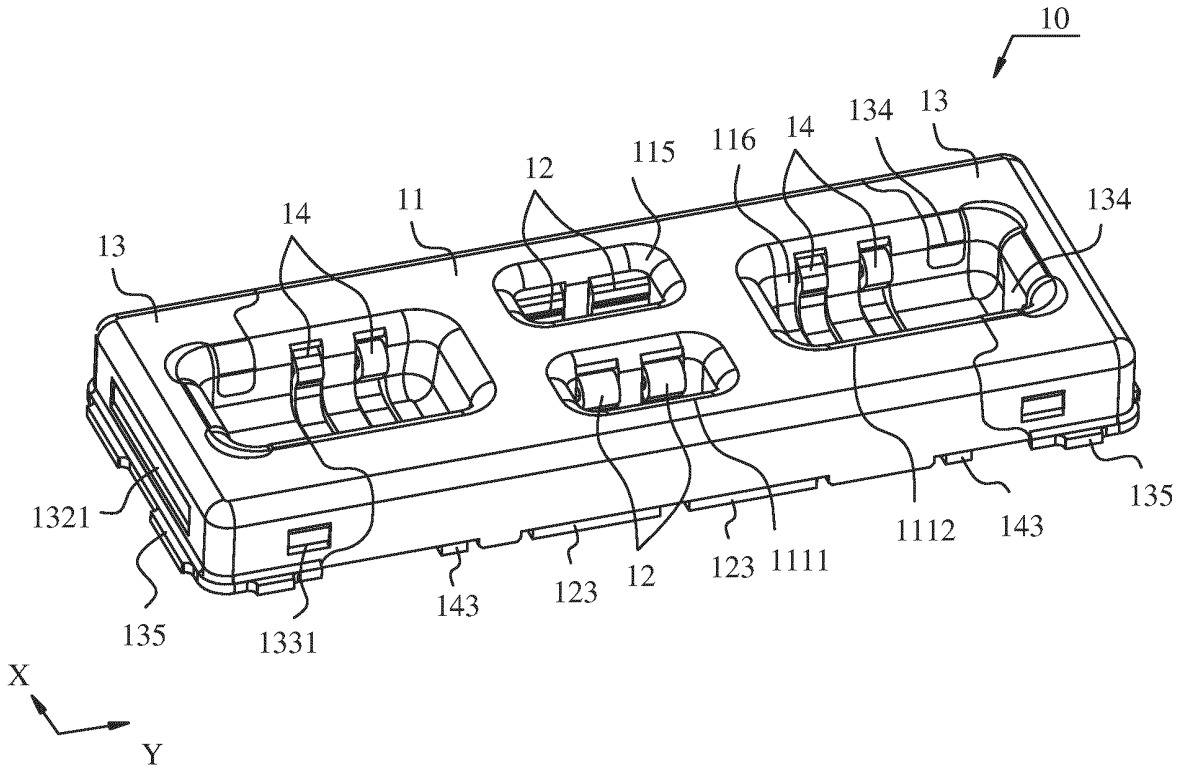
10
134
13
116
14
115
12
11
14
134
13
1321
135
1331
143
123
12
123
1111
1112
143
135
X
Y

FIG. 2

Description

[0001] This application claims priority to Chinese Patent Application No. 202210987879.8, with the China National Intellectual Property Administration on August 17, 2022 and entitled "CONNECTOR ASSEMBLY, FIRST CONNECTOR, SECOND CONNECTOR, COMPONENT MODULE, AND ELECTRONIC DEVICE", which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] Embodiments of this application relate to the field of electrical connectors, and in particular, to a connector assembly, a first connector, a second connector, a component module, and an electronic device.

BACKGROUND

[0003] To meet good assembly and maintainability of electronic devices such as a mobile phone, a tablet computer, and a notebook computer, a modular design is usually used. A power supply battery is used as an example. A modular power supply battery is connected to another mainboard or module through a BTB (Board-to-board) connector.

[0004] Atypical BTB connector is a main body integrating a metal terminal, a protective armor, and a plastic housing. The metal terminal includes a power supply terminal and a signal terminal, where the signal terminal is located in the middle of a connector body, and positive and negative power supply terminals are symmetrically disposed at two ends of the BTB connector body relative to the signal terminal. Due to configuration of a structure in which the positive terminal and the negative terminal are symmetrically distributed at the two ends of the connector body, during maintenance and discharge, if a male connector and a female connector of the BTB connector are rotated by 180 degrees to be embedded, there is a risk that the positive and negative terminals are short-circuited and hot melted. In addition, in a case of assembly deviation, there is a risk that the positive and negative terminals are short-circuited and sparked, causing a security risk.

SUMMARY

[0005] Embodiments of this application provide a connector assembly, a first connector, a second connector, a component module, and an electronic device, to effectively avoid a risk that a positive electrode and a negative electrode are short-circuited, and provide good technical assurance for use reliability in different application scenarios.

[0006] A first aspect of embodiments of this application provides a first connector, including a first body, and a power supply terminal and a signal terminal that are disposed on the first body. The power supply terminal includes one group of first electrode terminals and two groups of second electrode terminals. The first electrode terminals are disposed at a middle position of the first body, and the first electrode terminals include contact portions disposed in a rotational symmetry manner. The two groups of second electrode terminals are respectively disposed at two ends of the first body, and a contact portion of the second electrode terminal located at one end is disposed in a rotational symmetry manner relative to a contact portion of the second electrode terminal located at the other end. The signal terminal includes a first group of signal terminals and a second group of signal terminals. The first group of signal terminals is disposed between the first electrode terminals and one group of second electrode terminals, the second group of signal terminals is disposed between the first electrode terminals and the other group of second electrode terminals, and a contact portion of the first group of first electrode terminals is disposed in a rotational symmetry manner relative to a contact portion of the second group of signal terminals. The contact portions of the first electrode terminals, the contact portions of the second electrode terminals, and the contact portions of the signal terminals may be separately disposed in a 180° rotational symmetry manner, and rotational symmetry axes thereof overlap. In this way, assembly and embedding between the first connector and a mated connector (a second connector) are not restricted by an assembly direction. When the first connector and the mated connector are embedded in a 0° direction or a 180° direction, the power supply terminal and the signal terminal can be effectively connected, so that a possibility that a positive terminal and a negative terminal are short-circuited can be effectively avoided. In addition, the signal terminal is configured between the first electrode terminal and the second electrode terminal, and a physical distance between the first electrode terminal and the second electrode terminal is long, so that a short-circuiting risk can be further reduced. For example, the first connector is applied to a battery module. During maintenance and discharging, a case in which positive and negative terminals are short-circuited and hot melt can be totally avoided. In addition, in a case of assembly deviation, a security problem caused by a case in which the positive and negative terminals are short-circuited and sparking can be avoided.

[0007] In addition, based on a structure feature that contact portions of each terminal are disposed in a rotational symmetry manner, when the first connector or the second connector is assembled with a corresponding component on a production line, a structure or process for preventing incorrect assembly does not need to be considered. In this way, manufacturing process costs are properly controlled, and assembly efficiency of the production line can be further improved.

[0008] For example, the first electrode terminal may be a positive terminal, and correspondingly, the second electrode terminal is a negative terminal; or the first

electrode terminal may be a negative terminal, and correspondingly, the second electrode terminal is a positive terminal.

[0009] Based on the first aspect, embodiments of this application further provide a first implementation of the first aspect. The first body includes a top surface and a blocking surface, an opening is provided on the top surface, and the blocking surface extends downward from the opening on the top surface, to form a concave accommodation portion capable of accommodating a terminal of a mated connector. The blocking surface includes groove portions provided corresponding to the contact portion of the first electrode terminal and the contact portion of the signal terminal respectively, and the contact portion of the first electrode terminal and the contact portion of the signal terminal are respectively built in the corresponding groove portions, to reduce exposed areas of the contact portion of the first electrode terminal and the contact portion of the signal terminal. In addition, a contact of the contact portion of the first electrode terminal and a contact of the contact portion of the signal terminal protrude from the blocking surface through the corresponding groove portions respectively, that is, extend to the concave accommodation portion, to achieve a reliable electrical connection and signal connection with the mated connector. In this way, in this solution, main body parts of the first electrode terminal and the signal terminal are built in the first body, and only contact parts are exposed in the concave accommodation portion. Proper separation between terminals is constructed based on a structure, so that a possibility of short-circuiting contact can be reduced. In addition, in an application scenario in which the first connector and a battery are integrated into a modular component, and the second electrode terminal is a negative terminal, in an assembly and insertion process, the grounded negative terminal is first conducted, and then, the positive terminal is conducted, so that a phenomenon of assembly sparking can be avoided. In addition, in an insertion-removal mating process, the blocking surface serves as a main insertion-removal mating surface, so that pin breakage during insertion and removal can be further avoided.

[0010] Based on the first implementation of the first aspect, embodiments of this application further provide a second implementation of the first aspect. The second electrode terminal includes a first body surface, and further includes a second body surface or two third body surfaces connected to the first body surface; and the first body surface wraps the top surface that is of the first body and that is at an end at which the first body surface is located, the second body surface extends downward from the first body surface to wrap an end wall that is of the first body and that is at an end at which the second body surface is located, and the two third body surfaces respectively extend downward from two sides of the first body surface to wrap side walls of the first body at ends at which the two third body surfaces are located. In other words, the negative terminals may wrap two end portions of the corresponding first body, and further have a function of protective metal fitting, so that strength of the end portion of the connector can be increased, and an insertion loss of the end portion can be effectively avoided.

[0011] In an actual application, the first body surfaces of the two negative terminals may be flush with the top surface of the first body between the two negative terminals. For example, but not limited to, the two negative terminals may be integrally molded with the first body by using an injection molding process, or the two negative terminals and plastic are assembled and fastened after being independently processed.

[0012] Based on the second implementation of the first aspect, embodiments of this application further provide a third implementation of the first aspect. The second electrode terminal further includes a guiding portion, and the guiding portion extends downward from an inner edge of the first body surface to the concave accommodation portion, and is adaptively attached to a blocking surface on a corresponding side, to provide a good guiding function during assembly and embedding of the mated connectors, and help the mated connectors to be adjusted and aligned. In addition, strength of the end portion of the connector can be further increased based on the guiding portion formed by extending the inner edge downward.

[0013] For example, three guiding portions may be disposed, and are respectively adaptively attached to an end surface and two side surfaces of the blocking surface on the corresponding side.

[0014] Based on the first implementation of the first aspect, or the second implementation of the first aspect, or the third implementation of the first aspect, embodiments of this application further provide a fourth implementation of the first aspect. The opening on the top surface of the first body includes at least one first opening and at least two second openings that are disposed at spacings, and the blocking surface includes a first blocking surface that extends downward from the first opening, to form a first concave accommodation portion capable of accommodating a first electrode terminal on the mated connector side, where a contact of the first electrode terminal protrudes from the first blocking surface through the groove portion on the first blocking surface. The blocking surface further includes a second blocking surface that extends downward from the second opening, to form a second concave accommodation portion capable of accommodating a signal terminal on the mated connector side, where a contact of the signal terminal protrudes from the second blocking surface through the groove portion on the second blocking surface. Therefore, the first electrode terminal and the signal terminal are separately separated and blocked, that is, structure subdivision is performed, so that a possibility of connecting the positive electrode to the negative electrode can be further reduced.

[0015] In an actual application, there may be one opening on the top surface of the first body, and the groove

portions provided on the blocking surface include a first groove portion and a second groove portion, and the first groove portion and the second groove portion are respectively disposed corresponding to the contact portion of the first electrode terminal and the contact portion of the signal terminal.

[0016] Based on the first aspect, or the first implementation of the first aspect, or the second implementation of the first aspect, or the third implementation of the first aspect, or the fourth implementation of the first aspect, embodiments of this application further provide a fifth implementation of the first aspect. Dents or clamping convex portions are disposed on at least one of the second body surface that is of the second electrode terminal and that wraps the end wall of the first body, and the two third body surfaces that are of the second electrode terminal and that wrap the side walls of the first body, and the dents or the clamping convex portions are configured to be clamped with and adapted to the mated connector, and are disposed in a 180° rotational symmetry manner. In an assembly process, metal suffers from a large extrusion force and has deformation in an initial phrase. When a corresponding clamping convex portion is aligned with a dent, the extrusion force is reduced, and then, the deformation is released. In addition, a good hand feeling during insertion and removal may be fed back.

[0017] Based on the first aspect, or the first implementation of the first aspect, or the second implementation of the first aspect, or the third implementation of the first aspect, or the fourth implementation of the first aspect, or the fifth implementation of the first aspect, embodiments of this application further provide a sixth implementation of the first aspect. The first electrode terminal includes a fastening portion and a contact portion that are formed through bending and extending in sequence. The contact portion includes a first body segment and a second body segment that are spaced apart and disposed opposite to each other, to construct and form a dual-contact structure. The first body segment is connected to the fastening portion of the first electrode terminal, a first contact is disposed on the first body segment, and a second contact is disposed on the second body segment. In other words, the second body segment is an elastic arm, and may be in elastic contact with a fastening terminal or an elastic terminal on a side of a connector mated with the first connector, so that electrical contact reliability can be ensured. In addition, the elastic terminal may be accommodated inside the first body to a maximum extent, to reduce a short-circuiting risk.

[0018] Further, a width of the second body segment of the first electrode terminal is less than a width of the first body segment of the first electrode terminal. In this way, the groove portion that is on the first blocking surface and that is adapted to the second body segment may be configured to have a narrow size, to reduce a short-circuiting possibility. In addition, for the second contact on a side of the elastic arm, a contact size between the second contact and a terminal on a mated connector side is also small. When this solution is compared with a case of a terminal in an equal cross-sectional structure form, in this solution, a contact size of the second contact is small, a deformation force of the second body segment serving as the elastic arm is small, and a contact impedance is accordingly small, so that a large through-current capability can be obtained.

[0019] Based on the first aspect, or the first implementation of the first aspect, or the second implementation of the first aspect, or the third implementation of the first aspect, or the fourth implementation of the first aspect, or the fifth implementation of the first aspect, or the sixth implementation of the first aspect, embodiments of this application further provide a seventh implementation of the first aspect. The signal terminal includes a fastening portion and a contact portion that are formed through bending and extending in sequence. The contact portion includes a first body segment and a second body segment that are spaced apart and disposed opposite to each other. The first body segment is connected to the fastening portion of the signal terminal, a first contact is disposed on the first body segment, and a second contact is disposed on the second body segment. In other words, the second body segment of the signal terminal is an elastic arm, and may be in elastic contact with a fastening terminal or an elastic terminal on a side of a connector mated with the first connector, so that signal contact reliability can be ensured.

[0020] Further, at least two signal terminals are disposed on a same end side of the first electrode terminal, and the at least two signal terminals are configured as follows: a first contact and a second contact of a part of the signal terminals and a first contact and a second contact of the other part of the signal terminals are reversely configured in a width direction. In other words, the first body segment of a part of the signal terminals and the second body segment of the other part of the signal terminals are located on a same side in the width direction, and the second body segment of a part of the signal terminals and the first body segment of the other part of the signal terminals are also located on a same side in the width direction. In this way, for the at least two signal terminals configured on the same end side of the first electrode terminal, forces that are formed after the elastic arms deform and that act on the mated connector side are opposite in direction. Based on a structural feature of a same magnitude of the forces, a deflection torque is not generated or may be effectively reduced, to prevent the mated connector from generating a rotation trend, so that a reliable and stable connection relationship can be maintained between adaptation terminals.

[0021] A second aspect of embodiments of this application provides a second connector, including a second body, and a power supply terminal and a signal terminal that are disposed on the second body. The power supply terminal includes one group of first electrode terminals and two groups of second electrode terminals. The signal

terminal includes a first group of signal terminals and a second group of signal terminals. The one group of first electrode terminals is disposed at a middle position of the second body, and is located between the two groups of second electrode terminals, and the group of first electrode terminals includes contact portions disposed in a 180° rotational symmetry manner. The second body includes concave space capable of accommodating at least a part of a mated connector, the two groups of second electrode terminals are respectively disposed at two ends of the second body, and a contact portion of the second electrode terminal located at one end is disposed in a 180° rotational symmetry manner relative to a contact portion of the second electrode terminal located at the other end. The first group of signal terminals is disposed between the first electrode terminals and one group of second electrode terminals, the second group of signal terminals is disposed between the first electrode terminals and the other group of second electrode terminals, and a contact portion of the first group of signal terminals is disposed in a 180° rotational symmetry manner relative to a contact portion of the second group of signal terminals. A rotational symmetry axis of the contact portions of the first electrode terminals, a rotational symmetry axis of the contact portions of the second electrode terminals, and a rotational symmetry axis of the contact portions of the signal terminals overlap. Similar to the first connector provided in the first aspect, assembly and embedding between the second connector and a mated connector (the first connector) provided in this solution are not restricted by an assembly direction. When the second connector and the mated connector are embedded in a 0° direction or a 180° direction, the power supply terminal and the signal terminal can be effectively connected, so that a possibility that a positive terminal and a negative terminal are short-circuited can be effectively avoided, and a short-circuiting risk is reduced.

[0022] For example, the first electrode terminal may be a positive terminal, and correspondingly, the second electrode terminal is a negative terminal; or the first electrode terminal may be a negative terminal, and correspondingly, the second electrode terminal is a positive terminal.

[0023] Based on the second aspect, embodiments of this application further provide a first implementation of the second aspect. An island portion is disposed in concave space of the second body, the island portion extends upward from the second body, and the contact portion of the first electrode terminal and the contact portion of the signal terminal form the island portion or are configured on the island portion. In this way, based on a good bearing capacity of an island structure, insertion reliability of the first electrode terminal and the signal terminal can be improved.

[0024] Based on the first implementation of the second aspect, embodiments of this application further provide a second implementation of the second aspect. The island portion includes at least two second island portions and at least one first island portion that are disposed at spacings, the first island portion includes the contact portion of the first electrode terminal, and the contact portion of the signal terminal is configured on the second island portion. In this way, in this solution, the first electrode terminal and the signal terminal are respectively configured on corresponding island portions, and assembly and adaptation of each island portion may be adaptively adjusted and adapted, so that an insertion force can be properly balanced, pin breakage during insertion and removal is avoided, and overall reliability of a structure is improved.

[0025] In an actual application, one island portion may be disposed, and the contact portion of the first electrode terminal and the contact portion of the signal terminal are disposed on the island portion at a spacing.

[0026] Based on the second implementation of the second aspect, embodiments of this application further provide a third implementation of the second aspect. The second electrode terminal includes two contact portions and a fastening portion, the two contact portions are symmetrically disposed on two sides of the fastening portion, the contact portions are formed by extending side edges of the fastening portion upward, and the contact portions have inwardly convex contacts. In this solution, the contact portion that is of the second electrode terminal and that is formed through extending is an elastic arm, and may be in elastic contact with a fastening terminal or an elastic terminal on a side of a connector mated with the second connector, so that electrical contact reliability can be ensured.

[0027] Based on the second implementation of the second aspect or the third implementation of the second aspect, embodiments of this application further provide a fourth implementation of the second aspect. The second electrode terminal further includes a protection portion, and the protection portion is formed by bending and extending an edge of the fastening portion of the second electrode terminal upward, and wraps end regions on a top surface, an end surface, and two side surfaces of an adjacent island portion. Therefore, strength of the end regions of the island portion can be improved, and an insertion loss is effectively avoided.

[0028] Based on the second aspect, or the second implementation of the second aspect, or the third implementation of the second aspect, or the fourth implementation of the second aspect, embodiments of this application further provide a fifth implementation of the second aspect. The second connector further includes two protection metal parts that are respectively configured at two ends of the second body, where the protection metal part includes an end wall protection portion and two side wall protection portions, the end wall protection portion wraps an end wall of the second body, and the two side wall protection portions respectively wrap side walls on two sides of the second body. In other words, the second body is a shift, and the protection metal part has a function of

protective metal fitting, so that structural strength of an end portion of a connector can be increased.

[0029] Based on the fifth implementation of the second aspect, embodiments of this application further provide a sixth implementation of the second aspect. The protection metal part further includes a contact, and the contact is capable of being in contact with and electrically connected to a second electrode terminal on a mated connector side. Therefore, based on a provided reinforced end structure of the metal fitting, the protection metal part further has a current transmission function, so that a large through-current capability can be further improved. In an actual application, the second electrode terminal and the protection metal part that are located on a same end side may be of an integrated structure. In other words, the second electrode terminal may further have a function for protecting the metal fitting.

[0030] Based on the fifth implementation of the second aspect or the sixth implementation of the second aspect, embodiments of this application further provide a seventh implementation of the second aspect. Clamping convex portions or dents are disposed on at least one of an inner side protection segment of the end wall protection portion of the protection metal part and inner side protection segments of the two side wall protection portions of the protection metal part, and the clamping convex portions or the dents are configured to be clamped with and adapted to the mated connector, and are disposed in a 180° rotational symmetry manner. In an assembly process, a good hand feeling during insertion and removal may be obtained.

[0031] Based on the fifth implementation of the second aspect, or the sixth implementation of the second aspect, or the seventh implementation of the second aspect, embodiments of this application further provide an eighth implementation of the second aspect. A groove portion is provided on the inner side protection segment of the side wall protection portion of the protection metal part, the groove portion is disposed corresponding to the contact portion of the second electrode terminal, and a contact on the contact portion of the second electrode terminal is capable of protruding from the inner side protection segment through the groove portion. Overall, space occupation in a length direction can be reduced, and structure integration can be improved.

[0032] A third aspect of embodiments of this application provides a connector assembly, including the first connector according to the first aspect and the second connector according to the second aspect that are embedded and adapted. Based on structural features of the first connector and the second connector, a risk that a positive electrode and a negative electrode are short-circuited can be effectively avoided, so that security and reliability requirements in different application scenarios are met.

[0033] A fourth aspect of embodiments of this application provides a first connector, including a first body, and a power supply terminal and a signal terminal that are disposed on the first body. The power supply terminal includes a first electrode terminal and a second electrode terminal. The first body includes a top surface and a blocking surface, an opening is provided on the top surface, and the blocking surface extends downward from the opening on the top surface, to form a concave accommodation portion capable of accommodating an adaptation terminal on a mated connector side. The blocking surface includes groove portions provided corresponding to the contact portion of the first electrode terminal and the contact portion of the signal terminal respectively, the contact portion of the first electrode terminal and the contact portion of the signal terminal are respectively built in the corresponding groove portions, and a contact of the contact portion of the first electrode terminal and a contact of the contact portion of the signal terminal protrude from the blocking surface through the corresponding groove portions respectively. In this way, main body parts of the first electrode terminal and the signal terminal are built in the first body, and only contact parts are exposed in the concave accommodation portion. Proper separation between terminals is constructed based on a structure, so that a possibility of short-circuiting contact can be reduced. In addition, in an application scenario in which the first connector and a battery are integrated into a modular component, and the second electrode terminal is a negative terminal, in an assembly and insertion process, the grounded negative terminal is first conducted, and then, the positive terminal is conducted, so that a phenomenon of assembly sparking can be avoided. In addition, in an insertion-removal mating process, the blocking surface serves as a main insertion-removal mating surface, so that pin breakage during insertion and removal can be further avoided.

[0034] Based on the fourth aspect, embodiments of this application further provide a first implementation of the fourth aspect. The signal terminal is disposed at a middle position of the first body, and the first electrode terminal and the second electrode terminal are respectively located on two sides of the signal terminal. Therefore, a short-circuiting risk can be further reduced based on a physical barrier caused by the signal terminal.

[0035] In an actual application, the opening may include a first opening, a second opening, and a third opening that are provided at spacings, and the blocking surface includes a first blocking surface that extends downward from the first opening, to form a first concave accommodation portion capable of accommodating a first electrode terminal on the mated connector side, where a contact of the first electrode terminal protrudes from the first blocking surface through the groove portion on the first blocking surface. The blocking surface further includes a second blocking surface that extends downward from the second opening, to form a second concave accommodation portion capable of accommodating a signal terminal on the mated connector side, where the contact of a signal terminal protrudes from the second blocking surface through the groove portion on the sec-

ond blocking surface. The blocking surface further includes a third blocking surface that extends downward from the third opening, to form a third concave accommodation portion capable of accommodating a second electrode terminal on the mated connector side, where a contact of the second electrode terminal protrudes from the third blocking surface through the groove portion on the third blocking surface. Therefore, the power supply terminal and the signal terminal are respectively configured in corresponding concave accommodation portions, and blocking barriers are independently configured between various types of terminals, so that a structure is simple and easy to implement.

[0036] A fifth aspect of embodiments of this application provides a second connector, including a second body, and a power supply terminal and a signal terminal that are disposed on the second body. The power supply terminal includes a first electrode terminal and a second electrode terminal. An island portion is disposed in concave space of the second body, the island portion extends upward from the second body, and a contact portion of the first electrode terminal and a contact portion of the signal terminal form the island portion or are configured on the island portion. In this way, based on a good bearing capacity of an island structure, insertion reliability of the first electrode terminal, the second electrode terminal, and the signal terminal can be improved.

[0037] Based on the fifth aspect, embodiments of this application further provide a first implementation of the fifth aspect. The signal terminal is disposed at a middle position of the second body, and the first electrode terminal and the second electrode terminal are respectively located on two sides of the signal terminal. Therefore, a short-circuiting risk can be further reduced based on a physical barrier caused by the signal terminal.

[0038] In an actual application, the island portion may include a first island portion, a second island portion, and a third island portion that are disposed at spacings, the first island portion includes the contact portion of the first electrode terminal, the contact portion of the signal terminal is configured on the second island portion, and the third island portion includes a contact portion of the second electrode terminal.

[0039] A sixth aspect of embodiments of this application provides a connector assembly, including the first connector according to the fourth aspect and the second connector according to the fifth aspect that are embedded and adapted.

[0040] A seventh aspect of embodiments of this application provides a component module, including a component and a connector that are connected. The connector may be the first connector described above, or may be the second connector described above.

[0041] In a specific application, the component module may be a functional component module applied to an electronic device like a mobile phone, a tablet computer, or a notebook computer. For example, the component is a battery, and the connector is the first connector described above.

[0042] An eighth aspect of embodiments of this application provides an electronic device, including the connector assembly described above.

BRIEF DESCRIPTION OF DRAWINGS

[0043]

FIG. 1 is a diagram of a connector assembly according to an embodiment of this application;

FIG. 2 is a diagram of an overall structure of a first connector shown in FIG. 1;

FIG. 3 is a top view of the first connector shown in FIG. 2;

FIG. 4 is an exploded view of assembly of the first connector shown in FIG. 2;

FIG. 5 is a diagram of a positive terminal according to an embodiment of this application;

FIG. 6 is a diagram of a signal terminal according to an embodiment of this application;

FIG. 7 is a diagram of a negative terminal according to an embodiment of this application;

FIG. 8 is a diagram of an overall structure of a second connector shown in FIG. 1;

FIG. 9 is a diagram of the second connector shown in FIG. 8 from another perspective;

FIG. 10 is an exploded view of assembly of the second connector shown in FIG. 8;

FIG. 11 is a top view of the connector assembly shown in FIG. 1;

FIG. 12 is a diagram of a contact assembly relationship that is between positive terminals and that is formed at an A-A cutting position in FIG. 11;

FIG. 13 is a diagram of a contact assembly relationship that is between signal terminals and that is formed at a B-B cutting position in FIG. 11;

FIG. 14 is a diagram of a contact assembly relationship that is between negative terminals and that is formed at a C-C cutting position in FIG. 11;

FIG. 15 is a diagram of a clamping assembly relationship that is between mated connectors and that is formed at a D-D cutting position in FIG. 11;

FIG. 16 is a diagram of a clamping assembly relationship that is between mated connectors and that is formed at an E-E cutting position in FIG. 11;

FIG. 17 is a diagram of another connector assembly according to an embodiment of this application;

FIG. 18 is a diagram of an overall structure of a first connector shown in FIG. 17;

FIG. 19 is an exploded view of assembly of the first connector shown in FIG. 18;

FIG. 20 is a diagram of a structure of another positive terminal according to an embodiment of this application;

FIG. 21 is a diagram of a structure of another signal terminal according to an embodiment of this application;

FIG. 22 is a diagram of an overall structure of a second connector shown in FIG. 17;

FIG. 23 is an exploded view of assembly of the second connector shown in FIG. 22;

FIG. 24 is a diagram of still another connector assembly according to an embodiment of this application;

FIG. 25 is a diagram of an overall structure of a first connector shown in FIG. 24;

FIG. 26 is an exploded view of assembly of the first connector shown in FIG. 25;

FIG. 27 is a diagram of a structure of still another positive terminal according to an embodiment of this application;

FIG. 28 is a diagram of an overall structure of a second connector shown in FIG. 24;

FIG. 29 is an exploded view of assembly of the second connector shown in FIG. 28;

FIG. 30 is a diagram of a structure of another signal terminal according to an embodiment of this application;

FIG. 31 is a diagram of another connector assembly according to an embodiment of this application;

FIG. 32 is a diagram of an overall structure of a first connector shown in FIG. 31;

FIG. 33 is an exploded view of assembly of the first connector shown in FIG. 31;

FIG. 34 is a diagram of an overall structure of a second connector shown in FIG. 31; and

FIG. 35 is an exploded view of assembly of the second connector shown in FIG. 31.

DESCRIPTION OF EMBODIMENTS

[0044] Embodiments of this application provide an implementation solution of a connector assembly, to effectively avoid a short-circuiting risk caused by misconnection between a positive electrode and a negative electrode.

[0045] The connector assembly includes a first connector and a second connector that are mated. A power supply terminal and a signal terminal are fastened to each of insulation bodies of the first connector and the second connector, where the power supply terminal includes a first electrode terminal and a second electrode terminal. The "first electrode terminal" and the "second electrode terminal" are respectively a positive terminal and a negative terminal that are configured to transmit a current, and the signal terminal is configured to transmit a signal with functions such as sampling and anti-counterfeiting identification. After assembly and embedding, contact portions of the power supply terminal and the signal terminal on the first connector are respectively adapted to contact portions of the power supply terminal and the signal terminal on the second connector, to establish a corresponding connection relationship. Based on an assembly and embedding relationship of a mating connection, one of the first connector and the second connector may be a plug connector, and the other of the first connector and the second connector may be a socket connector.

[0046] In this implementation solution, a group of first electrode terminals are disposed at a middle position of the insulation body of the first connector or the second connector, and the first electrode terminals include contact portions disposed in a 180° rotational symmetry manner. The two groups of second electrode terminals are respectively disposed at two ends of the insulating body of the connector, and a contact portion of the second electrode terminal at one end is disposed in a 180° rotational symmetry manner relative to a contact portion of the second electrode terminal at the other end. A rotational symmetry axis of the contact portions of the first electrode terminals and a rotational symmetry axis of the contact portions of the second electrode terminals overlap.

[0047] In addition, the signal terminal includes a first group of signal terminals and a second group of signal terminals. The first group of signal terminals is disposed between the first electrode terminals and one group of second electrode terminals, the second group of signal terminals is disposed between the first electrode term-

inals and the other group of second electrode terminals, and a contact portion of the first group of signal terminals is disposed in a 180° rotational symmetry manner relative to a contact portion of the second group of signal terminals. A rotational symmetry axis of the contact portions of the signal terminals and a rotational symmetry axis of the contact portions of the power supply terminals overlap.

[0048] In this specification, the first electrode terminal, the second electrode terminal, and the signal terminal that are in a unit of group are corresponding terminals located in a same region. It should be understood that there is a case in which each group of terminals includes one terminal, and there is a case in which each group of terminals includes a plurality of terminals.

[0049] In this way, assembly and embedding between the first connector and the second connector are not restricted by an assembly direction. When the first connector and the second connector are embedded in a 0° direction or a 180° direction, the power supply terminal and the signal terminal can be effectively connected. Compared with an existing solution, this implementation solution can be used to totally avoid a possibility that positive and negative terminals are short-circuited, and to effectively avoid a security risk like being short-circuited and hot melt or being short-circuited and sparking. In addition, based on a structure feature that contact portions of each terminal are disposed in a 180° rotational symmetry manner, when the first connector or the second connector is assembled with a corresponding component on a production line, a structure or process for preventing incorrect assembly does not need to be considered. In this way, manufacturing process costs are properly controlled, and assembly efficiency of the production line can be further improved.

[0050] To better understand the technical solutions and technical effect of this application, the following describes specific embodiments in detail with reference to the accompanying drawings by using a BTB connector as a description object, and using a basic configuration structure in which a first electrode terminal is a positive terminal and a second electrode terminal is a negative terminal. FIG. 1 is a diagram of a connector assembly according to an embodiment of this application.

[0051] A connector assembly 100 includes a first connector 10 and a second connector 20 that are mated. The first connector 10 and the second connector 20 are respectively disposed on two to-be-connected components that are used for a mating connection. As shown in FIG. 1, in a direction shown by an arrow in FIG. 1(a), the first connector 10 may be inserted and embedded into the second connector 20, to form the connector assembly 100 shown in FIG. 1(b). After the first connector 10 and the second connector 20 are inserted and embedded into each other, an electrical connection and a signal connection between the two to-be-connected components can be implemented. Without loss of generality, the first connector 10 herein is a plug connector, and correspondingly, the second connector 20 is a socket connector. In addition, the first connector 10 and the second connector 20 are in long bar shapes that can be mated. A specific length-width size and a ratio relationship may be adaptively adjusted based on actual product configuration.

[0052] In this implementation solution, the first connector 10 includes a first body 11, a positive terminal 12, a negative terminal 13, and a signal terminal 14. Refer to both FIG. 2 and FIG. 3. FIG. 2 is a diagram of an overall structure of the first connector shown in FIG. 1, and FIG. 3 is a top view of the first connector shown in FIG. 2. The first connector 10 shown in FIG. 2 is shown from a perspective of a side on which the first connector 10 and the mated second connector 20 are inserted and embedded into each other, to clearly show an arrangement relationship between a power supply terminal and a signal terminal.

[0053] As shown in FIG. 2 and FIG. 3, the positive terminal 12 is disposed at a middle position of the first body 11, the negative terminals 13 are respectively disposed at two end portions of the first body 11, and the signal terminals 14 are respectively disposed on a part that is of the first body 11 and that is between the positive terminal 12 and one of the two negative terminals 13 and a part that is of the first body 11 and that is between the positive terminal 12 and the other of the two negative terminals 13. Refer to FIG. 4. FIG. 4 is an exploded view of assembly of the first connector shown in FIG. 2.

[0054] The first body 11 is made of an insulation material, and includes a top surface 111, two end walls 112, two side walls 113, and a bottom surface 114. The two end walls 112 extend downward from two ends of the top surface 111, the two side walls 113 are formed by extending two sides of the top surface 111 downward, and the bottom surface 114 is located at a lower position opposite to the top surface 111.

[0055] A first opening 1111 and a second opening 1112 are provided on the top surface 111 of the first body 11. As shown in FIG. 2 and FIG. 4, the first body 11 further includes a first blocking surface 115 and a second blocking surface 116.

[0056] In this implementation solution, the first blocking surface 115 extends downward from the first opening 1111, and forms, through enclosure, a first concave accommodation portion into which a positive terminal of a mated connector may be inserted, and a groove portion 1151 is provided on the first blocking surface 115. The positive terminal 12 has a positive contact portion 121, and contacts (12111 and 12121) are configured on the positive contact portion 121. A body of the positive contact portion 121 is built in the corresponding groove portion 1151, and the positive contacts (12111 and 12121) protrude from the first blocking surface 115 through the groove portion 1151, that is, are located in the first concave accommodation portion, to be connected to the positive terminal on a mated connector side. The second blocking surface 116 extends downward from the second opening 1112, and forms, through enclosure, a second concave accommodation portion

into which a signal terminal of the mated connector may be inserted, and a groove portion 1161 is provided on the second blocking surface 116. The signal terminal 14 has a signal terminal contact portion 141, and contacts (14111 and 14121) are configured on the signal terminal contact portion 141. A body of the signal terminal contact portion 141 is built in the corresponding groove portion 1161, and the signal contacts (14111 and 14121) protrude from the second blocking surface 116 through the groove portion 1161, that is, are located in the second concave accommodation portion, to be connected to the signal terminal on the mated connector side.

[0057] In other words, main body parts of the positive terminal 12 and the signal terminal 14 are both built in the first body 11, and only contact parts are exposed in the corresponding concave accommodation portions. Terminals are properly separated based on a structure, so that short-circuiting is effectively avoided. In addition, in an insertion-removal mating process, a main insertion-removal mating surface is the corresponding blocking surface, so that pin breakage during insertion and removal can be further avoided.

[0058] Specifically, the first blocking surface 115 and the second blocking surface 116 shown in the figure each form a corresponding concave accommodation portion through enclosure in a circumferential direction of a corresponding opening. In addition, the first blocking surface 115, the second blocking surface 116, and the top surface 111 jointly form a structure with an enhancement function, so that overall strength of the first body 11 is improved. In another specific implementation, a blocking surface (not shown in the figure) may alternatively be disposed only on a side on which a positive contact portion or a signal contact portion are located.

[0059] In this implementation solution, there are two first openings 1111, and the two first openings 1111 are provided at a spacing in a width direction X on the top surface 111 of the first body 11, to form two first concave accommodation portions. Four positive terminals 12 are disposed, and are symmetrically disposed corresponding to the two first concave accommodation portions separately, that is, two positive terminals 12 are configured in each first concave accommodation portion.

[0060] In a specific implementation, one first opening 1111 may alternatively be provided, and one or two positive terminals may be configured. In another specific implementation, four first openings 1111 may alternatively be provided, and one or two positive terminals are configured for each first opening 1111. It may be understood that it is feasible provided that contact portions of positive terminals in a corresponding implementation are disposed in a 180° rotational symmetry manner.

[0061] Refer to FIG. 5. FIG. 5 is a diagram of a positive terminal according to an embodiment of this application. The positive terminal 12 includes a contact portion 121 and a fastening portion 122 that are formed through bending and extending in sequence. The fastening portion 122 is configured to be fastened to the first body 11, and the contact portion 121 configured to be adapted to the positive terminal on the mated connector side is configured in an approximate "U" shape, to construct and form double contacts. Specifically, the contact portion 121 includes two body segments that are spaced apart and disposed opposite to each other. A first body segment 1211 is connected to the fastening portion 122, a first contact 12111 is disposed on the first body segment 1211, and the first contact 12111 is relatively fastened. A second body segment 1212 is an elastic arm, and a second contact 12121 is disposed on the second body segment 1212. The second body segment 1212 may be in elastic contact with a fastening terminal or an elastic terminal on a side of a connector mated with the first connector, so that electrical contact reliability can be ensured. In addition, the elastic terminal may be accommodated inside the first body to a maximum extent, to reduce a short-circuiting risk.

[0062] Herein, a weld leg 123 of the positive terminal 12 is formed by extending the fastening portion 122, and may be specifically located on a side edge of the bottom surface of the first body 11. Herein, the weld leg at an edge of the fastening portion 122 may be designed to be in a discontinuous wave form, to avoid a case in which welding strength is affected by an excessively long straight line length.

[0063] Still as shown in FIG. 2 and FIG. 3, corresponding to sides on which the first contact 12111 and the second contact 12121 are located, groove portions 1151 are respectively provided on two blocking surfaces that are disposed opposite to each other and that are of the first blocking surface 115, so that the first contact 12111 and the second contact 12121 protrude and are exposed in the corresponding first concave accommodation portions.

[0064] As shown in the figure, the contact portions 121 of the four positive terminals 12 are disposed in a 180° rotational symmetry manner, that is, have the first contacts 12111 and the second contacts 12121 that are disposed in a rotational symmetry manner. It may be determined that positive terminal contact portions disposed in a 180° rotational symmetry manner are adaptively configured on a mated second connector 20 described in detail below. When the first connector and the second connector are assembled and embedded in a 0° direction or a 180° direction, the positive terminals between the first connector and the second connector can be effectively connected.

[0065] In addition, the four positive terminals 12 in this implementation solution are configured in a mirror mode in the two first concave accommodation portions. In this way, after the positive terminals 12 are mated with positive terminals of the mated connector, forces formed in a width direction may offset each other. Based on this, connected positive terminals can maintain a reliable and stable connection status.

[0066] Further, as shown in FIG. 5, the contact portion

121 of the positive terminal 12 in this solution uses a through-flow structure with a non-equal cross section, and a width of the second body segment 1212 of the contact portion 121 is less than a width of the first body segment 1211 of the contact portion 121. In this way, the groove portion 1151 that is adapted to the second body segment 1212 and that is on the first blocking surface 115 may be configured to have a narrow size, to reduce a short-circuiting possibility on a positive side. In addition, for the second contact 12121 on a side of the elastic arm, a contact size between the second contact 12121 and a positive terminal on a mated connector side is also small. When this implementation solution is compared with a case of a positive terminal in an equal cross-sectional structure form, in this implementation solution, a contact size of the second contact 12121 is small, a deformation force of the second body segment 1212 serving as the elastic arm is small, and a contact impedance is accordingly small, so that a large through-current capability can be obtained.

[0067] In this implementation solution, there are two second openings 1112, and the two second openings 1112 are provided at a spacing in a length direction Y on parts that are of the top surface 111 and that are on two sides of the first opening 1111, to form two second concave accommodation portions. Four signal terminals 14 are disposed, and are symmetrically disposed corresponding to the two second accommodation portions separately, that is, two signal terminals 14 are configured in each second concave accommodation portion.

[0068] Refer to FIG. 6. FIG. 6 is a diagram of a signal terminal according to an embodiment of this application. The signal terminal 14 includes a contact portion 141 and a fastening portion 142 that are formed through bending and extending in sequence. The fastening portion 142 is configured to be fastened to the first body 11, and the contact portion 141 configured to be adapted to the signal terminal on the mated connector side is also configured in an approximate "U" shape, to construct and form double contacts. Specifically, the contact portion 141 includes two body segments that are disposed opposite to each other. A first body segment 1411 is connected to the fastening portion 142, a first contact 14111 is disposed on the first body segment 1411, and the first contact 14111 is relatively fastened. A second body segment 1412 is an elastic arm, and a second contact 14121 is disposed on the second body segment 1412.

[0069] A weld leg 143 of the signal terminal 14 is formed by extending the fastening portion 142, and may be specifically located on a side edge of the bottom surface of the first body 11.

[0070] Still as shown in FIG. 2 and FIG. 3, corresponding to sides on which the first contact 14111 and the second contact 14121 are located, groove portions 1161 are respectively provided on two blocking surfaces that are disposed opposite to each other and that are of the second blocking surface 116, so that the first contact 14111 and the second contact 14121 protrude and are exposed in the corresponding second concave accommodation portions.

[0071] As shown in the figure, the contact portions 141 of the four signal terminals 14 are disposed in a 180° rotational symmetry manner, that is, have the first contact 14111 and the second contact 14121 that are disposed in a rotational symmetry manner. When the first connector and the second connector are assembled and embedded in a 0° direction or a 180° direction, the signal terminals between the first connector and the second connector can be effectively connected. In another specific implementation, a quantity of configured signal terminals 14 may be determined based on function setting. For example, but not limited to, one signal terminal is configured on each side or a plurality of signal terminals disposed at spacings are configured on each side.

[0072] To prevent the elastic arm of the signal terminal 14 from acting on the mated connector to form a deflection torque, a manner for configuring the two signal terminals 14 in each second concave accommodation portion may be further optimized, to ensure a balanced force. In this implementation solution, for the two signal terminals 14 disposed corresponding to each second concave accommodation portion, the first contact 14111 and the second contact 14121 of the contact portion 141 of each of the two signal terminals 14 may be reversely configured in a width direction. In other words, the first body segment 1411 of one of the two signal terminals 14 and the second body segment 1412 of the other of the two signal terminals 14 are located on a same side in the width direction, and the second body segment 1412 of one of the two signal terminals 14 and the first body segment 1411 of the other of the two signal terminals 14 are also located on a same side in the width direction.

[0073] In this way, for the two signal terminals 14 configured in each second concave accommodation portion, forces that are formed after the elastic arms of the two signal terminals 14 deform and that act on the mated connector side are opposite in direction. Based on a structural feature of a same magnitude of the forces, a deflection torque that causes the mated connector to generate a rotation trend is not generated, so that a reliable and stable connection relationship can be maintained between adaptation terminals.

[0074] In a specific implementation, for a case in which the plurality of signal terminals disposed at spacings are configured on each side, the foregoing structural configuration principle may also be applied. The first body segment of a part of the signal terminals and the second body segment of the other part of the signal terminals are located on a same side in the width direction, and the second body segment of a part of the signal terminals and the first body segment of the other part of the signal terminals are also located on a same side in the width direction, so that the deflection torque can also be effectively reduced. Certainly, specifically, the rotation trend of the mated connector may be further avoided by adjusting

a size of each signal terminal.

[0075] It should be noted that, in a manner for assembling the positive terminal 12 and the signal terminal 14 with the first body 11, a socket connected to the top surface may be provided on a side of the bottom surface 114 of the first body 11. Specifically, as shown in FIG. 1, a first socket 1141 is configured for insertion of the positive terminal 12, and a second socket 1142 is configured for insertion of the signal terminal 14. A structure is simple and a process is good. Certainly, in another specific implementation, based on the positive terminal 12 and the signal terminal 14, the first body 11 may alternatively be molded by using an integral injection molding process, to obtain a stable fastening relationship.

[0076] In this implementation solution, the two negative terminals 13 are respectively configured at two ends of the first body 11. Based on a basic structure feature that the positive terminal is located at the middle position of the connector and the two negative terminals 13 are symmetrically disposed at the two ends, the mated connectors are assembled and embedded in a 0° direction or a 180° direction, and the positive and negative terminals all can be connected in a mutual insertion manner. As shown in FIG. 2, FIG. 3, and FIG. 4, the negative terminals 13 wrap two end portions of the corresponding first body 11, and further have a function of protective metal fitting, so that strength of the end portion of the connector can be increased.

[0077] Refer to FIG. 7. FIG. 7 is a diagram of a negative terminal according to an embodiment of this application. The negative terminal 13 includes a first body surface 131, a second body surface 132, and two third body surfaces 133 that are connected, and at least one of the first body surface 131, the second body surface 132, and the third body surface 133 may serve as a contact portion of the negative terminal, to provide and form a corresponding negative contact. The first body surface 131 wraps a top surface 111 at an end at which the first body surface 131 is located, the second body surface 132 extends downward from one end of the first body surface 131 and wraps an end wall 112 at an end at which the second body surface 132 is located, and the two third body surfaces 133 extend downward from two sides of the first body surface 131 and wrap side walls 113 at ends at which the two third body surfaces 133 are located, to form an approximately groove-shaped structure that is open at one end. Therefore, comprehensive protection is formed at two ends of an insertion side of the first connector 10, to prevent an assembly mating loss while a connection function of the negative terminal is met. In addition, based on an end portion protection capability provided by the negative terminal 13, no additional protective metal fitting needs to be configured, and manufacturing costs can be reduced.

[0078] A weld leg 135 of the negative terminal 13 may be formed by extending bottom edges of the second body surface 132 and the third body surface 133 in a lateral direction, and a design of a plurality of weld legs has good welding strength. For example, but not limited to, a length of the bottom edge of the second body surface 132 is long, and two weld legs 135 may be configured on the bottom edge of the second body surface 132; and a length of the bottom edge of the third body surface 133 is short, and one weld leg 135 may be configured on the bottom edge of the third body surface 133. In another specific application, a manner for configuring the weld leg 135 is determined based on an actual product design.

[0079] In another specific implementation, an actual wrapping part and an actual wrapping area of the negative terminal 13 may be determined based on an overall design requirement of different products. For example, but not limited to, the negative terminal includes only the first body surface 131 that wraps the top surface and the second body surface 132 that wraps the end wall, or includes only the first body surface 131 that wraps the top surface and the third body surfaces 133 that wrap the two side walls, so that strength of the end portion of the connector can also be increased.

[0080] In addition, in this implementation solution, the first body surfaces 131 of the two negative terminals 13 may be flush with the top surface 111 of the first body 11 between the two negative terminals 13. Each positive terminal 12 is located below the top surface 111, and is blocked by the first blocking surface 115. In an application scenario in which the first connector 10 and a battery are integrated into a modular component, in an assembly and insertion process, the grounded negative terminal is first conducted, and then, the positive terminal is conducted, so that a phenomenon of assembly sparking can be avoided.

[0081] In addition, the negative terminal 13 further includes a guiding portion 134 formed by extending an inner edge of the first body surface 131 downward. Refer to all of FIG. 2, FIG. 4, and FIG. 7. Three guiding portions 134 are disposed, and are respectively attached to an end face and two side faces of the second blocking surface 116 on a corresponding side, to provide a good guiding function during assembly and embedding of the mated connectors, help the mated connectors to be adjusted and aligned, and quickly implement an assembly operation. In addition, strength of the end portion of the connector can be further increased based on the guiding portion 134 formed by extending the inner edge downward.

[0082] To further provide a hand feeling during assembly, a dent 1321 is disposed on the second body surface 132 of the negative terminal 13, a dent 1331 is disposed on the third body surface 133, and the dent 1321 and the dent 1331 may be respectively adapted to convex portions on the mated connectors.

[0083] The following describes in detail a second connector 20 mated with the first connector 10. FIG. 8 and FIG. 9 are diagrams of a second connector from different perspectives. FIG. 8 is from a perspective of a mated insertion side of the second connector, that is, from a top angle of view. FIG. 9 is from a bottom angle of view of the

second connector shown in FIG. 8.

[0084] In this implementation solution, the second connector 20 includes a second body 21, a positive terminal 22, a negative terminal 23, and a signal terminal 24. Corresponding to the power supply terminal and the signal terminals on the first connector 10, the positive terminal 22 of the second connector 20 is also disposed at a middle position of the second body 21, the negative terminals 23 are disposed at two ends of the second body 21 at spacings, and the signal terminals 24 are respectively disposed on a part that is of the second body 21 and that is between the positive terminal 22 and one of the two negative terminals 23 and a part that is the second body 21 and that is between the positive terminal 22 and the other of the two negative terminals 23. Refer to FIG. 10. FIG. 10 is an exploded view of assembly of the second connector shown in FIG. 8.

[0085] The second body 21 is made of an insulation material, and includes a bottom surface 211, two end walls 212, and two side walls 213. The two end walls 212 are formed by extending two ends of the bottom surface 211 upward, and the two side walls 213 are formed by extending two sides of the bottom surface 211 upward. The bottom surface 211, the two end walls 212, and the two side walls 213 form, through enclosure, concave space that can accommodate the first connector 10.

[0086] In this implementation solution, the positive terminal 22 includes a bottom plate 222 and two contact portions 221. The two contact portions 221 are disposed on the bottom plate 222 at a spacing in a width direction, and are respectively formed by protruding upward from the bottom plate 222. Specifically, the two contact portions may be protruding housing structures that may be inserted and adapted to the first concave accommodation portion on the mated connector side. Herein, based on a metal plate material, the positive terminal 22 may be molded by using an integrated extruding process, or may be molded by using a sheet metal bending process, to provide higher reliability.

[0087] Herein, a weld leg 224 of the positive terminal 22 may be formed by extending the bottom plate 222, and may be specifically located on a side edge of a bottom surface of the second body 21.

[0088] Refer to both FIG. 11 and FIG. 12. FIG. 11 is a top view of the connector assembly 100 shown in FIG. 1, and FIG. 12 is a diagram of a contact assembly relationship that is between positive terminals of mated connectors and that is formed at an A-A cutting position in FIG. 11.

[0089] As shown in the figure, the two contact portions 221 are disposed in a 180° rotational symmetry manner, and have contacts that are disposed in a rotational symmetry manner and that are adapted to positive terminals on a mated connector side. When the first connector and the second connector are assembled and embedded in a 0° direction or a 180° direction, the positive terminals between the first connector and the second connector can be effectively connected.

[0090] The positive terminal 22 may be integrally formed with the second body 21 by using an injection molding process, and the bottom plate 222 of the positive terminal 22 may be built in the bottom surface 211. As shown in FIG. 9, a width of the bottom plate 222 in this solution is approximately equal to a width of the second body 21, and the bottom plate 222 may serve as an internal enhancement plate to improve strength of a bottom plate of the second body 21. In addition, two bending portions 223 are further configured on the positive terminal 22. The two bending portions 223 are formed by extending the bottom plate 22 upward, and are disposed at a spacing in a width direction. Therefore, reliability of fastening between injection molding parts can be further enhanced.

[0091] In this implementation solution, the second body 21 further includes two island portions 214 that protrude upward from the bottom surface 211, and the two island portions 214 are respectively disposed in a one-to-one correspondence with the two second concave accommodation portions on the mated connector side. Two signal terminals 24 are configured on each island portion 214. As shown in FIG. 8, FIG. 9, and FIG. 10, the signal terminal 24 includes a contact portion 241 and a fastening portion 242 that are formed through bending and extending in sequence, and the contact portion 241 is in an "n" shape, to construct and form double contacts. Two oppositely disposed body segments 2411 of the contact portion 241 are respectively located on two sides of the island portion 214, and a convex contact 24111 is disposed on one of the body segments 2411. The adjacent body segment 2411 of the convex contact 21111 is concave, and is configured to be adapted to the first contact 14111 that is relatively fastened on the mated connector side. In a mating process, the first contact 14111 is deformed due to pressure and springs back, so that a good hand feeling during insertion and removal can be fed back.

[0092] Refer to both FIG. 11 and FIG. 13. FIG. 13 is a diagram of a contact assembly relationship that is between signal terminals of mated connectors and that is formed at a B-B cutting position in FIG. 11.

[0093] Two segments of fastening portions 242 are disposed, are respectively formed by extending the two body segments 2411 of the contact portion 241, and a design of double weld legs may be constructed, so that welding strength is good. The signal terminal 24 may be integrally formed with the second body 21 by using an injection molding process, and the two segments of fastening portions 242 of the signal terminals 24 may be built in the bottom surface 211, and extend out of the second body 21 in a lateral direction to form weld legs 243.

[0094] As shown in the figure, the contact portions 241 configured on the two island portions 214 are also disposed in a 180° rotational symmetry manner, and have contacts (14121 and 14111) that are disposed in a rotational symmetry manner and that are adapted to the

signal terminals on the mated connector side. When the first connector and the second connector are assembled and embedded in a 0° direction or a 180° direction, the signal terminals between the first connector and the second connector can be effectively connected.

[0095] In this implementation solution, the two negative terminals 23 are respectively configured at two ends of the second body 21, and are disposed close to the signal terminals 24. As shown in FIG. 8 and FIG. 10, the negative terminal 23 includes a fastening portion 232 and two contact portions 231. The two contact portions 231 are symmetrically disposed on two sides of the fastening portion 232 in a width direction. The fastening portion 232 is plate-shaped, and the contact portion 231 is formed by extending a side edge of the fastening portion 232 upward. The contact portions 231 are elastic arms, and have inwardly convex contacts 2311. In addition, reliable contact between the contacts is ensured based on a structure form of the elastic arm. The contacts 2311 on the contact portions 231 of each negative terminal 23 are respectively adapted to corresponding contacts formed on the second body surface 132 of the negative terminal of the mated connector.

[0096] A weld leg 234 of the negative terminal 23 may be formed by extending the bottom plate 222, and may be specifically located at an end portion of the bottom surface of the second body 21. In a specific implementation, a design of a plurality of weld legs may be adopted to improve welding strength.

[0097] Refer to both FIG. 11 and FIG. 14. FIG. 14 is a diagram of a contact assembly relationship that is between negative terminals of mated connectors and that is formed at a C-C cutting position in FIG. 11.

[0098] As shown in the figure, the four contact portions 221 of the two negative terminals 23 are disposed in a 180° rotational symmetry manner, and have contacts that are disposed in a rotational symmetry manner and that are adapted to the negative terminals on the mated connector side. When the first connector and the second connector are assembled and embedded in a 0° direction or a 180° direction, the negative terminals between the first connector and the second connector can be effectively electrically connected.

[0099] To improve a mating pressure bearing capability of the two island portions 214, the negative terminal 23 in this solution further includes a protection portion 233 formed by bending and extending an edge of the fastening portion 232 upward. The protection portion 233 is located at an edge that is of the fastening portion 232 and that is close to an island portion 214 on a corresponding side, and wraps end portion regions of a top surface, an end surface, and two side surfaces of an opposite end of the corresponding island portion 214, to improve strength of the end portion regions. Herein, the negative terminal 23 may be assembled and fastened to the second body 21 in a mating manner, or may be integrally molded with the second body 21 by using an injection molding process, so that a structure is more reliable.

[0100] Certainly, the protection portion 233 has a shape that is adapted to the island portion 214, for example, but not limited to, an extension slope and a round corner. The protection portion 233 increases local strength of the island portion 214, and may further provide a guiding function in an assembly and embedding process.

[0101] Further, in this implementation solution, the second connector 20 further includes two protection metal parts 25, and the two protection metal parts 25 are respectively configured at two ends of the second body 21. As shown in FIG. 8 and FIG. 10, the protection metal part 25 includes an end wall protection portion 251 and two side wall protection portions 252, and the three portions are all in a cover shape. The end wall protection portion 251 wraps the end wall 212 of the second body 21, and the two side wall protection portions 252 respectively wrap the two side walls 213 of the second body 21. The three portions have a function of protective metal fitting, so that structural strength of the end portion of the connector can be increased.

[0102] A top protection segment 2511 of the end wall protection portion 251 is in a convex arc shape, and an inner protection segment 2512 is formed by tilting and extending the top protection segment 2511 downward, and has a good insertion guiding function. Similarly, a top protection segment 2521 of the side wall protection portion 252 is in a convex arc shape, and an inner protection segment 2522 is formed by tilting and extending the top protection segment 2521 downward, and overall, good guidance can be achieved in two dimensional directions of planes that are assembled and embedded.

[0103] To further obtain a good hand feeling during assembly, the protection metal part 25 in this solution has clamping convex portions that are adapted to the dents (1321 and 1331) on the mated connector side. Specifically, a clamping convex portion 25121 is disposed on the inner protection segment 2512 of the end wall protection portion 251, where the clamping convex portion 25121 is adapted to the dent 1321 on the mated connector side; and a clamping convex portion 25221 is disposed on the inner protection segment 2522 of the side wall protection portion 252, where the clamping convex portion 25221 is adapted to the dent 1331 on the mated connector side. Refer to all of FIG. 11, FIG. 15, and FIG. 16. FIG. 15 is a diagram of a clamping assembly relationship that is between mated connectors and that is formed at a D-D cutting position in FIG. 11, and FIG. 16 is a diagram of a clamping assembly relationship that is between mated connectors and that is formed at an E-E cutting position in FIG. 11.

[0104] In an assembly process, metal suffers from a large extrusion force and has deformation in an initial phrase. When a corresponding clamping convex portion is aligned with a dent, the extrusion force is reduced, and then, the deformation is released. In addition, a good hand feeling during insertion and removal may be fed back. Certainly, in another specific implementation, a

clamping convex portion and a dent that are clamped with and adapted to each other may alternatively be reversely configured, that is, the clamping convex portion is configured on a first connector side, and the dent is configured on a second connector side.

[0105] It may be understood that the clamping convex portions of the protection metal part 25 and the dents (1321 and 1331) on the mated connector side are also disposed in a 180° rotational symmetry manner, and when the first connector and the second connector are assembled and embedded in a 0° direction or a 180° direction, a good hand feeling during insertion and removal can be fed back.

[0106] In addition, to effectively improve structure integration and reduce space occupation in a length direction, in this implementation solution, structures of the protection metal parts 25 and the negative terminals 23 that are located at the ends of the second body 21 are configured in a staggered manner in a width direction. Still as shown in FIG. 8 and FIG. 10, a groove portion 25222 is provided on the inner protection segment 2522 of the side wall protection portion 252, and the groove portion 25222 is disposed at a position corresponding to that of the contact portion 231 of the negative terminal 23. The contact 2311 on the contact portion 231 may protrude from the inner protection segment 2522 through the groove portion 25222, to be adapted to the contact portion of the negative terminal on the mated connector side. In addition, for the negative terminal 23, the inner protection segment 2522 of the side wall protection portion 252 can further provide a blocking protection function, to reduce a short-circuiting possibility, and enhance security and reliability.

[0107] In addition, to further improve a through-current capability, in this implementation solution, both the protection metal part 25 and the negative terminal 23 are in contact with the negative terminal on the mated connector side. Herein, the protection metal part 25 further has a transmission capability of the negative terminal. For example, but not limited to, the protection metal part 25 and the negative terminal on the mated connector side may be electrically connected to each other through contact between a clamping convex portion and a dent that are adapted to each other.

[0108] A weld leg 253 of the protection metal part 25 may be formed by extending an outer protection segment 2523 of the side wall protection portion 252, and may be specifically located on a side edge of the bottom surface of the second body 21.

[0109] In the foregoing implementation solution, the positive terminal and the signal terminal of the first connector 10 are respectively built in concave accommodation portions formed by different openings. In a specific implementation, an opening configured to build a positive terminal and a signal terminal may be provided on the top surface of the first body of the first connector. Refer to FIG. 17. FIG. 17 is a diagram of another connector assembly according to an embodiment of this application.

[0110] A connector assembly 100a includes a first connector 10a and a second connector 20a that are mated. The first connector 10a and the second connector 20b are respectively disposed on two to-be-connected components that are used for a mating connection. In a direction shown by an arrow in FIG. 17(a), the first connector 10a may be inserted and embedded into the second connector 20a, to form the connector assembly 100a shown in FIG. 17(b). After the first connector 10a and the second connector 20a are inserted and embedded into each other, an electrical connection and a signal connection between the two to-be-connected components can be implemented.

[0111] In this implementation solution, the first connector 10a includes a first body 11a, a positive terminal 12a, a negative terminal 13a, and a signal terminal 14a. Refer to both FIG. 18 and FIG. 19. FIG. 18 is a diagram of an overall structure of the first connector shown in FIG. 17, and FIG. 19 is an exploded view of assembly of the first connector shown in FIG. 17. The first connector 10a shown in FIG. 18 is shown from a perspective of a side on which the first connector 10a and the mated second connector 20a are inserted and embedded into each other, to clearly show an arrangement relationship between a power supply terminal and a signal terminal.

[0112] As shown in FIG. 18 and FIG. 19, the positive terminal 12a is disposed at a middle position of the first body 11a, the negative terminals 13a are respectively disposed at two end portions of the first body 11a, and the signal terminals 14a are respectively disposed on a part that is of the first body 11a and that is between the positive terminal 12a and one of the two negative terminals 13a and a part that is of the first body 11a and that is between the positive terminal 12a and the other of the two negative terminals 13a.

[0113] The first body 11a includes a top surface 111a, two end walls 112a, two side walls 113a, and a bottom surface 114a (shown in FIG. 17). The two end walls 112a extend downward from two ends of the top surface 111a, the two side walls 113a are formed by extending two sides of the top surface 111a downward, and the bottom surface 114a is located at a lower position opposite to the top surface 111a.

[0114] One opening 1111a is provided on the top surface 111a of the first body 11a. The first body 11a further includes a blocking surface 115a, and the blocking surface 115 is formed by extending the opening 1111a downward, and form, through enclosure, a concave accommodation portion into which a positive terminal and a signal terminal of the mated connector may be inserted. In addition, a first groove portion 1151a and a second groove portion 1152a are provided on the first blocking surface 115a.

[0115] The positive terminal 12a includes a contact portion 121a and a fastening portion 122a that are formed through bending and extending in sequence. Refer to FIG. 20. FIG. 20 is a diagram of a structure of another

positive terminal shown in FIG. 18. The fastening portion 122a is configured to be fastened to the first body 11a. The contact portion 121a configured to be adapted to the positive terminal on the mated connector side is an elastic arm, and a contact 12111a is disposed on the contact portion 121a. Herein, a weld leg 123a of the positive terminal 12a is formed by extending the fastening portion 122a, and may be specifically located on a side edge of the bottom surface of the first body 11a.

[0116] In this implementation solution, the contact portions 121a of the four positive terminals 12a are disposed in a 180° rotational symmetry manner, that is, have contacts 12121a disposed in a rotational symmetry manner. It may be determined that positive terminal contact portions disposed in a 180° rotational symmetry manner are adaptively configured on the mated second connector 20a described in detail below. When the first connector and the second connector are assembled and embedded in a 0° direction or a 180° direction, the positive terminals between the first connector and the second connector can be effectively connected.

[0117] Certainly, in another specific implementation, two or another even quantity of positive terminals 12a may alternatively be disposed. It should be understood that it is feasible provided that the contact portions 121a of the positive terminal 12a are disposed in a 180° rotational symmetry manner.

[0118] In this implementation solution, eight signal terminals 14a are disposed, and respectively correspond to accommodation portions on two sides of the positive terminal 12a. The signal terminal 14a includes a contact portion 141a and a fastening portion 142a that are formed through bending and extending in sequence. Refer to FIG. 21. FIG. 21 is a diagram of a structure of another signal terminal shown in FIG. 18. The fastening portion 142a is configured to be fastened to the first body 11a. The contact portion 141a configured to be adapted to the signal terminal on the mated connector side is an elastic arm, and a contact 14111a is disposed on the contact portion 141a. As shown in the figure, the contact 14111a on each signal terminal 14a and a contact 14111a on another signal terminal 14a on an opposite side in a width direction form a pair of signal contacts, to form a signal pin. A weld leg 143a of the signal terminal 14a is formed by extending the fastening portion 142a, and may be specifically located on a side edge of the bottom surface of the first body 11a.

[0119] As shown in the figure, the contact portions 141a of the eight signal terminals 14a are disposed in a 180° rotational symmetry manner, that is, have the contacts 14111a disposed in a rotational symmetry manner. When the first connector and the second connector are assembled and embedded in a 0° direction or a 180° direction, the signal terminals between the first connector and the second connector can be effectively connected.

[0120] For the positive terminal 12a, a body of the contact portion 121a configured with the contact 12111a is built in the corresponding first groove portion 1151a, and the contact 12111a on the body protrudes from the blocking surface 115a through the first groove portion 1151a, to be connected to the positive terminal on the mated connector side. For the signal terminal 14a, a body of the contact portion 141a configured with the contact 14111a is built in the corresponding second groove portion 1152a, and the contact 14111a on the body protrudes from the blocking surface 115a through the second groove portion 1152a, to be connected to the signal terminal on the mated connector side. Similarly, in an insertion-removal mating process, a main insertion-removal mating surface is the blocking surface, so that pin breakage during insertion and removal can be avoided.

[0121] Specifically, the blocking surface 115a shown in the figure forms a concave accommodation portion through enclosure in a circumferential direction of the opening 1111a. In another specific implementation, a blocking surface (not shown in the figure) may alternatively be disposed only on a side on which a contact portion is located.

[0122] In a specific implementation, in a manner for assembling the positive terminal 12a and the signal terminal 14a with the first body 11a, a socket connected to the top surface may be provided on a side of the bottom surface 114a of the first body 11a. Specifically, as shown in FIG. 17, a first socket 1141a is configured for insertion of the positive terminal 12a, and a second socket 1142a is configured for insertion of the signal terminal 14a. Certainly, in another specific implementation, based on the positive terminal 12a and the signal terminal 14a, the first body 11a may alternatively be molded by using an integral injection molding process.

[0123] In this implementation solution, the two negative terminals 13a are respectively configured at two ends of the first body 11a, the mated connectors are assembled and embedded in a 0° direction or a 180° direction, and the positive and negative terminals can be connected in a mutual insertion manner. As shown in FIG. 18 and FIG. 19, the negative terminals 13a wraps two end portions of the corresponding first body 11a, and further have a function of protective metal fitting.

[0124] The negative terminal 13a includes a first body surface 131a, a second body surface 132a, and two third body surfaces 133a that are connected, and at least one of the first body surface 131a, the second body surface 132a, and the third body surface 133a may serve as a contact portion of the negative terminal, to provide and form a corresponding negative contact. The first body surface 131a wraps a top surface 111a at an end at which the first body surface 131a is located, the second body surface 132a extends downward from one end of the first body surface 131a and wraps an end wall 112a at an end at which the second body surface 132a is located, and the two third body surfaces 133a extend downward from two sides of the first body surface 131a and wrap side walls 113a at ends at which the two third body surfaces 133a are located, to prevent an assembly mating loss.

[0125] A weld leg 135a of the negative terminal 13a may be formed by extending bottom edges of the second body surface 132a and the third body surface 133a in a lateral direction. In another specific application, a manner for configuring the weld leg 135a may be determined based on an actual product design, instead of being limited to that shown in the figure.

[0126] In addition, the negative terminal 13a and the first body 11a may be integrally injection molded. The negative terminal 13a further includes an enhancement portion 134a formed by extending an inner edge of the first body surface 131a downward. After injection molding is completed, a guiding portion 134a may be built in the first body 11a, so that strength of the end portion of the connector can be further increased.

[0127] The following describes in detail a second connector 20a mated with the first connector 10a. Refer to FIG. 22 and FIG. 23. FIG. 22 is a diagram of an overall structure of the second connector shown in FIG. 17, and FIG. 23 is an exploded view of assembly of the second connector shown in FIG. 22. To clearly show a difference and a relationship between this solution and the foregoing implementation solution, compositions and structures with a same function are illustrated by using a same mark in the figures.

[0128] In this implementation solution, the second connector 20a includes a second body 21a, a positive terminal 22a, a negative terminal 23, a signal terminal 24a, and a protection metal part 25. Corresponding to the power supply terminal and the signal terminals on the first connector 10a, the positive terminal 22a of the second connector 20a is also disposed at a middle position of the second body 21a, the negative terminals 23 are disposed at two ends of the second body 21a at spacings, and the signal terminals 24a are respectively disposed on a part that is of the second body 21a and that is between the positive terminal 22a and one of the two negative terminals 23 and a part that is of the second body 21a and that is between the positive terminal 22a and the other of the two negative terminals 23.

[0129] The second body 21a includes a bottom surface 211a, two end walls 212a, and two side walls 213a. The two end walls 212a are formed by extending two ends of the bottom surface 211a upward, and the two side walls 213a are formed by extending two sides of the bottom surface 211a upward. The bottom surface 211a, the two end walls 212a, and the two side walls 213a form, through enclosure, space that can accommodate the first connector 10a.

[0130] In addition, the second body 21a further includes island portions 214a that protrude upward from the bottom surface 211a, and the island portions 214a are disposed corresponding to the concave accommodation portions on the mated connector side respectively. Both the positive terminal 22a and the signal terminal 24a are disposed on the island portion 214a.

[0131] In this implementation solution, the positive terminal 22a includes an "n"-shaped contact portion 221a and two bottom plates 222a, two oppositely disposed conductor segments of the contact portion 221a are respectively located on two sides of the island portion 214a, and the two bottom plates 222a are respectively formed by extending bottom edges of the two conductor segments. Herein, a weld leg 223a of the positive terminal 22 is formed by extending the bottom plate 222a, and may be specifically located on a side edge of the bottom surface of the second body 21a.

[0132] The signal terminal 24a includes an "n"-shaped contact portion 241a and two fastening portions 242a, two oppositely disposed conductor segments of the contact portion 241a are respectively located on two sides of the island portion 214a, and the two fastening portions 242a are respectively formed by extending bottom edges of the two conductor segments. A weld leg 243a of the signal terminal 24a is formed by extending the fastening portion 242a, and may be specifically located on a side edge of the bottom surface of the second body 21a.

[0133] In this implementation solution, specific structures of the two negative terminals 23 and the two protection metal parts 25 are specifically the same as those in the foregoing embodiment, and corresponding adaptation principles are the same. Therefore, details are not described herein again. It should be understood that, in this implementation solution, a specific structure in which each of the positive terminal 22a, the negative terminal 23, the signal terminal 24a, and the protection metal part 25 of the second connector 20a is adapted to the mated connector side is disposed in a 180° rotational symmetry manner, and when the first connector and the second connector are assembled and embedded in a 0° direction or a 180° direction, the first connector and the second connector can also be effectively connected.

[0134] In the embodiment described in FIG. 17, an opening is opened in a length direction, and a concave accommodation portion formed based on the opening is overall connected. Therefore, there is a possibility that a long metal part and a terminal are short-circuited. In another specific implementation, a plurality of openings may be provided on the top surface of the first body of the first connector, to respectively form concave accommodation portions used to build a positive terminal and a signal terminal, and form a reliable physical barrier. Refer to FIG. 24. FIG. 24 is a diagram of still another connector assembly according to an embodiment of this application. To clearly show a difference and a relationship between this solution and the foregoing implementation solution, compositions and structures with a same function are illustrated by using a same mark in the figures.

[0135] A connector assembly 100b includes a first connector 10b and a second connector 20b that are mated. In a direction shown by an arrow in FIG. 24(a), the first connector 10b may be inserted and embedded into the second connector 20b, to form the connector assembly 100b shown in FIG. 24(b).

[0136] In this implementation solution, the first connector 10b includes a first body 11b, a positive terminal

12b, a negative terminal 13a, and a signal terminal 14a. Refer to both FIG. 25 and FIG. 26. FIG. 25 is a diagram of an overall structure of the first connector shown in FIG. 24, and FIG. 26 is an exploded view of assembly of the first connector shown in FIG. 25. The first connector 10b shown in FIG. 26 is shown from a perspective of a side on which the first connector 10b and the mated second connector 20b are inserted and embedded into each other.

[0137] As shown in FIG. 25 and FIG. 26, the positive terminal 12b is disposed at a middle position of the first body 11b, the negative terminals 13a are respectively disposed at two end portions of the first body 11b, and the signal terminals 14a are respectively disposed on a part that is of the first body 11b and that is between the positive terminal 12b and one of the two negative terminals 13a and a part that is of the first body 11b and that is between the positive terminal 12b and the other of the two negative terminals 13a.

[0138] The first body 11b includes a top surface 111b, two end walls 112b, two side walls 113b, and a bottom surface 114b (shown in FIG. 24). The two end walls 112b extend downward from two ends of the top surface 111b, the two side walls 113b are formed by extending two sides of the top surface 111b downward, and the bottom surface 114b is located at a lower position opposite to the top surface 111b.

[0139] One first opening 1111b and two second openings 1112b are provided on the top surface 111b of the first body 11b. As shown in FIG. 25 and FIG. 26, the first body 11b further includes a first blocking surface 115b and a second blocking surface 116b.

[0140] In this implementation solution, the first blocking surface 115b extends downward from the first opening 1111b, and forms, through enclosure, a first concave accommodation portion into which a positive terminal of a mated connector may be inserted, and a groove portion 1151b is provided on the first blocking surface 115b. The positive terminal 12b has a positive contact portion 121b, and a contact 12111b is configured on the positive contact portion 121b. A body of the positive contact portion 121b is built in the corresponding groove portion 1151b, and the positive contact 12111b protrudes from the first blocking surface 115b through the groove portion 1151b, to be connected to the positive terminal on a mated connector side.

[0141] The second blocking surface 116b extends downward from the second opening 1112b, and forms, through enclosure, a second concave accommodation portion into which a signal terminal of the mated connector may be inserted, and a groove portion 1161b is provided on the second blocking surface 116b. The signal terminal 14a has a signal terminal contact portion 141a, and a contact 14111a is configured on the signal terminal contact portion 141a. A body of the signal terminal contact portion 141a is built in the corresponding groove portion 1161b, and the signal contact 14111a protrudes from the second blocking surface 116b through the groove portion 1161, to be connected to the signal terminal on the mated connector side. Based on proper separation between terminals, short-circuiting is effectively avoided.

[0142] In this implementation solution, a basic form of the positive terminal is similar to that in the implementation solution described in FIG. 17. To be specific, the positive terminal 12b includes a fastening portion 122a and a contact portion 121b that are formed through bending in sequence, the contact portion 121b is an elastic arm having one positive contact 12111b, the positive contact 12111b forms a pair of positive contacts with a positive contact 12111b on the other positive terminal 12b on an opposite side in a width direction, and the positive terminal 12b is adaptively connected to the positive terminal of the mated connector. Similarly, a weld leg 123b of the positive terminal 12b is formed by extending the fastening portion 122b.

[0143] Refer to FIG. 27. FIG. 27 is a diagram of a structure of a positive terminal in this solution. As shown in the figure, a difference lies in the following: The fastening portion 122a of the positive terminal 12b extends to form two contact portions 121b, and the two contact portions 121b are disposed at a spacing. In this implementation solution, the contact portions 121b of the four positive terminals 12b are disposed in a 180° rotational symmetry manner, that is, have contacts 12121b disposed in a rotational symmetry manner. Positive terminal contact portions disposed in a 180° rotational symmetry manner are adaptively configured on the mated second connector 20b described in detail below. When the first connector and the second connector are assembled and embedded in a 0° direction or a 180° direction, the positive terminals between the first connector and the second connector can be effectively connected.

[0144] In this implementation solution, eight signal terminals 14a are disposed. As shown in the figure, the contact portions 141b of the eight signal terminals 14a are disposed in a 180° rotational symmetry manner, that is, have the contacts 14111b disposed in a rotational symmetry manner. When the first connector and the second connector are assembled and embedded in a 0° direction or a 180° direction, the signal terminals between the first connector and the second connector can be effectively connected.

[0145] It should be noted that a structure form of a body of the signal terminal 14a in this solution is the same as that in the implementation solution described in FIG. 17. Details are not described herein again. In a specific implementation, in a manner for assembling the positive terminal 12b and the signal terminal 14a with the first body 11b, a socket connected to the top surface may be provided on a side of the bottom surface 114b of the first body 11b. Specifically, as shown in FIG. 24, a first socket 1141b is configured for insertion of the positive terminal 12b, and a second socket 1142b is configured for insertion of the signal terminal 14a. Certainly, in another specific implementation, based on the positive terminal

12b and the signal terminal 14a, the first body 11b may alternatively be molded by using an integral injection molding process.

[0146] In this implementation solution, the two negative terminals 13a are respectively configured at two ends of the first body 11b, the mated connectors are assembled and embedded in a 0° direction or a 180° direction, and the positive and negative terminals can be connected in a mutual insertion manner. As shown in FIG. 25 and FIG. 26, the negative terminals 13a wraps two end portions of the corresponding first body 11b, and further have a function of protective metal fitting.

[0147] Similarly, the negative terminal 13a and the first body 11a may be integrally injection molded, and a structure form of a body of the negative terminal 13a is the same as that in the implementation solution described in FIG. 17. Details are not described herein again.

[0148] The following describes in detail a second connector 20b mated with the first connector 10b. Refer to both FIG. 28 and FIG. 29. FIG. 28 is a diagram of an overall structure of the second connector shown in FIG. 24, and FIG. 29 is an exploded view of assembly of the second connector shown in FIG. 28. To clearly show a difference and a relationship between this solution and the foregoing implementation solution, compositions and structures with a same function are illustrated by using a same mark in the figures.

[0149] In this implementation solution, the second connector 20b includes a second body 21b, a positive terminal 22b, a negative terminal 23, signal terminals (24a and 24b), and a protection metal part 25. Corresponding to the power supply terminal and the signal terminals on the first connector 10b, the positive terminal 22b of the second connector 20b is also disposed at a middle position of the second body 21b, the negative terminals 23 are disposed at two ends of the second body 21b at spacings, and the signal terminals (24a and 24b) are respectively disposed on a part that is of the second body 21b and that is between the positive terminal 22b and one of the two negative terminals 23 and a part that is of the second body 21b and that is between the positive terminal 22b and the other of the two negative terminals 23.

[0150] The second body 21b includes a bottom surface 211b, two end walls 212b, and two side walls 213b. The two end walls 212b are formed by extending two ends of the bottom surface 211b upward, and the two side walls 213b are formed by extending two sides of the bottom surface 211b upward.

[0151] In addition, the second body 21b further includes one first island portion 214b and two second island portions 215b that protrude upward from the bottom surface 211b, and the first island portion 214b and the two second island portions 215b are disposed corresponding to the concave accommodation portions on the mated connector side respectively. The positive terminal 22b is configured on the first island portion 214b located in the middle, and the signal terminals (24a and 24b) are respectively configured on the two second island portions 215b.

[0152] In this implementation solution, the positive terminal 22b includes a bottom plate 222b and a contact portion 221b. The contact portion 221 protrudes upward from the bottom plate 222b, and specifically, the contact portion 221 is a protruding housing structure that may be inserted and adapted to the first concave receptacle on the mated connector side. The positive terminal 22b may be integrally molded with the second body 21b by using an injection molding process, the bottom plate 222b of the positive terminal 22b may be built in the bottom surface 211b, and a weld leg 224b of the positive terminal 22b may be formed by extending the bottom plate 222b.

[0153] Still as shown in FIG. 28 and FIG. 29, basic forms of the signal terminals (24a and 24b) are the same as those in the implementation solution described in FIG. 17. In addition, the signal terminals (24a and 24b) may be integrally molded with the second body 21b by using an injection molding process. A difference lies in the following: In this solution, the basic form of the signal terminal 24a that is adjacent to the negative terminal 23 and that is of the two signal terminals located on each side is totally the same as that in the foregoing implementation, a body structure of the signal terminal 24b that is adjacent to the positive terminal 22b and that is of the two signal terminals located on each side is the same as that in the foregoing implementation, and an enhanced protection structure is added.

[0154] Refer to FIG. 30. FIG. 30 is a diagram of a structure of the signal terminal 24b in this solution. The signal terminal 24b includes a fastening portion 243b and a contact portion 242b that are formed through extending in sequence, and further includes a protection portion 243b that is formed by extending an edge of the contact portion 241b of the signal terminal 24b downward. In addition, end portion regions of a top surface, an end surface, and two side surfaces of a corresponding end of the second island portion 215b are wrapped, to improve strength of the end portion regions, and enhance reliability of fastening between injection molding parts.

[0155] In a specific implementation, specific structures of the two negative terminals 23 and the two protection metal parts 25 in this solution are specifically the same as those in the foregoing embodiment, and corresponding adaptation principles are the same. Therefore, details are not described herein again. It should be understood that, in this implementation solution, a specific structure in which each of the positive terminal 22b, the negative terminal 23, the signal terminals (24a and 24b), and the protection metal part 25 of the second connector 20b is adapted to the mated connector side is disposed in a 180° rotational symmetry manner.

[0156] It may be understood that, based on common sense in this field, a plurality of positive terminals and a plurality of negative terminals are connected in series, and corresponding signal terminals in a plurality of signal terminals are connected in series, so that when the first connector and the second connector are assembled and

embedded in a 0° direction or a 180° direction, positive terminals, negative terminals, and signal terminals on a plug connecting part and a socket connecting part that are mated can be connected in a mating manner correspondingly.

[0157] Based on the solutions described in the foregoing embodiments, a blocking portion is used to form a concave accommodation portion that is adapted to a corresponding terminal, to form a reliable physical barrier, and achieve a technical concept of anti-short-circuiting performance. In another specific implementation, this technical concept may be further applied to a solution in which a signal terminal is configured at a middle position and positive and negative terminals are respectively configured on two ends, so that good anti-short-circuiting performance can also be obtained. Refer to FIG. 31. FIG. 31 is a diagram of another connector assembly according to an embodiment of this application.

[0158] A connector assembly 100c includes a first connector 10c and a second connector 20c that are mated. In a direction shown by an arrow in FIG. 31(a), the first connector 10c may be inserted and embedded into the second connector 20c, to form the connector assembly 100c shown in FIG. 31(b).

[0159] In this implementation solution, the first connector 10c includes a first body 11c, a positive terminal 12c, a negative terminal 13c, and a signal terminal 14c. Refer to both FIG. 32 and FIG. 33. FIG. 32 is a diagram of an overall structure of the first connector shown in FIG. 31, and FIG. 33 is an exploded view of assembly of the first connector shown in FIG. 31.

[0160] As shown in FIG. 32 and FIG. 33, the signal terminal 14c is disposed at a middle position of the first body 11c, and the positive terminal 12c and the negative terminal 13c are separately located on the first body 11c on two sides of the signal terminal 14c.

[0161] The first body 11c includes a top surface 111c, two end walls 112c, and two side walls 113c. The two end walls 112c are formed by extending two ends of the top surface 111c downward, and the two side walls 113c are formed by extending two sides of the top surface 111c downward.

[0162] One first opening 1111c, one second opening 1112c, and one third opening 1113c are provided on the top surface 111c of the first body 11c. As shown in FIG. 32 and FIG. 33, the first body 11c further includes a first blocking surface 115c, a second blocking surface 116c, and a third blocking surface 117c.

[0163] In this implementation solution, the first blocking surface 115c extends downward from the first opening 1111c, and forms, through enclosure, a first concave accommodation portion into which a positive terminal of a mated connector may be inserted, and a groove portion 1151c is provided on the first blocking surface 115c. The positive terminal 12c has a positive contact portion 121c, and a contact 12111c is configured on the positive contact portion 121c. A body of the positive contact portion 121c is built in the corresponding groove portion 1151c, and the positive contact 12111c protrudes from the first blocking surface 115c through the groove portion 1151c, to be connected to the positive terminal on a mated connector side.

[0164] The second blocking surface 116c extends downward from the second opening 1112c, and forms, through enclosure, a second concave accommodation portion into which a signal terminal of the mated connector may be inserted, and a groove portion 1161c is provided on the second blocking surface 116c. The signal terminal 14c has a signal terminal contact portion 141c, and a contact 14111c is configured on the signal terminal contact portion 141c. A body of the signal terminal contact portion 141c is built in the corresponding groove portion 1161c, and the signal contact 14111c protrudes from the second blocking surface 116c through the groove portion 1161c, to be connected to the signal terminal on the mated connector side.

[0165] The third blocking surface 117c extends downward from the first opening 1131c, and forms, through enclosure, a first concave accommodation portion into which a negative terminal of the mated connector may be inserted, and a groove portion 1171c is provided on the third blocking surface 117c. The negative terminal 13c has a positive contact portion 131c, and a contact 13111c is configured on the negative terminal 13c. A body of the positive contact portion 131c is built in the corresponding groove portion 1171c, and the negative contact 13111c protrudes from the third blocking surface 117c through the groove portion 1171c, to be connected to the negative terminal on the mated connector side.

[0166] Based on proper separation between terminals, short-circuiting is effectively avoided. In another specific implementation, a plurality of first openings 1111c, second openings 1112c, and third openings 1113c may alternatively be provided based on a product design requirement.

[0167] In this implementation solution, a basic form of the signal terminal 14c is the same as that of the signal terminal 14a described in FIG. 19 and FIG. 26, and both a basic form of the positive terminal 12c and a basic form of the negative terminal 13c are the same as that of the positive terminal 12b described in FIG. 26. Details are not described herein again.

[0168] In a specific implementation, the positive terminal 12c, the negative terminal 13c, and the signal terminal 14c may be assembled with the first body 11c in an insertion manner. Certainly, in another specific implementation, based on the positive terminal 12c, the negative terminal 13c, and the signal terminal 14c, the first body 11c may alternatively be molded by using an integral injection molding process.

[0169] In addition, protection metal parts 15c are respectively disposed at two ends of the first body 11c. As shown in the figure, the protection metal part 15c at one end is located on an outer end side of the positive terminal 12c, and the protection metal part 15c at the other end is located on an outer end side of the negative terminal 13c.

In a specific implementation, the protection metal part 15c may further have a through-current capability, that is, the protection metal part 15c adjacent to the positive terminal 12c further has a function of the positive terminal, and the protective metal part 15c adjacent to the negative terminal 13c further has a function of the negative terminal.

[0170] The following describes in detail a second connector 20c mated with the first connector 10c. Refer to FIG. 34 and FIG. 35. FIG. 34 is a diagram of an overall structure of the second connector shown in FIG. 31, and FIG. 35 is an exploded view of assembly of the second connector shown in FIG. 31.

[0171] In this implementation solution, the second connector 20c includes a second body 21c, a positive terminal 22c, a negative terminal 2c, a signal terminal 24c, and a protection metal part 25c. Corresponding to the power supply terminal and the signal terminal on the first connector 10c, the signal terminal 24c of the second connector 20c is also disposed at a middle position of the second body 21c, and the positive terminal 22c and the negative terminal 23c are disposed on two sides of the signal terminal 24c at spacings.

[0172] The second body 21c includes a bottom surface 211c, two end walls 212c, and two side walls 213c. The two end walls 212c are formed by extending two ends of the bottom surface 211c upward, and the two side walls 213c are formed by extending two sides of the bottom surface 211c upward.

[0173] In addition, the second body 21c further includes one first island portion 214c, one second island portion 215c, and one third island portion 216c that protrude upward from the bottom surface 211c, and the first island portion 214c, the second island portion 215c, and the third island portion 216c are disposed corresponding to the concave accommodation portions on the mated connector side respectively. The positive terminal 22c is configured on the first island portion 214c located on one side, the signal terminal 24c is configured on the second island portion 215c located at the middle position, and the negative terminal 23c is configured on the third island portion 216c located on the other side.

[0174] In this implementation solution, basic forms (two forms) of the signal terminal 24c are the same as those of the signal terminal described in FIG. 29, both a basic form of the positive terminal 22c and a basic form of the negative terminal 23c are the same as that of the positive terminal 22b described in FIG. 29, and a basic form of the protection metal part 25c is the same as that of the protection metal part 25 described in FIG. 10, FIG. 19, and FIG. 26. Details are not described herein again.

[0175] Similarly, in a specific implementation, the protection metal part 25c may further have a through-current capability, that is, the protection metal part 25c adjacent to the positive terminal 22c further has a function of the positive terminal, and the protective metal part 25c adjacent to the negative terminal 23c further has a function of the negative terminal.

[0176] An embodiment of this application further provides a component module. The component module includes a component and a connector. The connector may be the first connector (10, 10a, 10b, or 10c) described above, or may be the second connector (20, 20a, 20b, or 20c) described above. When the connectors are assembled and embedded, a security risk of short-circuiting may be avoided.

[0177] The component module may be applied to an application scenario of an electronic device like a mobile phone, a tablet computer, or a notebook computer. For example, but not limited to, the component module may be a battery module. It should be understood that another functional composition of the corresponding component module is not a core invention opinion of this application. Therefore, details are not described in this specification again.

[0178] In addition to the foregoing connector assembly, an embodiment of this application further provides an electronic device. The electronic device includes the foregoing connector assembly, to avoid short-circuiting during component interface assembly. For example, but not limited to, the electronic device is an electronic device like a mobile phone, a tablet computer, or a notebook computer. It should be understood that another functional composition of the electronic device is not a core invention opinion of this application. Therefore, details are not described in this specification again.

[0179] The foregoing descriptions are merely example implementations of the present invention. It should be noted that a person of ordinary skill in the art may make several improvements and refinements without departing from the principle of the present invention, and these improvements and refinements shall fall within the protection scope of the present invention.

Claims

1. A first connector, comprising a first body, and a power supply terminal and a signal terminal that are disposed on the first body, wherein the power supply terminal comprises one group of first electrode terminals and two groups of second electrode terminals, and the signal terminal comprises a first group of signal terminals and a second group of signal terminals;

   the one group of first electrode terminals is disposed at a middle position of the first body, and is located between the two groups of second electrode terminals, and the first electrode terminals comprise contact portions disposed in a rotational symmetry manner;

   the two groups of second electrode terminals are respectively disposed at two ends of the first body, and a contact portion of the second electrode terminal located at one end is disposed in a

rotational symmetry manner relative to a contact portion of the second electrode terminal located at the other end;

the first group of signal terminals is disposed between the first electrode terminals and one group of second electrode terminals, the second group of signal terminals is disposed between the first electrode terminals and the other group of second electrode terminals, and a contact portion of the first group of signal terminals is disposed in a rotational symmetry manner relative to a contact portion of the second group of signal terminals; and

a rotational symmetry axis of the contact portions of the first electrode terminals, a rotational symmetry axis of the contact portions of the second electrode terminals, and a rotational symmetry axis of the contact portions of the signal terminals overlap.

2. The first connector according to claim 1, wherein the first body comprises a top surface and a blocking surface, an opening is provided on the top surface, and the blocking surface extends downward from the opening on the top surface, to form a concave accommodation portion capable of accommodating an adaptation terminal on a mated connector side; and the blocking surface comprises groove portions provided corresponding to the contact portion of the first electrode terminal and the contact portion of the signal terminal respectively, the contact portion of the first electrode terminal and the contact portion of the signal terminal are respectively built in the corresponding groove portions, and a contact of the contact portion of the first electrode terminal and a contact of the contact portion of the signal terminal protrude from the blocking surface through the corresponding groove portions respectively.

3. The first connector according to claim 2, wherein the second electrode terminal comprises a first body surface, and further comprises a second body surface or two third body surfaces connected to the first body surface; and the first body surface wraps the top surface that is of the first body and that is at an end at which the first body surface is located, the second body surface extends downward from the first body surface to wrap an end wall that is of the first body and that is at an end at which the second body surface is located, and the two third body surfaces respectively extend downward from two sides of the first body surface to wrap side walls of the first body at ends at which the two third body surfaces are located.

4. The first connector according to claim 3, wherein the second electrode terminal further comprises a guiding portion, and the guiding portion extends downward from an inner edge of the first body surface to the concave accommodation portion, and is adaptively attached to a blocking surface on a corresponding side.

5. The first connector according to claim 4, wherein three guiding portions are disposed, and are respectively adaptively attached to an end surface and two side surfaces of the blocking surface on the corresponding side.

6. The first connector according to any one of claims 2 to 5, wherein the opening comprises at least one first opening and at least two second openings that are disposed at spacings, and the blocking surface comprises a first blocking surface that extends downward from the first opening, to form a first concave accommodation portion capable of accommodating a first electrode terminal on the mated connector side, wherein a contact of the first electrode terminal protrudes from the first blocking surface through the groove portion on the first blocking surface; and the blocking surface further comprises a second blocking surface that extends downward from the second opening, to form a second concave accommodation portion capable of accommodating a signal terminal on the mated connector side, wherein a contact of the signal terminal protrudes from the second blocking surface through the groove portion on the second blocking surface.

7. The first connector according to any one of claims 2 to 5, wherein there is one opening, the groove portions provided on the blocking surface comprise a first groove portion and a second groove portion, the first groove portion is disposed corresponding to the contact portion of the first electrode terminal, and the second groove portion is disposed corresponding to the contact portion of the signal terminal.

8. The first connector according to any one of claims 1 to 7, wherein dents or clamping convex portions are disposed on at least one of the second body surface that is of the second electrode terminal and that wraps the end wall of the first body, and the two third body surfaces that are of the second electrode terminal and that wrap the side walls of the first body, and the dents or the clamping convex portions are configured to be clamped with and adapted to a mated connector, and are disposed in a rotational symmetry manner.

9. The first connector according to any one of claims 1 to 8, wherein the first electrode terminal comprises a fastening portion and a contact portion that are formed through bending and extending in sequence, the contact portion comprises a first body segment and a second body segment that are spaced apart

and disposed opposite to each other, the first body segment is connected to the fastening portion of the first electrode terminal, a first contact is disposed on the first body segment, and a second contact is disposed on the second body segment; and a width of the second body segment is less than a width of the first body segment.

10. The first connector according to any one of claims 1 to 8, wherein the signal terminal comprises a fastening portion and a contact portion that are formed through bending and extending in sequence, the contact portion comprises a first body segment and a second body segment that are spaced apart and disposed opposite to each other, the first body segment is connected to the fastening portion of the signal terminal, a first contact is disposed on the first body segment, and a second contact is disposed on the second body segment; and at least two signal terminals are disposed on a same end side of the first electrode terminal, and the at least two signal terminals are configured as follows: a first contact and a second contact of a part of the signal terminals and a first contact and a second contact of the other part of the signal terminals are reversely configured in a width direction.

11. The first connector according to any one of claims 1 to 10, wherein the first electrode terminal is a positive terminal, and the second electrode terminal is a negative terminal.

12. A second connector, comprising a second body, and a power supply terminal and a signal terminal that are disposed on the second body, wherein the power supply terminal comprises one group of first electrode terminals and two groups of second electrode terminals, and the signal terminal comprises a first group of signal terminals and a second group of signal terminals;

the one group of first electrode terminals is disposed at a middle position of the second body, and is located between the two groups of second electrode terminals, and the first electrode terminals comprise contact portions disposed in a rotational symmetry manner;
the second body comprises concave space capable of accommodating at least a part of a mated connector, the two groups of second electrode terminals are respectively disposed at two ends of the second body, and a contact portion of the second electrode terminal located at one end is disposed in a rotational symmetry manner relative to a contact portion of the second electrode terminal located at the other end;
the first group of signal terminals is disposed between the first electrode terminals and one group of second electrode terminals, the second group of signal terminals is disposed between the first electrode terminals and the other group of second electrode terminals, and a contact portion of the first group of signal terminals is disposed in a rotational symmetry manner relative to a contact portion of the second group of signal terminals; and
a rotational symmetry axis of the contact portions of the first electrode terminals, a rotational symmetry axis of the contact portions of the second electrode terminals, and a rotational symmetry axis of the contact portions of the signal terminals overlap.

13. The second connector according to claim 12, wherein an island portion is disposed in concave space of the second body, the island portion extends upward from the second body, and the contact portion of the first electrode terminal and the contact portion of the signal terminal form the island portion or are configured on the island portion.

14. The second connector according to claim 13, wherein the island portion comprises at least two second island portions and at least one first island portion that are disposed at spacings, the first island portion comprises the contact portion of the first electrode terminal, and the contact portion of the signal terminal is configured on the second island portion.

15. The second connector according to claim 13, wherein one island portion is disposed, and the contact portion of the first electrode terminal and the contact portion of the signal terminal are disposed on the island portion at a spacing.

16. The second connector according to any one of claims 13 to 15, wherein the second electrode terminal comprises two contact portions and a fastening portion, the two contact portions are symmetrically disposed on two sides of the fastening portion, the contact portions are formed by extending side edges of the fastening portion upward, and the contact portions have inwardly convex contacts.

17. The second connector according to any one of claims 13 to 16, wherein the second electrode terminal further comprises a protection portion, and the protection portion is formed by bending and extending an edge of the fastening portion of the second electrode terminal upward, and wraps end regions on a top surface, an end surface, and two side surfaces of an adjacent island portion.

18. The second connector according to any one of claims 12 to 17, further comprising two protection metal parts that are respectively configured at two

ends of the second body, wherein the protection metal part comprises an end wall protection portion and two side wall protection portions, the end wall protection portion wraps an end wall of the second body, and the two side wall protection portions respectively wrap side walls on two sides of the second body.

19. The second connector according to claim 18, wherein the protection metal part further comprises a contact, and the contact is capable of being in contact with and electrically connected to a second electrode terminal on a mated connector side.

20. The second connector according to claim 18 or 19, wherein clamping convex portions or dents are disposed on at least one of an inner side protection segment of the end wall protection portion of the protection metal part and inner side protection segments of the two side wall protection portions of the protection metal part, and the clamping convex portions or the dents are configured to be clamped with and adapted to the mated connector, and are disposed in a rotational symmetry manner.

21. The second connector according to any one of claims 18 to 20, wherein a groove portion is provided on the inner side protection segment of the side wall protection portion of the protection metal part, the groove portion is disposed corresponding to the contact portion of the second electrode terminal, and a contact on the contact portion of the second electrode terminal is capable of protruding from the inner side protection segment through the groove portion.

22. The second connector according to any one of claims 18 to 21, wherein the second electrode terminal and the protection metal part that are located on a same end side are of an integrated structure.

23. The second connector according to any one of claims 12 to 22, wherein the first electrode terminal is a positive terminal, and the second electrode terminal is a negative terminal.

24. A connector assembly, comprising a first connector and a second connector that are embedded and adapted, wherein the first connector is the first connector according to any one of claims 1 to 11, and the second connector is the second connector according to any one of claims 12 to 23.

25. A first connector, comprising a first body, and a power supply terminal and a signal terminal that are disposed on the first body, wherein the power supply terminal comprises a first electrode terminal and a second electrode terminal; the first body comprises a top surface and a blocking surface, an opening is configured on the top surface, and the blocking surface extends downward from the opening on the top surface, to form a concave accommodation portion capable of accommodating an adaptation terminal on a mated connector side; and the blocking surface comprises groove portions provided corresponding to a contact portion of the first electrode terminal and a contact portion of the signal terminal respectively, the contact portion of the first electrode terminal and the contact portion of the signal terminal are respectively built in the corresponding groove portions, and a contact of the contact portion of the first electrode terminal and a contact of the contact portion of the signal terminal protrude from the blocking surface through the corresponding groove portions respectively.

26. The first connector according to claim 25, wherein the signal terminal is disposed at a middle position of the first body, and the first electrode terminal and the second electrode terminal are respectively located on two sides of the signal terminal.

27. The first connector according to claim 25 or 26, wherein the opening comprises a first opening, a second opening, and a third opening that are provided at spacings, and the blocking surface comprises a first blocking surface that extends downward from the first opening, to form a first concave accommodation portion capable of accommodating a first electrode terminal on the mated connector side, wherein a contact of the first electrode terminal protrudes from the first blocking surface through the groove portion on the first blocking surface; the blocking surface further comprises a second blocking surface that extends downward from the second opening, to form a second concave accommodation portion capable of accommodating a signal terminal on the mated connector side, wherein a contact of the signal terminal protrudes from the second blocking surface through the groove portion on the second blocking surface; and the blocking surface further comprises a third blocking surface that extends downward from the third opening, to form a third concave accommodation portion capable of accommodating a second electrode terminal on the mated connector side, wherein a contact of the second electrode terminal protrudes from the third blocking surface through the groove portion on the third blocking surface.

28. A second connector, comprising a second body, and a power supply terminal and a signal terminal that are disposed on the second body, wherein the power supply terminal comprises a first electrode terminal and a second electrode terminal; and an island portion is disposed in concave space of the second

body, the island portion extends upward from the second body, and a contact portion of the first electrode terminal and a contact portion of the signal terminal form the island portion or are configured on the island portion.

29. The second connector according to claim 28, wherein the signal terminal is disposed at a middle position of the second body, and the first electrode terminal and the second electrode terminal are respectively located on two sides of the signal terminal.

30. The second connector according to claim 29, wherein the island portion comprises a first island portion, a second island portion, and a third island portion that are disposed at spacings, the first island portion comprises the contact portion of the first electrode terminal, the contact portion of the signal terminal is configured on the second island portion, and the third island portion comprises a contact portion of the second electrode terminal.

31. A connector assembly, comprising a first connector and a second connector that are embedded and adapted, wherein the first connector is the first connector according to any one of claims 25 to 27, and the second connector is the second connector according to any one of claims 28 to 30.

32. A component module, comprising a component and a connector that are connected, wherein the connector is the first connector according to any one of claims 1 to 11 and claims 25 to 27, or the connector is the second connector according to any one of claims 12 to 22 and claims 28 to 30.

33. The component module according to claim 32, wherein the component is a battery, and the connector is the first connector according to any one of claims 1 to 11 and claims 25 to 27.

34. An electronic device, comprising a connector assembly, wherein the connector assembly is the connector assembly according to claim 31.

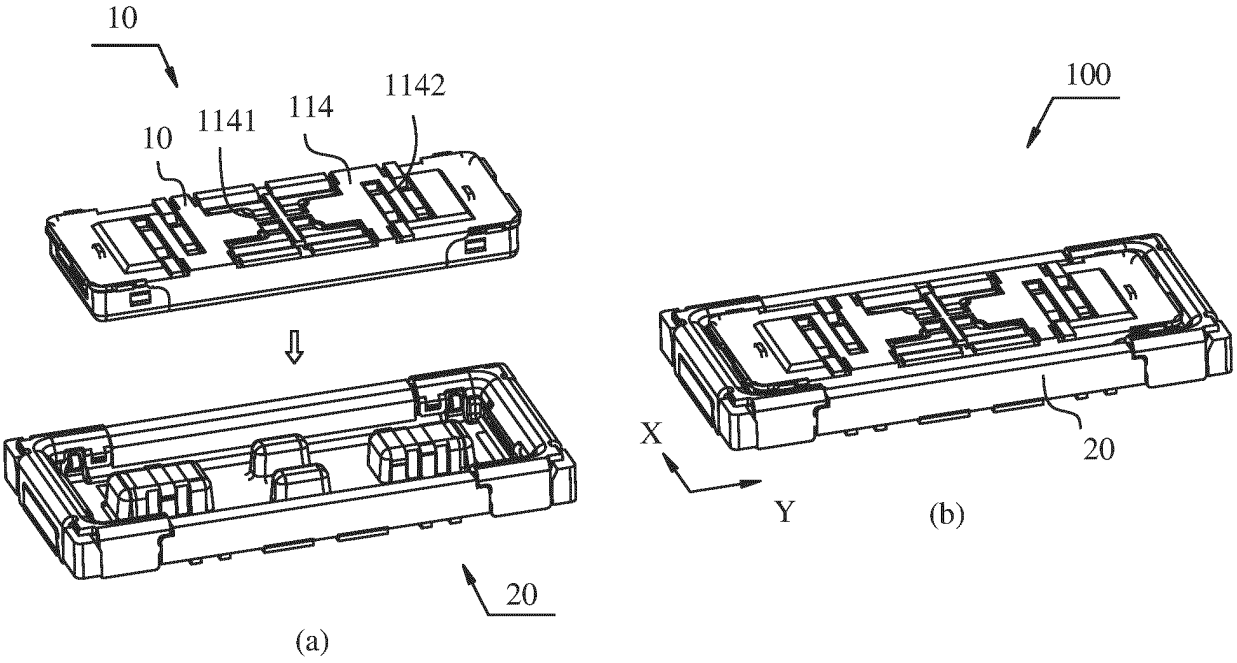
10
10
1141
114
1142
20
(a)
100
X
Y
20
(b)

FIG. 1

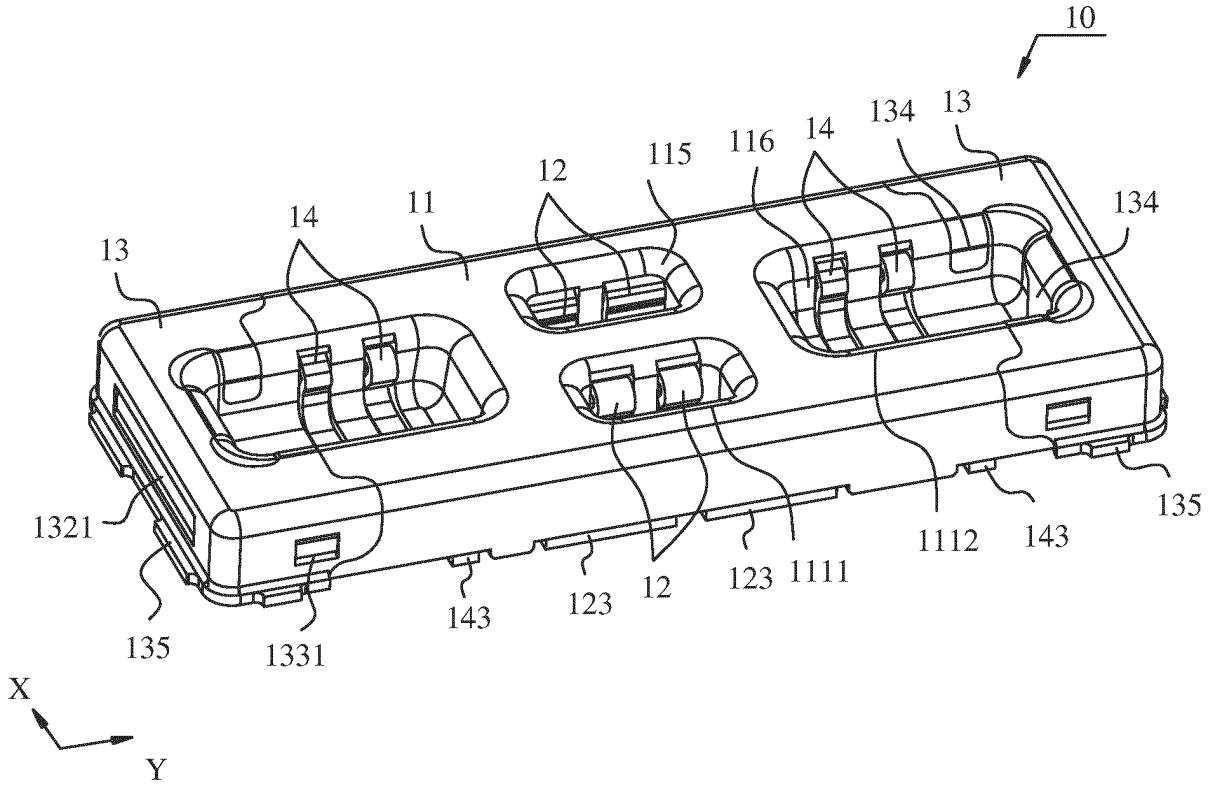
10
13
14
11
12
115
116
14
134
13
134
1321
135
1331
143
123
12
123
1111
1112
143
135
X
Y

FIG. 2

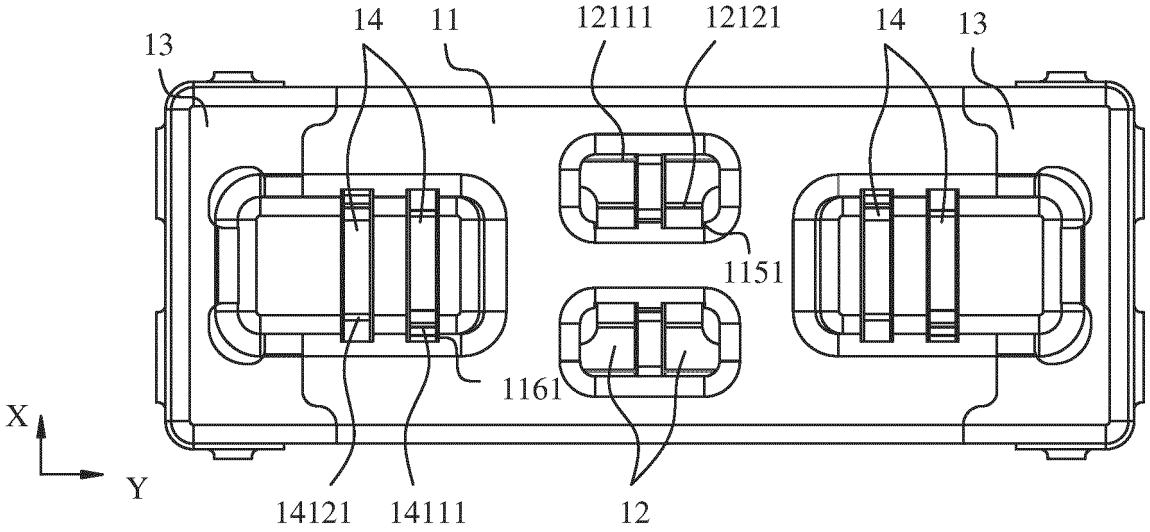
13
14
11
12111
12121
14
13
1151
1161
X
Y
14121
14111
12

FIG. 3

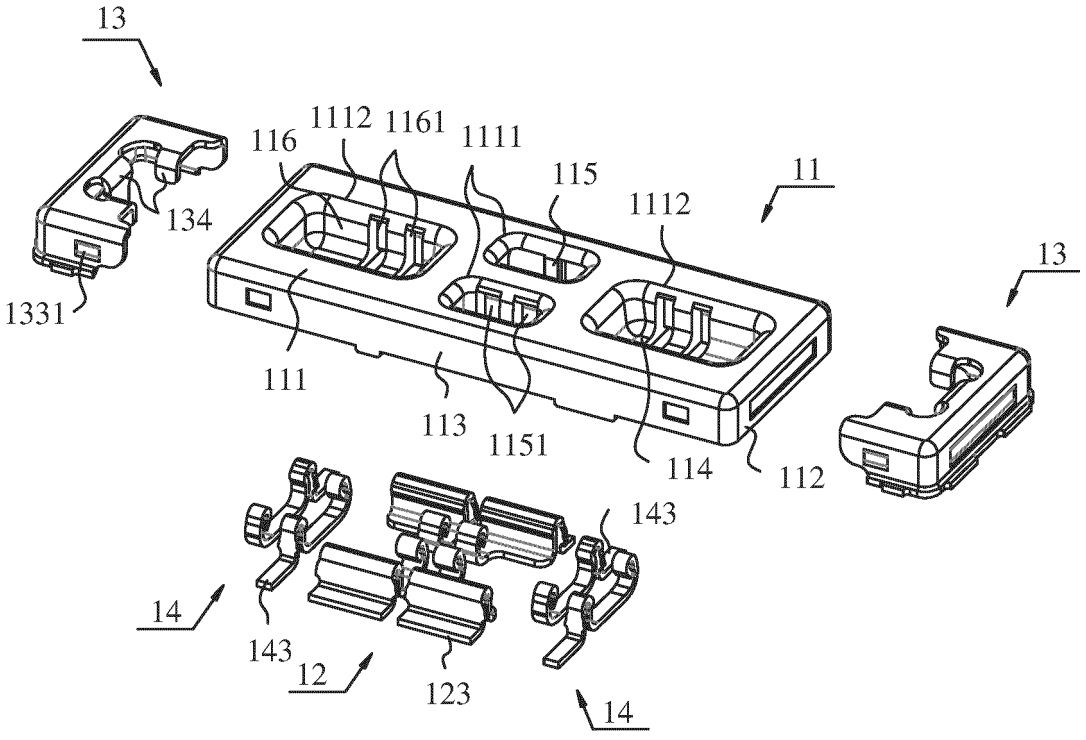
13
116
1112
1161
1111
115
11
1112
134
13
1331
111
113
1151
114
112
143
14
143
12
123
14

FIG. 4

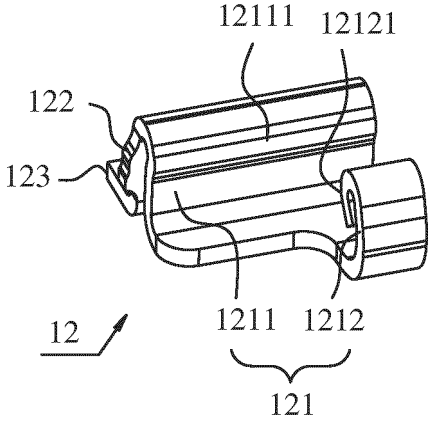
12111
12121
122
123
12
1211
1212
121

FIG. 5

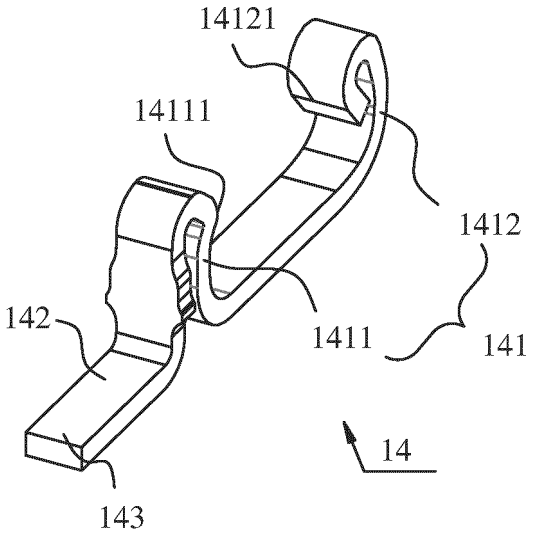
14121
14111
1412
142
1411
141
14
143

FIG. 6

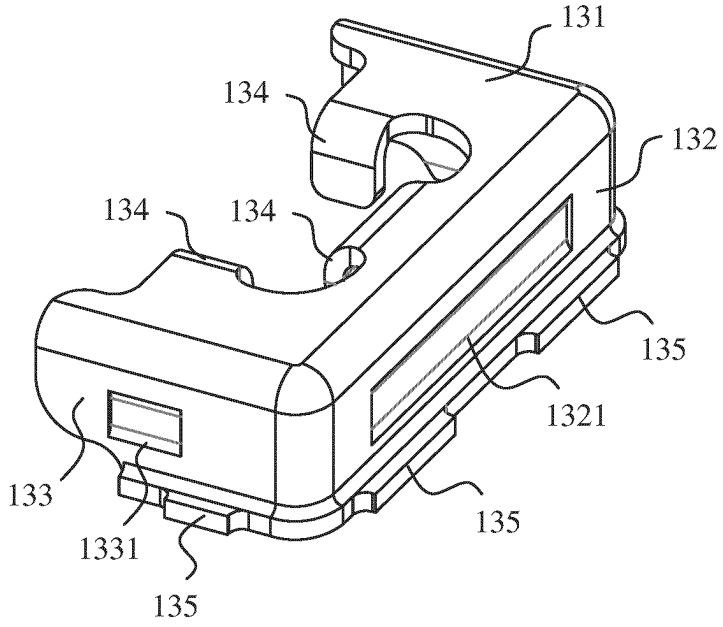
131
134
132
134
134
135
1321
133
135
1331
135

FIG. 7

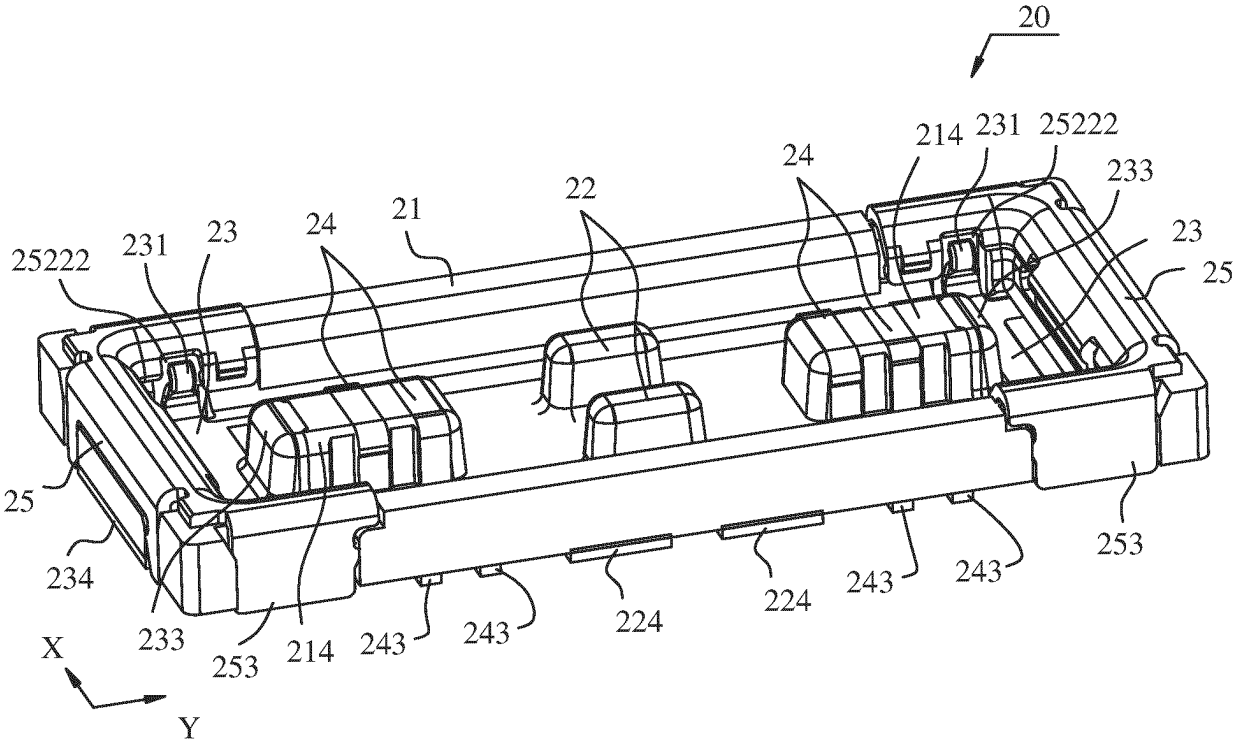
20
214
231
25222
24
233
22
21
24
23
25222
231
23
25
25
234
233
253
214
243
243
224
224
243
243
253
X
Y

FIG. 8

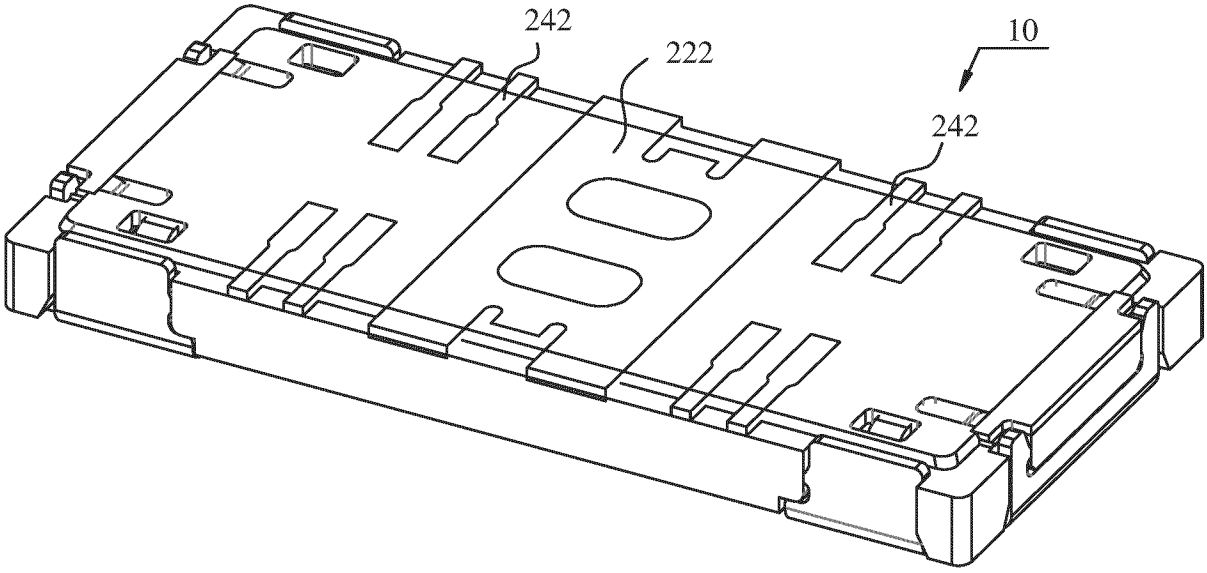

FIG. 9

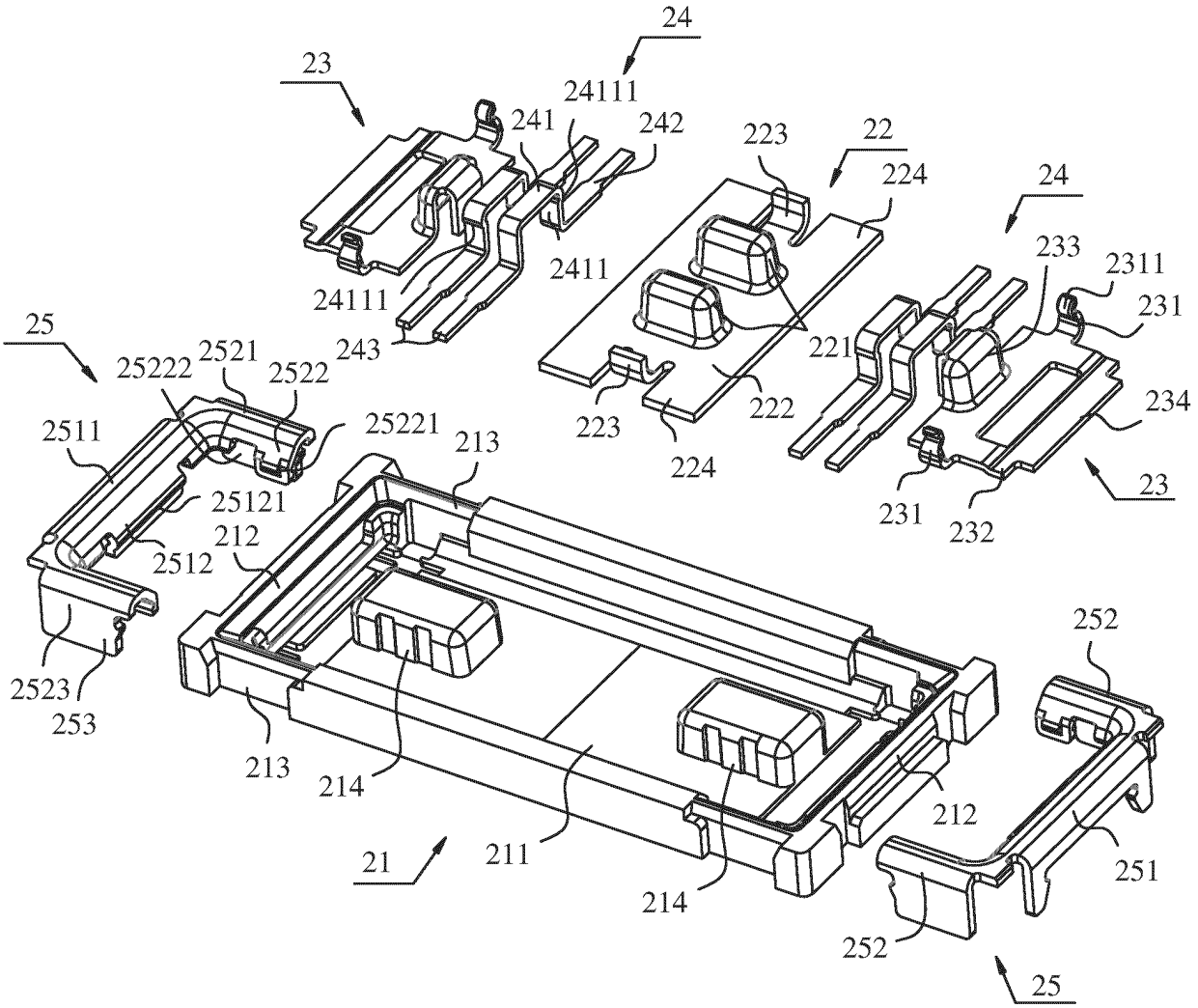
24
23
24111
241
242
223
22
224
24
2411
233
2311
231
24111
243
221
25
25222
2521
2522
222
234
2511
25221
213
223
224
25121
231
23
212
232
2512
252
2523
253
213
214
212
21
211
214
251
252
25

FIG. 10

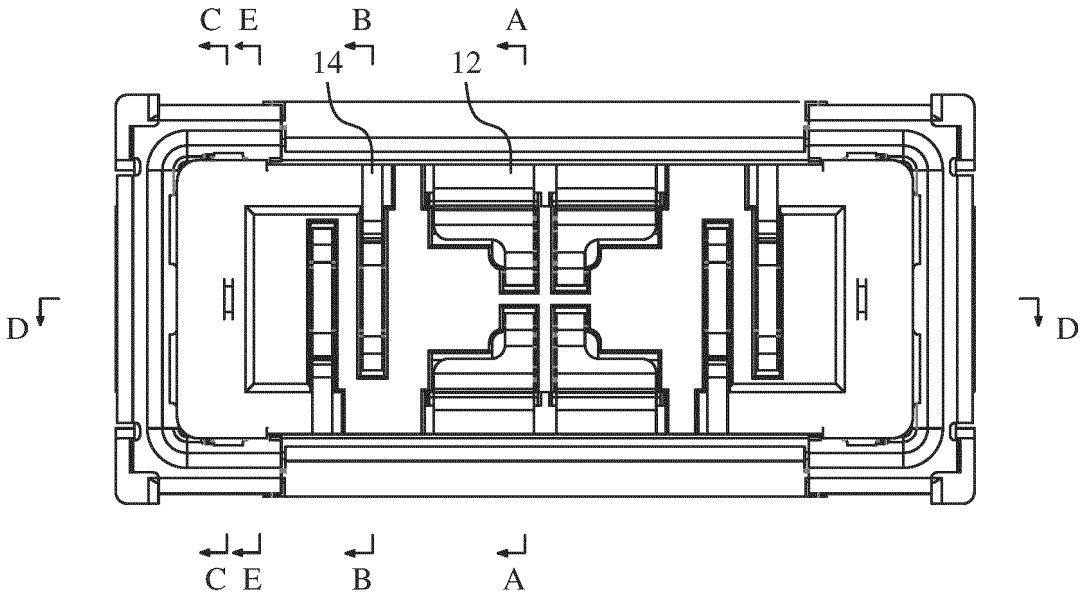
C E
B
A
14
12
D
D
C E
B
A

FIG. 11

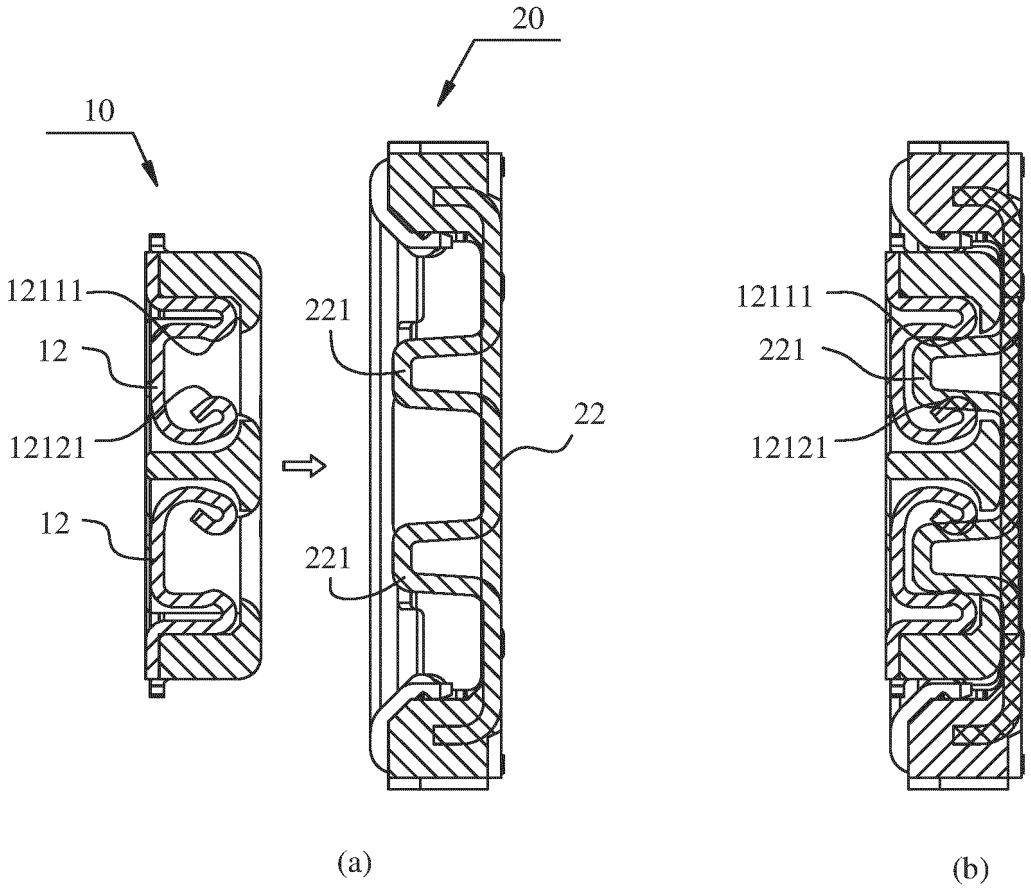
20
10
12111
12
12121
12
221
221
22
12111
221
12121
(a)
(b)

FIG. 12

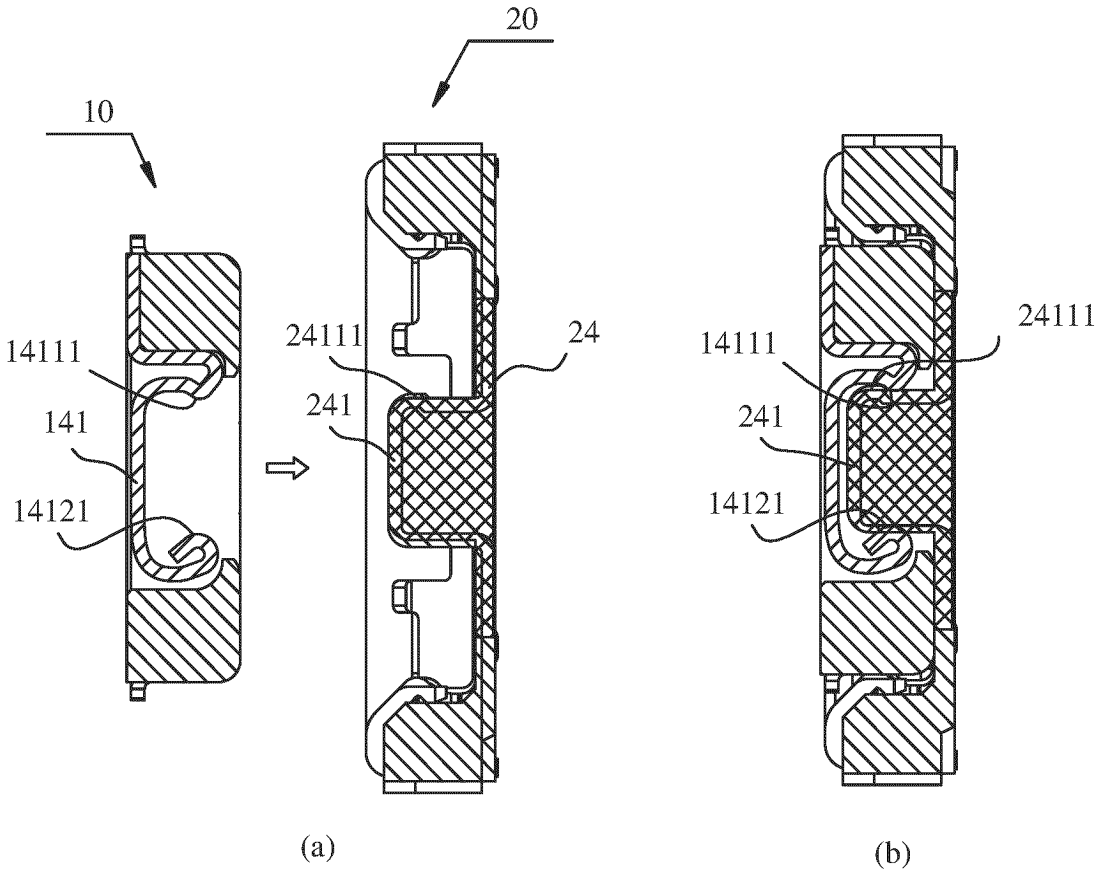

FIG. 13

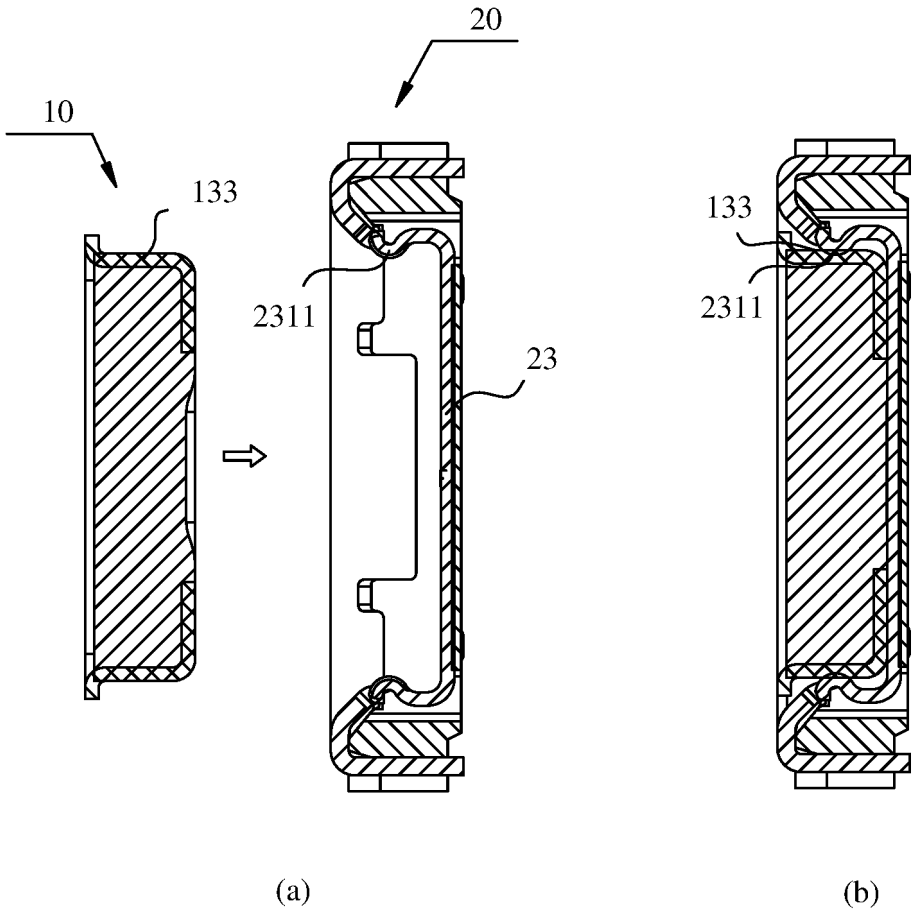

FIG. 14

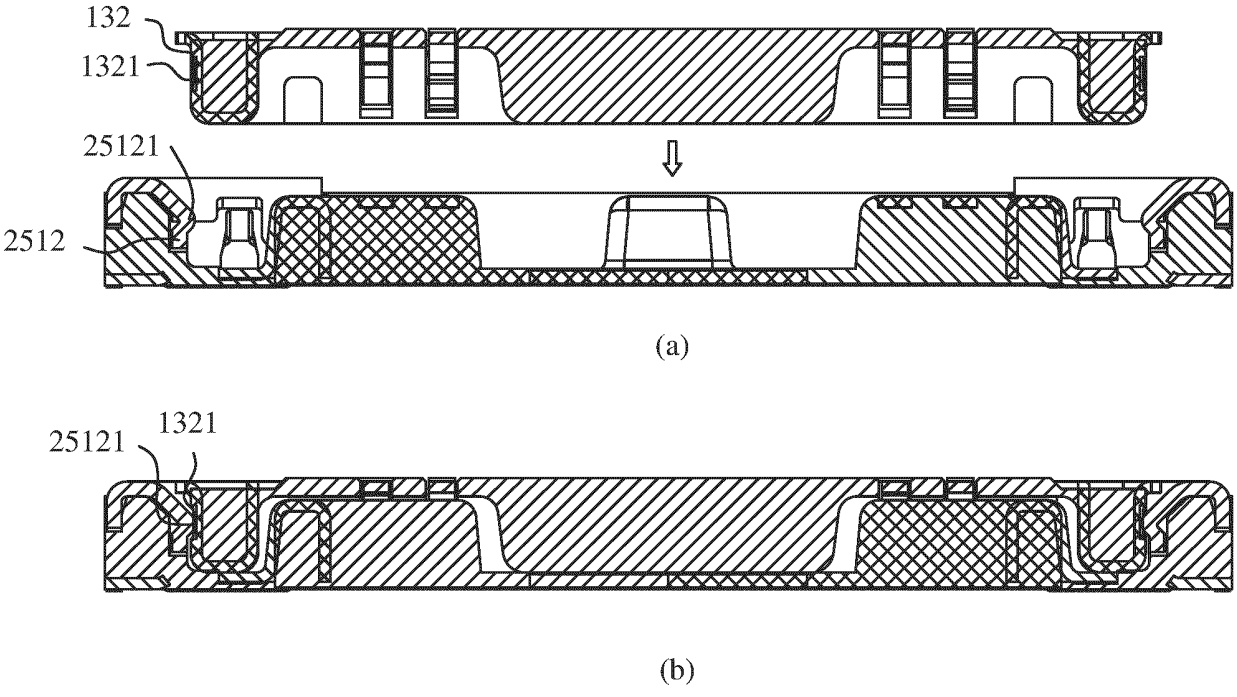
132
1321
25121
2512
(a)
25121
1321
(b)

FIG. 15

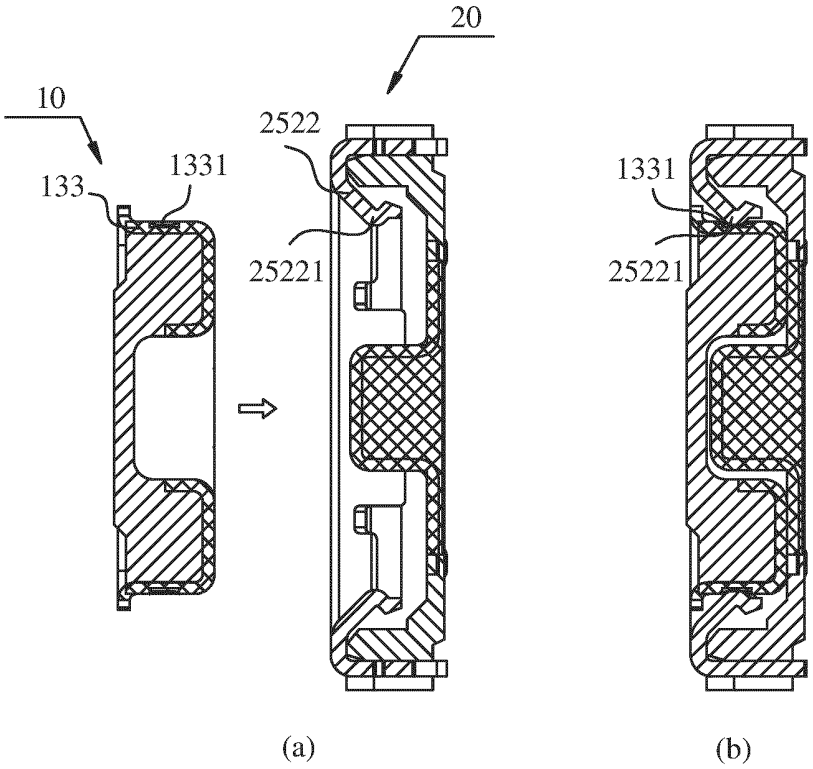
20
10
2522
133
1331
25221
1331
25221
(a)
(b)

FIG. 16

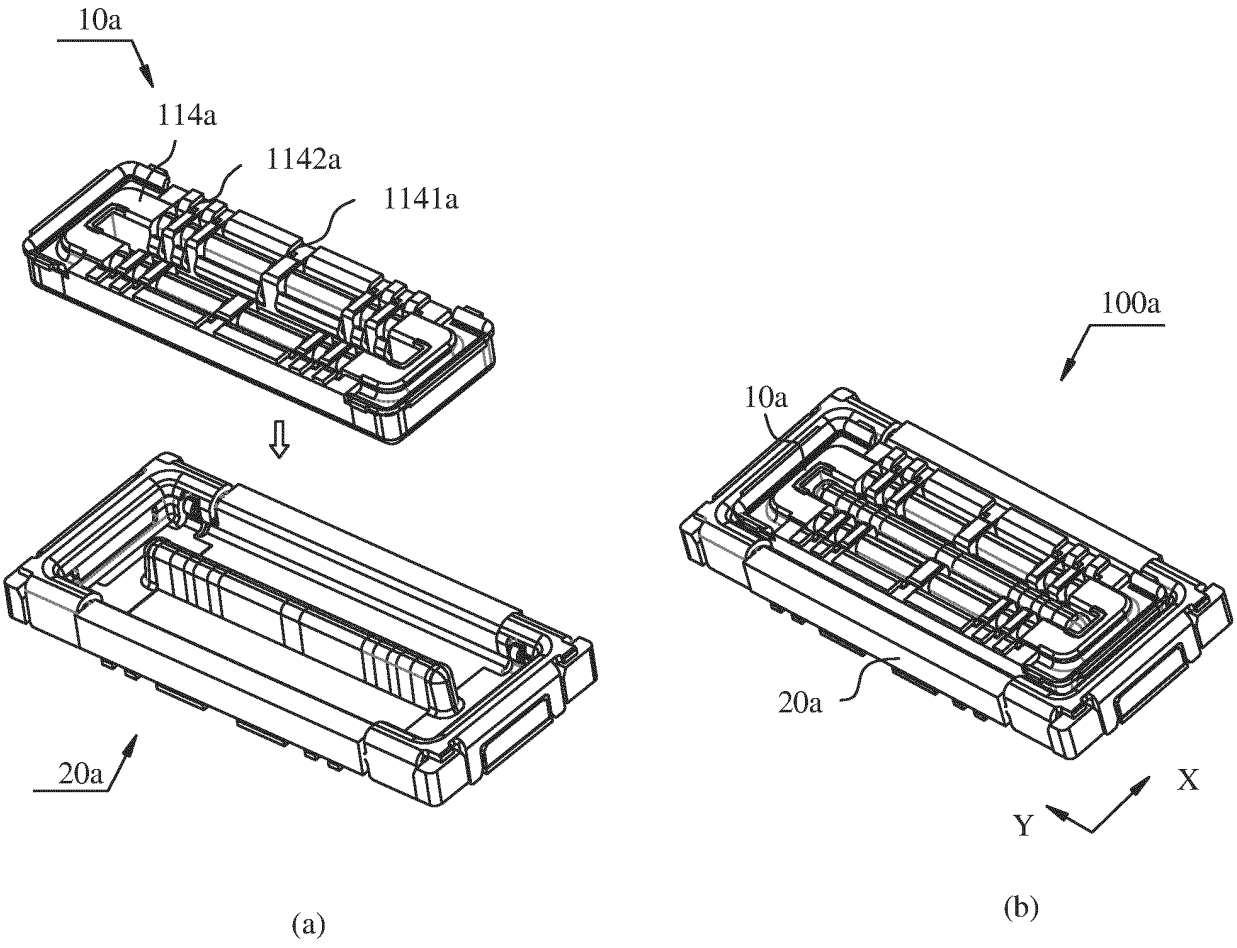

FIG. 17

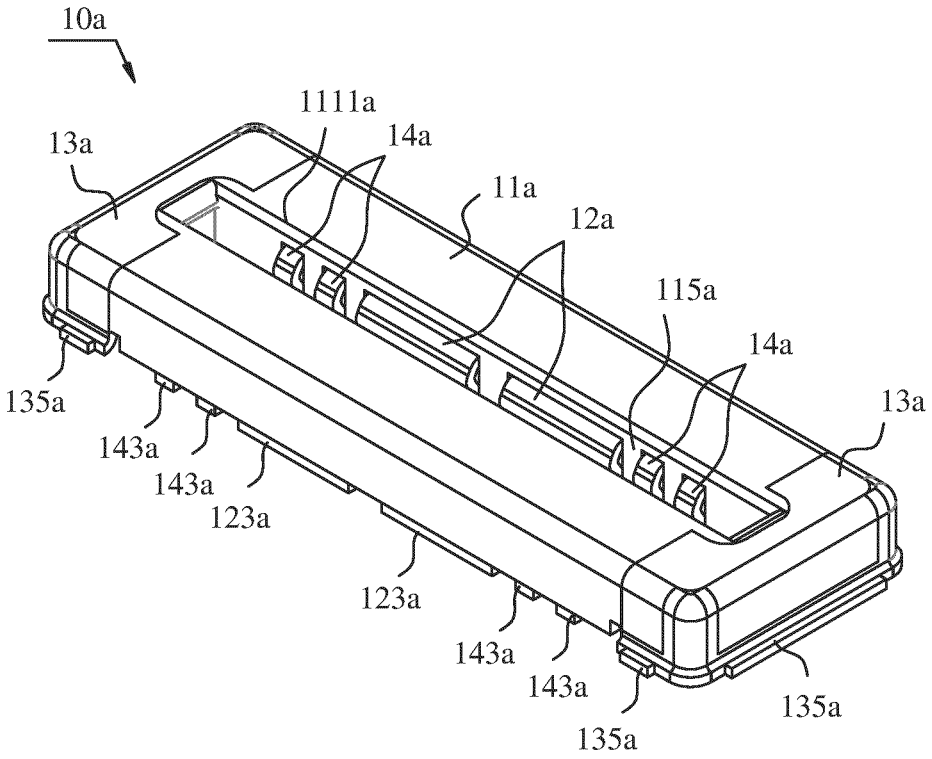
10a
1111a
14a
13a
11a
12a
115a
14a
13a
135a
143a
143a
123a
123a
143a
143a
135a
135a

FIG. 18

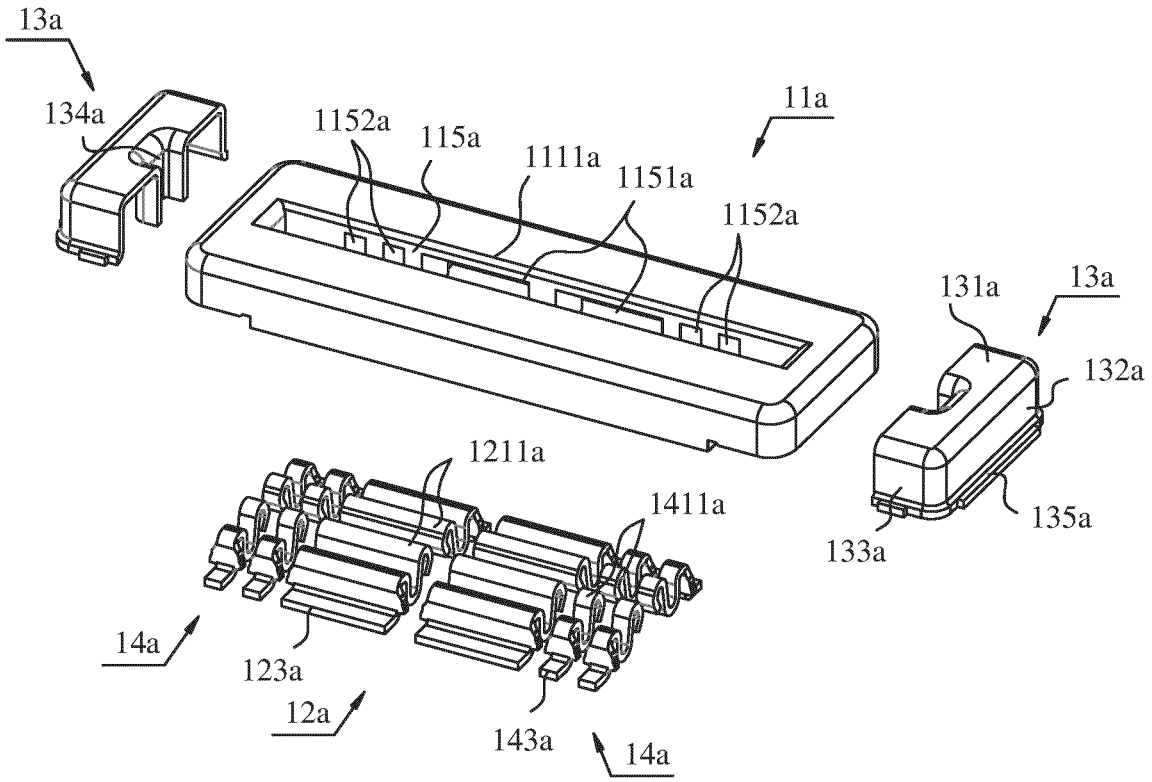
13a
134a
1152a
115a
1111a
1151a
1152a
11a
131a
13a
132a
135a
133a
1211a
1411a
14a
123a
12a
143a
14a

FIG. 19

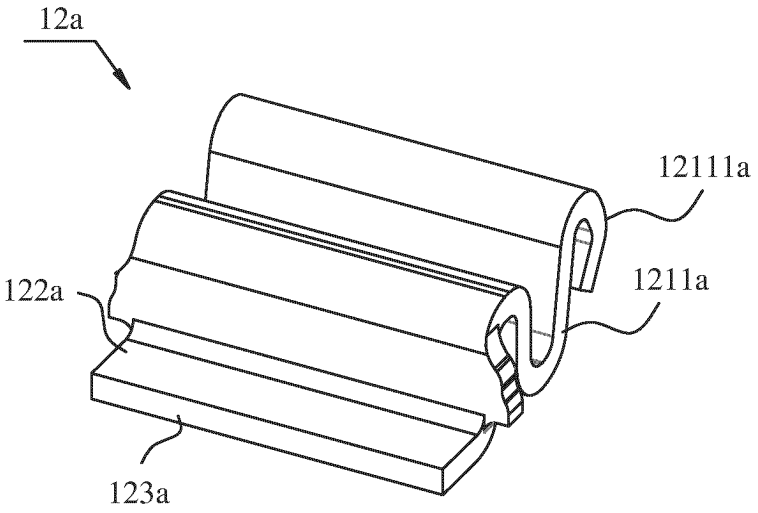

FIG. 20

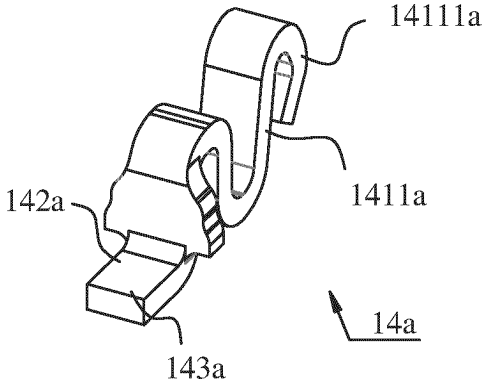

FIG. 21

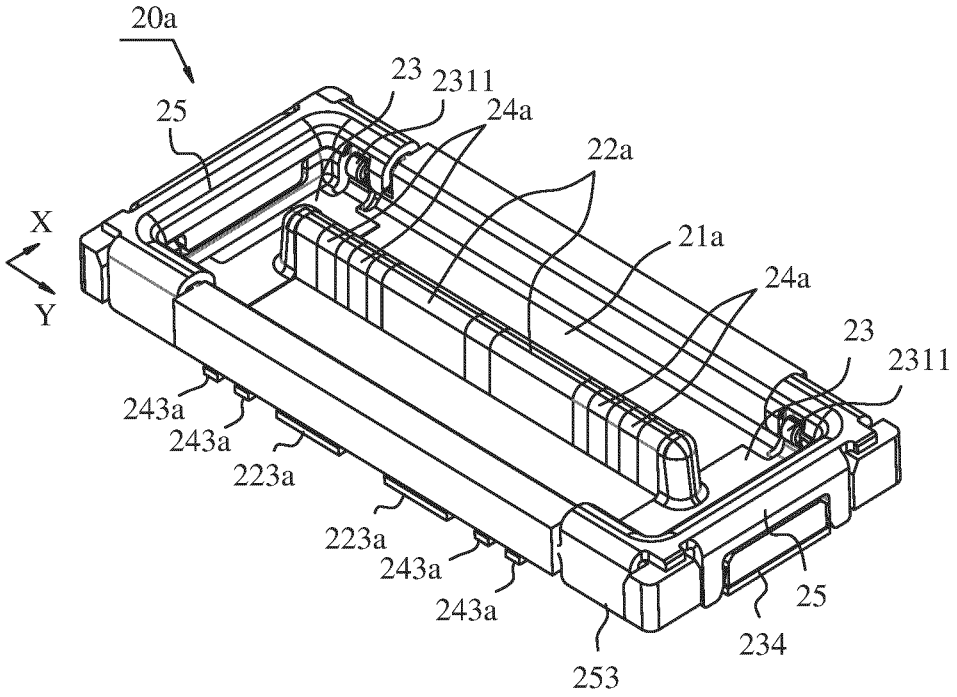
20a
23
2311
25
24a
22a
X
21a
24a
Y
23
2311
243a
243a
223a
223a
243a
243a
25
234
253

FIG. 22

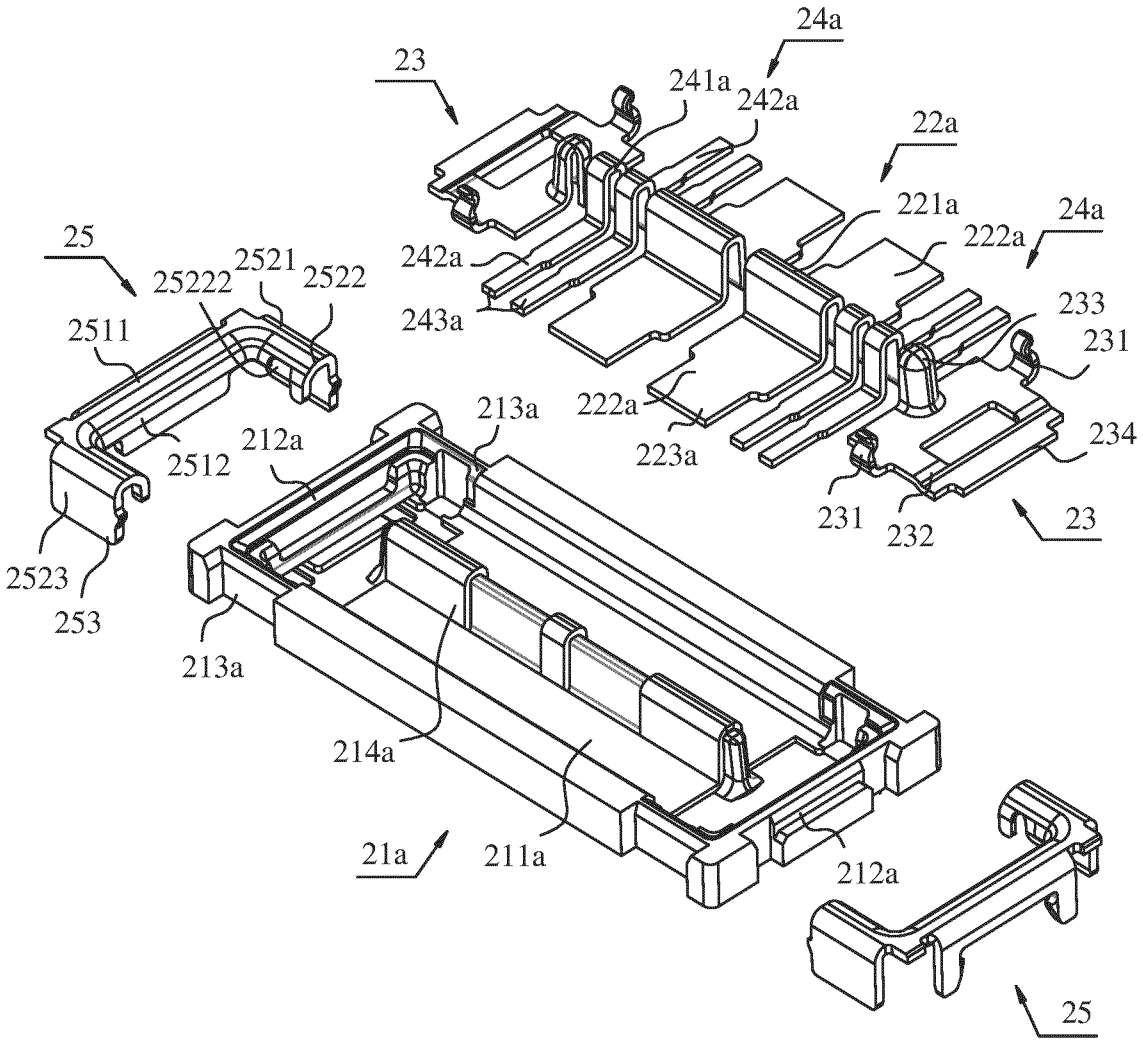
24a
23
241a
242a
22a
221a
24a
222a
25
25222
2521
2522
242a
243a
233
231
2511
222a
213a
234
212a
223a
2512
231
232
23
2523
253
213a
214a
21a
211a
212a
25

FIG. 23

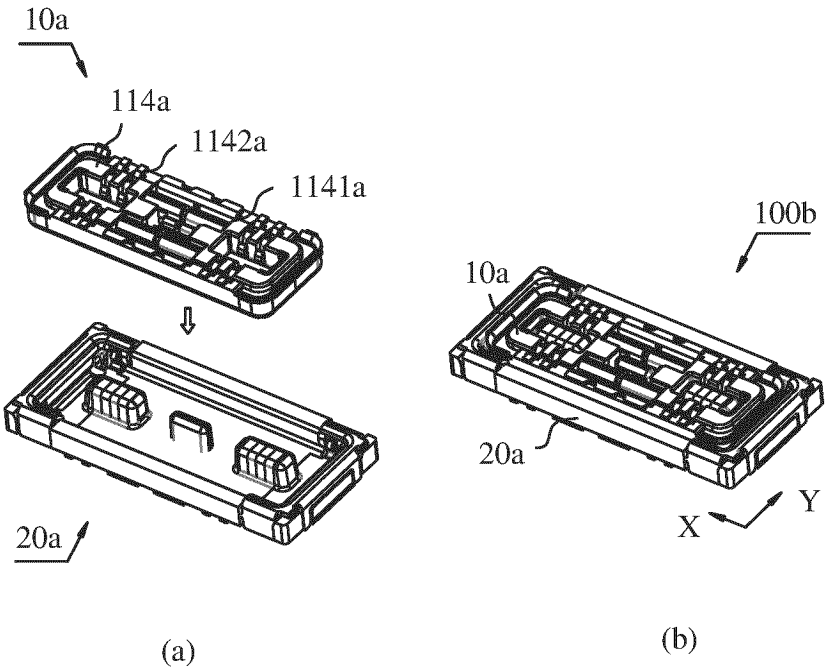
10a
114a
1142a
1141a
20a
(a)
100b
10a
20a
X
Y
(b)

FIG. 24

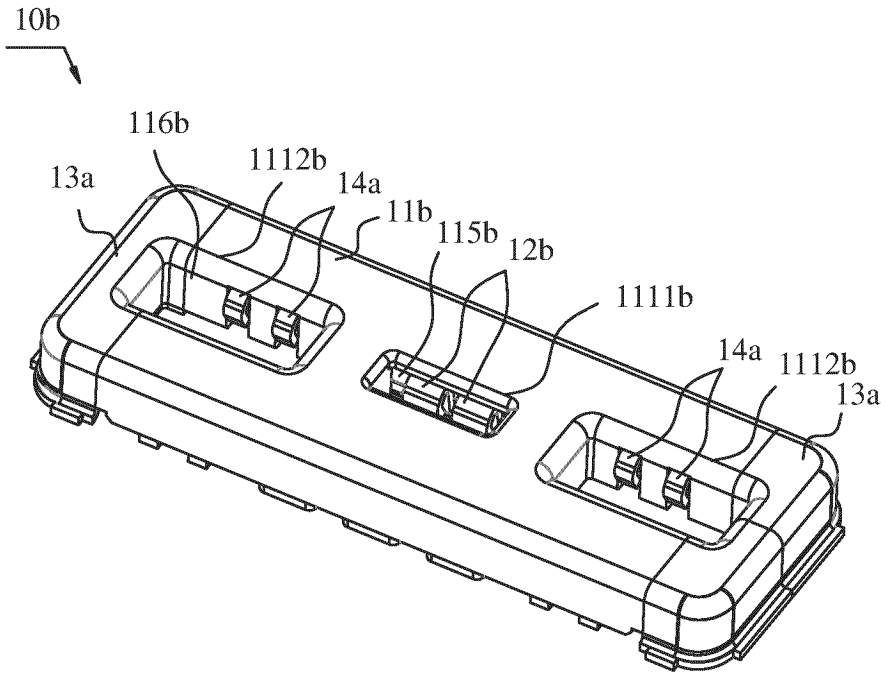
10b
116b
13a
1112b
14a
11b
115b
12b
1111b
14a
1112b
13a

FIG. 25

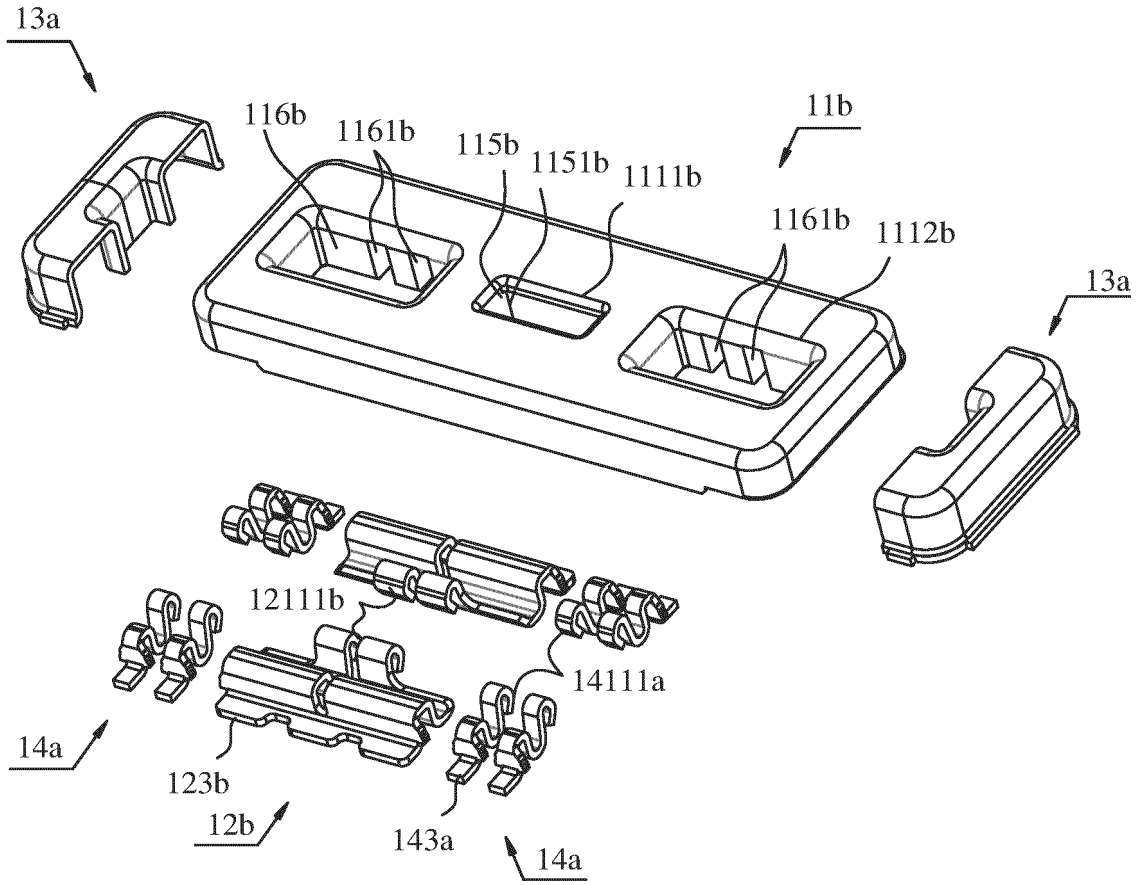
13a
116b
1161b
115b
1151b
1111b
11b
1161b
1112b
13a
12111b
14111a
14a
123b
12b
143a
14a

FIG. 26

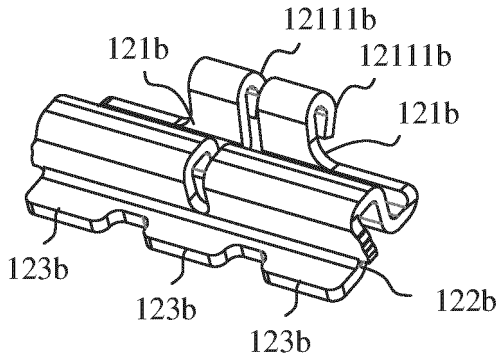
12111b
121b
12111b
121b
123b
123b
123b
122b

FIG. 27

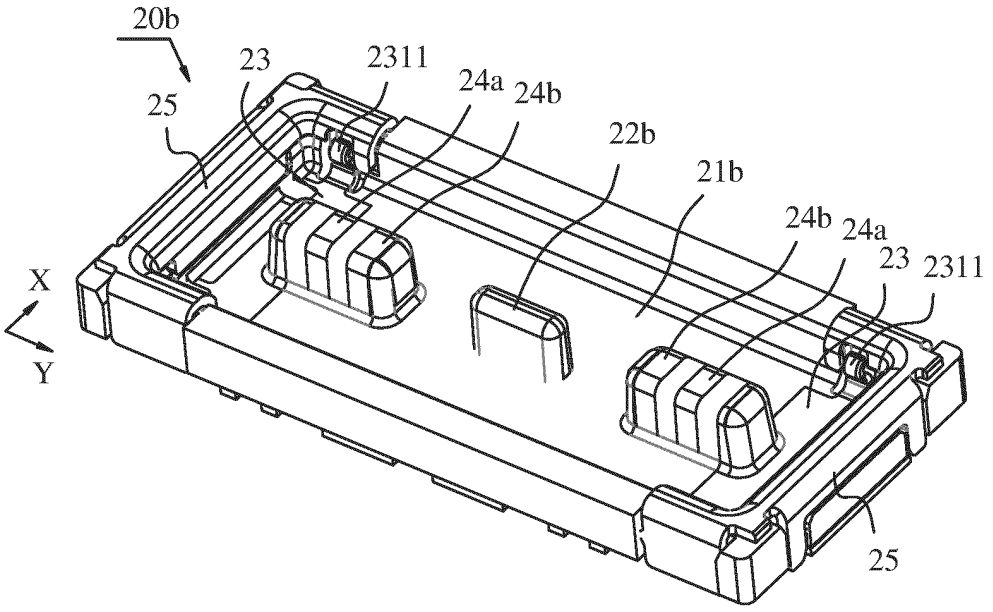
20b
23
2311
24a
24b
25
22b
21b
24b
24a
23
2311
X
Y
25

FIG. 28

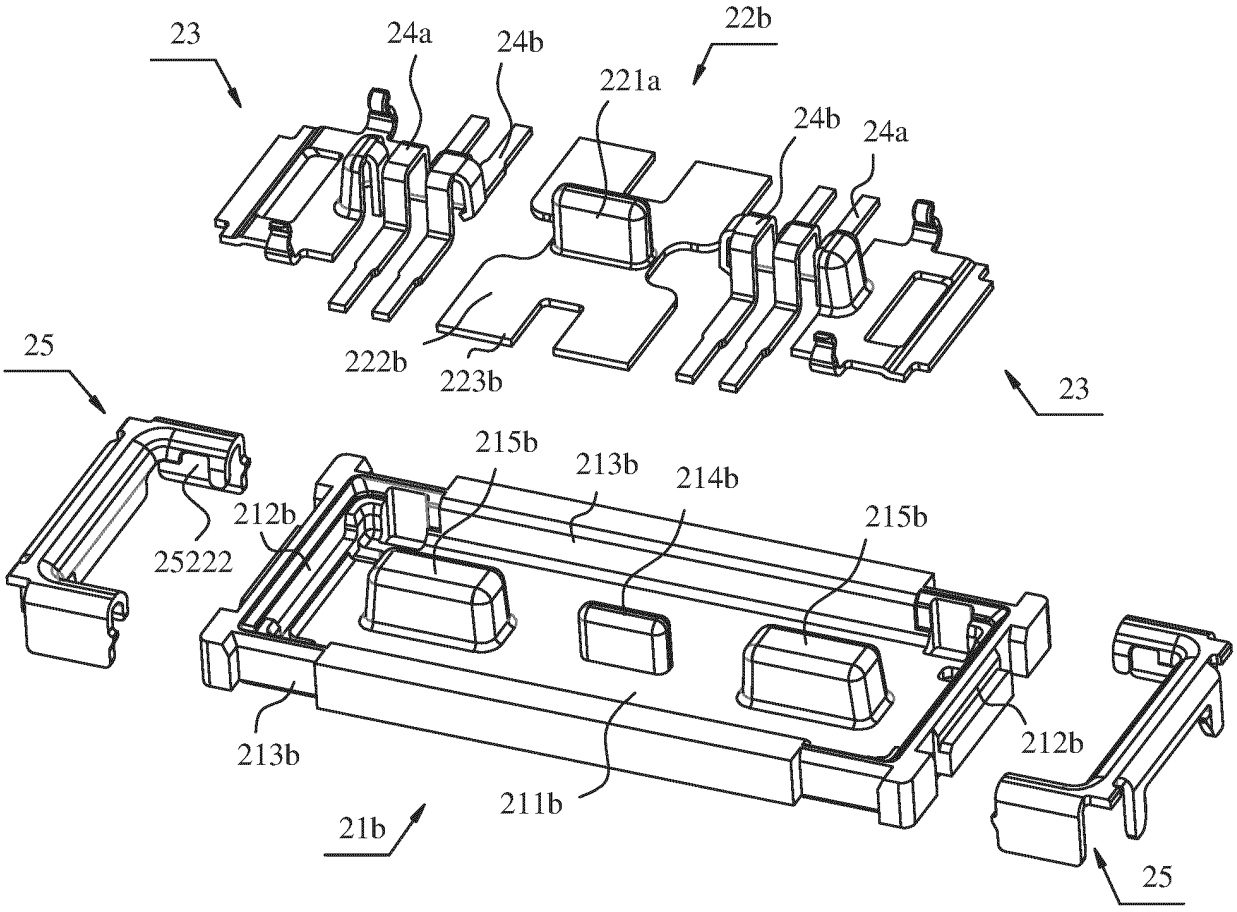
23
24a
24b
22b
221a
24b
24a
25
222b
223b
23
215b
213b
214b
212b
215b
25222
213b
212b
211b
21b
25

FIG. 29

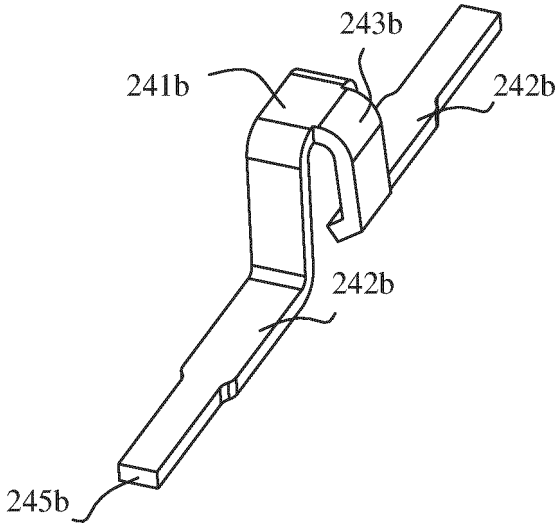

FIG. 30

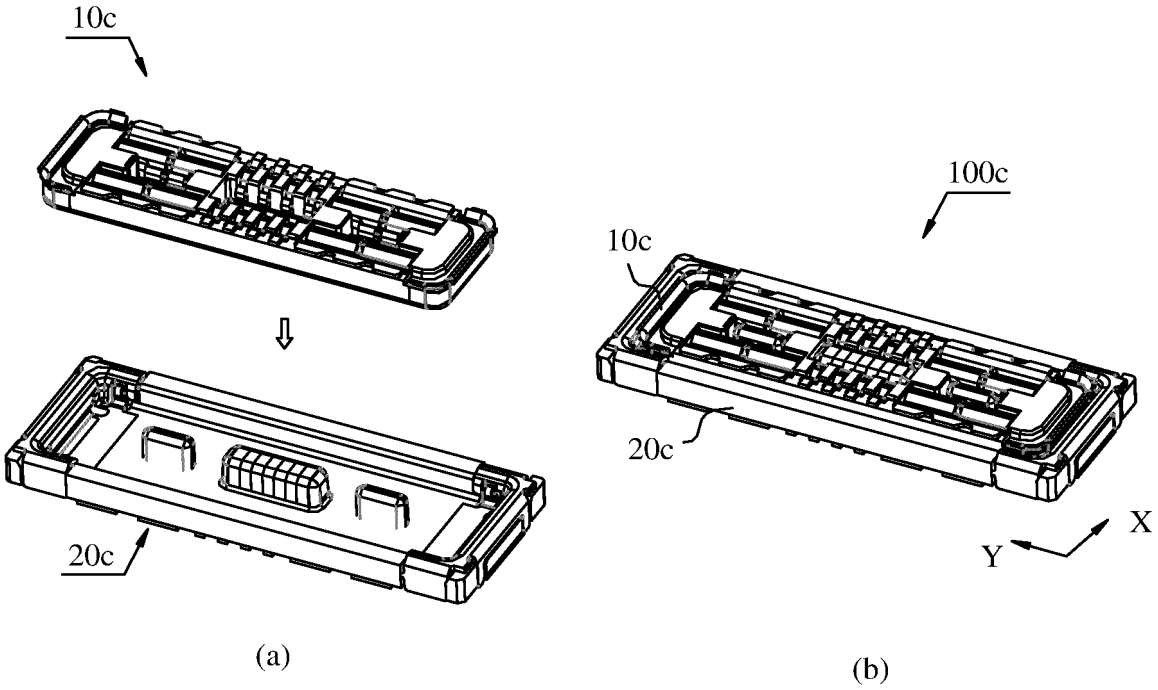

FIG. 31

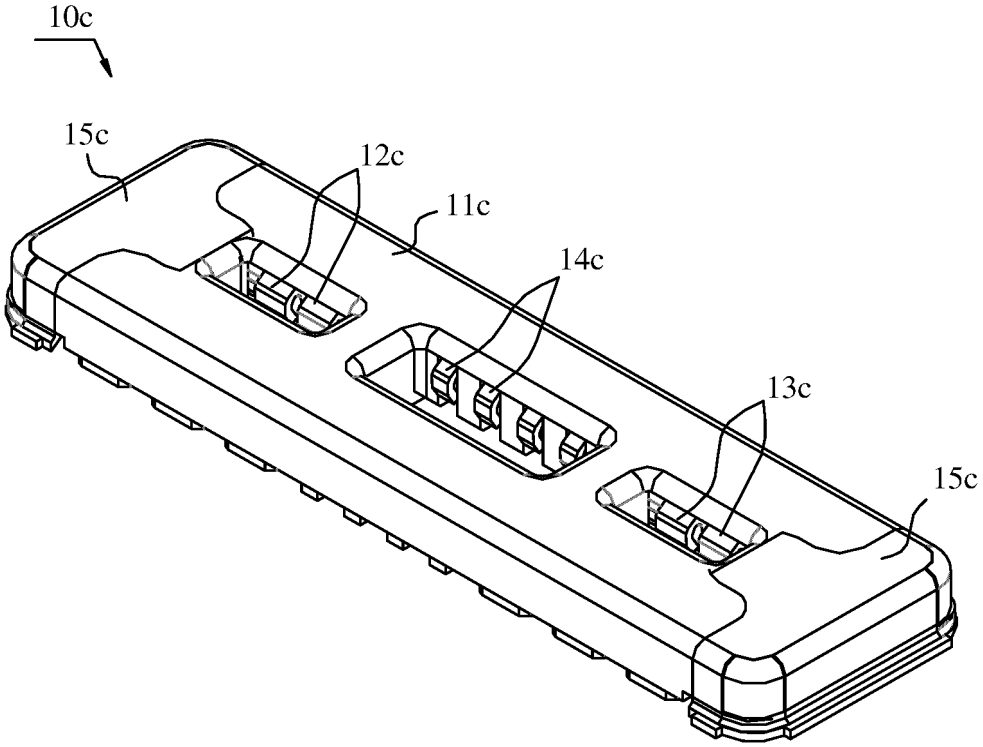

FIG. 32

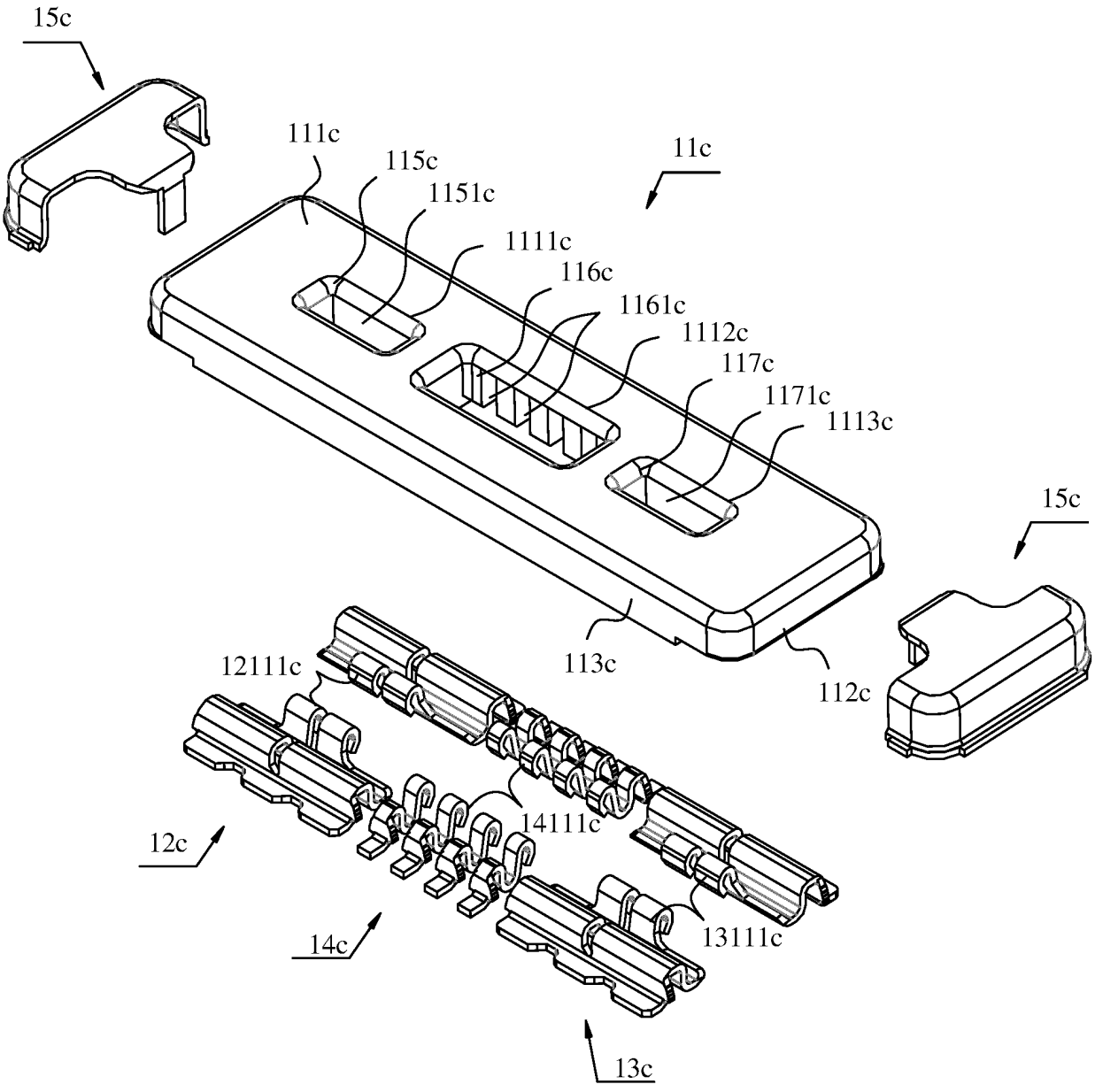
15c
111c
115c
1151c
11c
1111c
116c
1161c
1112c
117c
1171c
1113c
15c
12111c
113c
112c
14111c
12c
13111c
14c
13c

FIG. 33

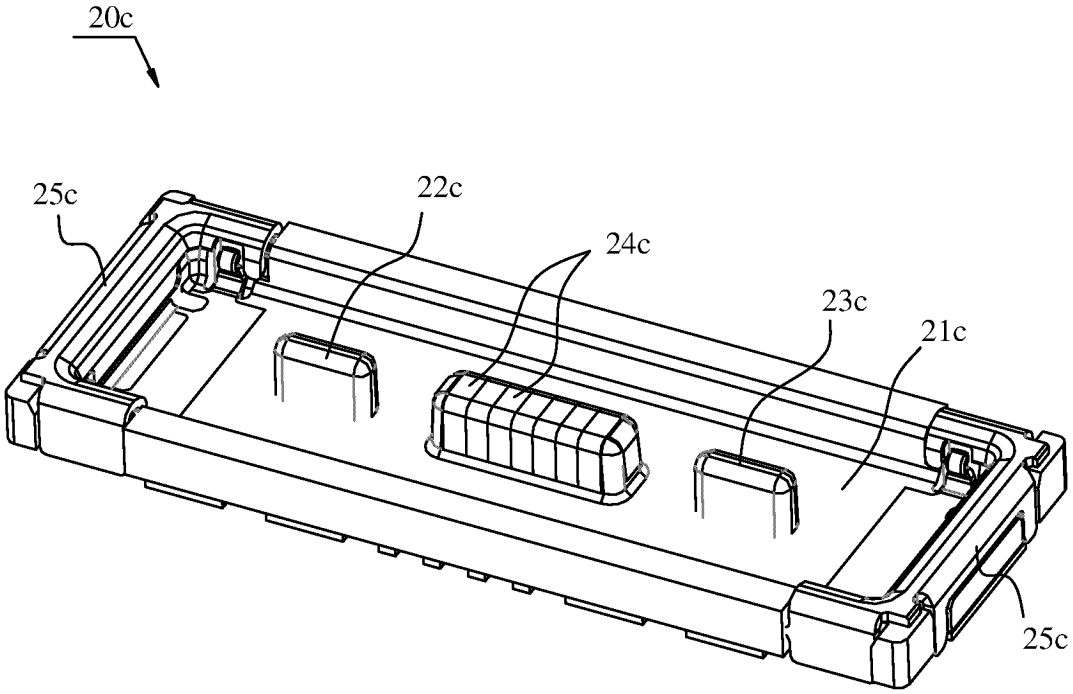

FIG. 34

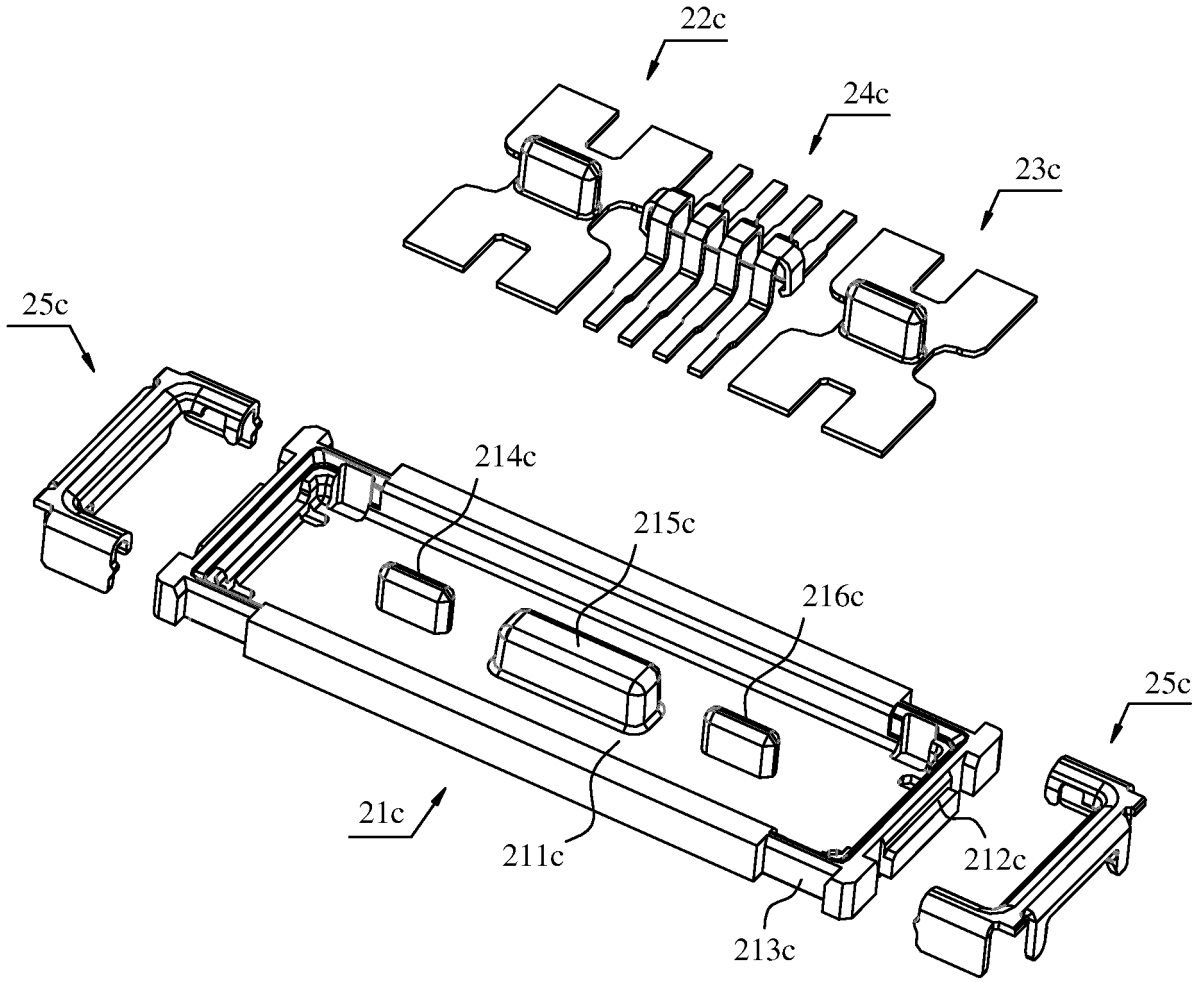

FIG. 35

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/111393

A. CLASSIFICATION OF SUBJECT MATTER

H01R13/02(2006.01)i; H01R13/40(2006.01)i; H01R24/00(2011.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPABS; DWPI; CNABS; CNTXT; CNKI; EPTXT; USTXT; WOTXT: 电源端子, 信号端子, 正极端子, 负极端子, 短接, 短路, 正反插, 双面插, 板对板, BTB, power, signal, terminal, short, circuit, double, socket, plug

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 104348025 A (FOXCONN (KUNSHAN) COMPUTER CONNECTOR CO., LTD.) 11 February 2015 (2015-02-11) description, paragraphs [0009]-[0021], and figures 1-32	1-24, 32, 33
X	CN 114824862 A (HUAWEI TECHNOLOGIES CO., LTD.) 29 July 2022 (2022-07-29) description, paragraphs [0095]-[0252], and figures 1-29	1-24, 32, 33
X	CN 212626413 U (SZ DJI TECHNOLOGY CO., LTD.) 26 February 2021 (2021-02-26) description, paragraphs [0086]-[0183], and figures 1-6	25-34
X	CN 111564717 A (QIDONG LINKCONN ELECTRONICS CO., LTD.) 21 August 2020 (2020-08-21) description, paragraphs [0024]-[0040], and figures 1-8	25-34
A	CN 208939182 U (SHANGHAI AEROSPACE SCIENCE & INDUSTRY ELECTRIC APPLIANCE RESEARCH INSTITUTE CO., LTD.) 04 June 2019 (2019-06-04) entire document	1-34

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 September 2023	**21 October 2023**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2023/111393

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 104348025 A	11 February 2015	TW 201517412 A	01 May 2015
		US 2015044886 A1	12 February 2015
		CN 204361413 U	27 May 2015
		TW M504383 U	01 July 2015
		CN 104779489 A	15 July 2015
		TW M506402 U	01 August 2015
		CN 104901060 A	09 September 2015
		TW 201535875 A	16 September 2015
		US 9385459 B2	05 July 2016
		TW 548158 B1	01 September 2016
		US 9525227 B2	20 December 2016
		CN 104348025 B	11 January 2017
		CN 104779489 B	24 May 2017
		CN 104901060 B	27 October 2017
CN 114824862 A	29 July 2022	WO 2022156742 A1	28 July 2022
CN 212626413 U	26 February 2021	CN 113795984 A	14 December 2021
CN 111564717 A	21 August 2020	CN 212230649 U	25 December 2020
CN 208939182 U	04 June 2019	CN 111129837 A	08 May 2020
		CN 111129837 B	18 June 2021

Form PCT/ISA/210 (patent family annex) (July 2022)

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

- CN 202210987879 **[0001]**