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REACTOR AND ELECTRICAL DEVICE

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A reactor and an electrical device according to the present application are provided. The reactor includes: a housing, which is provided with a support pillar; a coil assembly, which is fitted in the housing; a positioning plate, which is mounted on the support pillar and is provided with a support surface; and a conductive bar, which is electrically connected with a lead-out end of the coil assembly. The conducting bar has a first section, and a first side portion of the first section is supported on the support surface. With an arrangement of the conducting bar and the positioning plate described above, there is no need to use cables and crimping terminals to lead out the port, which can simplify an overall structural design and reduce cost of parts. The positioning plate shortens a dimension chain from the conducting bar to an external electrical component and avoids error accumulation.

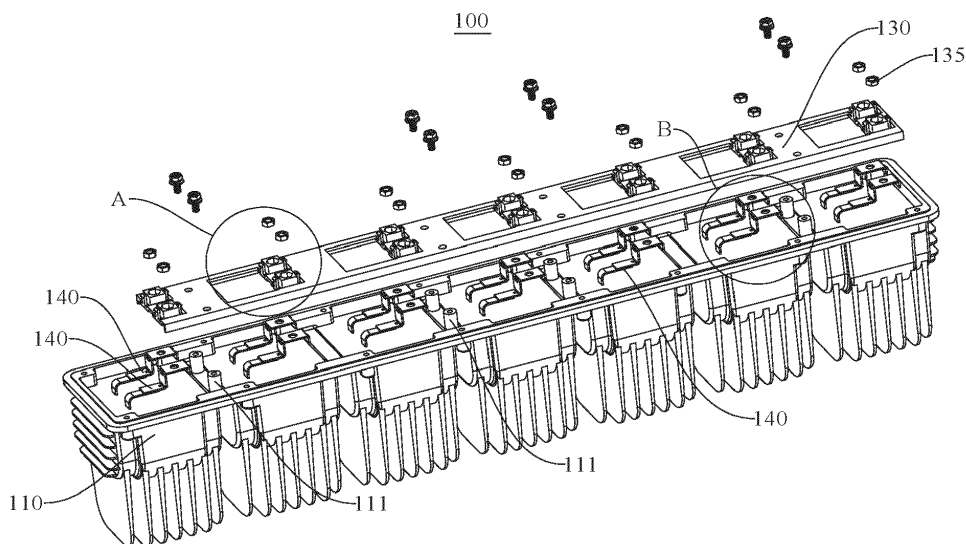


FIG. 1

Description

FIELD

[0001] The present application relates to the technical field of electricity, and in particular to a reactor and an electrical device.

BACKGROUND

[0002] In some electrical device, a wiring port in a reactor is led out by a cable, with a connection terminal being crimped at a terminal end of the cable. In related technologies, a circuit board (Printed Circuit Board) is generally provided with a connector, and a terminal at the terminal end of the cable of the reactor is locked and connected to the connector of the circuit board through a fastener, to realize an electrical connection with the circuit board.

[0003] However, the inventor found that a risk of electric leakage may occur in an event that a sheath of the cable is damaged during fitting and use. In addition, the cable will occupy a space in a case, which leads to a reduced utilization rate of an overall space inside the case, a large number of parts, and a high cost of material and mounting time.

SUMMARY

[0004] The present application aims to solve at least one of the technical problems in the conventional technology. To this end, a reactor and an electrical device are provided according to the present application, so as to simplify an overall structural design, reduce cost of parts, and improve reliability of electrical connection

[0005] In a first aspect, a reactor is provided according to the present application, including:

a housing, which is provided with a support pillar;

a coil assembly, which is fitted in the housing;

a positioning plate, which is mounted on the support pillar and is provided with a support surface;

a conductive bar, which is electrically connected with a lead-out end of the coil assembly, where the conducting bar has a first section, and a first side portion of the first section is supported on the support surface.

[0006] In the reactor provided according to the present application, through an arrangement of the conducting bar and the positioning plate described above, there is no need to use a cable and a crimping terminal to lead out the port, which can simplify an overall structural design and reduce cost of parts. Also, the positioning plate shortens a dimension chain from the conducting bar to

an external electrical component and avoids error accumulation, thus improving a mounting accuracy and strength of a rigid connecting member and further improving a reliability of electrical connection.

[0007] According to an embodiment of the present application, the positioning plate includes:

a plate body, which is connected with the support pillar;

a boss, which is arranged on the plate body, and an end face of the boss away from the plate body may form the support surface.

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[0008] According to an embodiment of the present application, the boss protrudes away from the coil assembly relative to the plate body, and a second side portion of the first section is used for electrical connection with the external electrical component.

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[0009] According to an embodiment of the present application, the first section has a through hole, and the boss is provided with a threaded connection structure facing the through hole, and the threaded connection structure is used for being connected with the external electrical component.

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[0010] According to an embodiment of the present application, the boss is provided with a mounting groove, and a nut is arranged in the mounting groove.

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[0011] According to an embodiment of the present application, the conducting bar includes a second section connected with a first end portion of the first section, where the first section and the second section form a bent structure, and the second section is provided with a first fitting groove. The positioning plate includes a first buckle arranged on the plate body, and the first buckle is snap fitted with the first fitting groove.

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[0012] According to an embodiment of the present application, the first fitting groove is arranged at the end of the second section connected with the first section.

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[0013] According to an embodiment of the present application, the conducting bar further includes a third section which is connected with the second section and forms a bent structure with the second section. The third section is parallel to the first section and extends in an opposite direction about the second section, and the lead-out end of the coil assembly is provided with a copper bar, with which the third section is lap jointed.

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[0014] According to an embodiment of the present application, the conducting bar further includes a flange connected with the second end portion of the first section, where the first section and the flange form a bent structure, and the flange is provided with a second fitting groove. The positioning plate includes a second buckle arranged on the plate body, and the second buckle is snap fitted with the second fitting groove.

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[0015] According to an embodiment of the present application, the number of the coil assembly may be multiple, and multiple sets of conductive bars are provided

corresponding to the multiple coil assemblies, respectively. The positioning plate is provided with multiple sets of support surfaces arranged in parallel with each other, and the first sections of the multiple sets of conductive bars are supported on the multiple sets of support surfaces, respectively.

[0016] In a second aspect, an electrical device is provided according to the present application, including:

a case, a bottom wall of which is provided with an avoidance opening;

a circuit board, which is mounted on the case;

the reactor as described in any one of the above, where the housing is connected with the case, and the conducting bar extends into the case through the avoidance opening and is electrically connected with the circuit board.

[0017] In the electrical device provided according to the present application, with the arrangement of the case, the circuit board and the reactor as well as the connection design of the conductive bar, the risk of electric leakage caused by damaged wire sheath during the mounting and use is eliminated, so that the system is simplified and more reliable. A phenomenon of an increased overall volume of the case caused by large-volume components being piled up in the case can be avoided, thus improving the utilization rate of the overall space inside the case.

[0018] In a third aspect, a photovoltaic energy storage system is provided according to the present application, including:

the electrical device as described above;

a photovoltaic module, where the photovoltaic module is electrically connected with the electrical device; and

a battery, where the battery is electrically connected with the electrical device.

[0019] In the photovoltaic energy storage system provided according to the present application, with the arrangement of the electrical device, the power generation of the system is more stable and persistent, efficiency of the electricity utilization is improved, and cost of the electricity utilization is reduced. Moreover, the failure risk of the energy storage system is decreased, so that the safety is significantly improved and the working performance of the whole system is optimized.

[0020] Additional aspects and advantages of the present application are set forth in part in the description below, which will become apparent from the description, or may be learned from practice of the present application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The above and/or additional aspects and advantages of the present application will become apparent and readily understood from the following description of embodiments in conjunction with the accompanying drawings, in which:

FIG. 1 is a first schematic structural view of a reactor provided according to an embodiment of the present application;

FIG. 2 is a schematic enlarged view of a part A shown in FIG. 1;

FIG. 3 is a schematic enlarged view of a part B shown in FIG. 1;

FIG. 4 is a second schematic structural view of a reactor provided according to an embodiment of the present application;

FIG. 5 is a schematic enlarged view of a part C shown in FIG. 4;

FIG. 6 is a first schematic structural view of an electrical device provided according to an embodiment of the present application;

FIG. 7 is a second schematic structural view of an electrical device provided according to an embodiment of the present application;

FIG. 8 is a third schematic structural view of an electrical device provided according to an embodiment of the present application;

[0022] Reference numerals in the drawings are listed as follows:

100 reactor;

110 housing, 111 support pillar;

120 coil assembly, 121 copper bar;

130 positioning plate, 131 support surface, 132 plate body, 133 boss, 134 first buckle, 135 threaded connection structure, 136 second buckle;

140 conductive bar, 141 first section, 142 through hole, 143 second section, 144 first fitting groove, 145 flange, 146 second fitting groove, 147 third section;

200 electrical device, 300 case, 310 avoidance opening, 400 circuit board.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0023] Embodiments of the present application are described in detail below. Examples of the embodiments are shown in the drawings. Throughout the drawings, the same or similar reference signs denote the same or similar elements or elements having the same or similar functions. The embodiments described in the following with reference to the drawings are only exemplary embodiments which are used to explain the present application, and should not be construed to limit the present application.

[0024] A reactor 100 is provided according to the present application.

[0025] Hereinafter, a reactor 100 according to an embodiment of the present application will be described with reference to FIG. 1 to FIG. 7.

[0026] In some embodiments, the reactor 100 includes a housing 110, a coil assembly 120, a positioning plate 130 and a conducting bar 140.

[0027] The housing 110 is provided with a support pillar 111.

[0028] The housing 110 may be configured to support an overall frame of the reactor 100, and the housing 110 may be made of metal material or plastic material, where the plastic material may include but not limited to ABS (acrylonitrile butadiene styrene), HIP (High Impact Polystyrene) and PC (Polycarbonate), and the metal material may include but not limited to aluminum alloy, stainless steel, sheet metal or titanium alloy. For example, in some embodiments, the housing 110 is made of the plastic material.

[0029] The number of the support pillar 111 may be multiple, where multiple means two or more. For example, in some embodiments, as shown in FIG. 1, eight support pillars 111 are provided in the housing 110.

[0030] The coil assembly 120 is fitted into the housing 110.

[0031] The coil assembly 120 is configured to serve as a functional device to resist a change of current. The coil assembly 120 may include a copper wire and an iron core, where the copper wire may be wound around the iron core for multiple turns to finally form an inductance coil.

[0032] The positioning plate 130 is mounted on the support pillar 111, and the positioning plate 130 is provided with a support surface 131.

[0033] The positioning plate 130 may be configured to assist the reactor 100 to be positioned and connected with an external electrical component. The positioning plate 130 may be made of insulating material, which may include but not limited to PC (polycarbonate), PVC (polyvinyl chloride) or epoxy resin. For example, in some embodiments, the positioning plate 130 is made of PVC (polyvinyl chloride).

[0034] As shown in FIG. 1, the positioning plate 130 may be mounted at a top portion of the housing 110, and the support surface 131 may be positioned at a side,

away from the support pillar 111, of the positioning plate 130.

[0035] It should be noted that the positioning plate 130 can be accurately assembled to the housing 110 by the support pillars 111, where the support pillar 111 may be in at least one of the following structural forms.

[0036] First, the support pillar 111 has an internal threaded hole.

[0037] In this embodiment, as shown in FIG. 1 and FIG. 4 to FIG. 5, the positioning plate 130 may be provided with a connection hole corresponding to the support pillar 111, and an aperture of the connection hole may be equal to an aperture of the internal threaded hole of the support pillar 111. When the positioning plate 130 is connected to the support pillar 111, the support pillar 111 abuts against the positioning plate 130, and the internal threaded hole of the support pillar is concentrically arranged with the connection hole of the positioning plate 130. A stud passes through the connection hole and is in a threaded connection with the internal threaded hole, and the positioning plate 130 is positioned between the stud and the support pillar 111 after the stud is tightened by a clamping tool.

[0038] Secondly, the support pillar 111 has external threads.

[0039] In this embodiment, the positioning plate 130 may be provided with the connection hole corresponding to the support pillar 111, and the aperture of the connection hole may be slightly larger than an outer diameter of the support pillar 111. When the positioning plate 130 is connected to the support pillar 111, the support pillar 111 passes through the connection hole and is in the threaded connection with a nut.

[0040] Thirdly, the support pillar 111 has a snap-fitting structure.

[0041] In this embodiment, the positioning plate 130 may be provided with a snap-fitting structure corresponding to the support pillar 111. When the positioning plate 130 is connected to the support pillar 111, the snap-fitting structure of the support pillar 111 and the corresponding snap-fitting structure on the positioning plate 130 are snap fitted with each other.

[0042] The conducting bar 140 is electrically connected with a lead-out end of the coil assembly 120. The conducting bar 140 has a first section 141, and a first side portion of the first section 141 is supported on the support surface 131.

[0043] The conducting bar 140 may be used as a conductive medium to realize the electrical connection between the reactor 100 and the external electrical component. In an event that the electrical device 200 is an inverter, the external electrical component may be a circuit board 400, and the conducting bar 140 is electrically connected with the circuit board 400.

[0044] The conducting bar 140 may be made of metal material, which may include but not limited to copper, aluminum, silver or the like. For example, in some embodiments, the conducting bar 140 is made of copper.

[0045] In actual use, as shown in FIG. 1 and FIG. 3 to FIG. 5, the conducting bar 140 may be in a bent bar shape, and a first side portion of the first section 141 can be attached to the support surface 131 of the positioning plate 130, so that the first section 141 may protrude above the top portion of the housing 110. Since the positioning plate 130 has been positioned in place, the assembly accuracy of the conducting bar 140 is high, and in a process of connecting the conducting bar 140 with the external electrical component, a distance between the conducting bar 140 and the external electrical component is reduced.

[0046] In the reactor 100 provided according to the embodiment of the present application, with an arrangement of the conducting bar 140 and the positioning plate 130, there is no need to use a cable and a crimping terminal to lead out the port, which can simplify an overall structural design and reduce cost of parts. Moreover, the positioning plate 130 shortens a dimension chain from the conducting bar 140 to the external electrical component and avoids error accumulation, thereby improving a mounting accuracy and strength of rigid connecting member and further improving a reliability of electrical connection.

[0047] In some embodiments, as shown in FIG. 2 and FIG. 5, the positioning plate 130 may include a plate body 132 and a boss 133.

[0048] The plate body 132 may be connected with the support pillar 111.

[0049] As shown in FIG. 1 to FIG. 5, the plate body 132 can be provided with avoidance holes, and the conductive bars 140 can be supported on the support surface 131 through the avoidance holes.

[0050] In actual use, as shown in FIG. 1 and FIG. 4 to FIG. 5, the support pillar 111 may have an internal threaded hole, and the positioning plate 130 may be provided with a connection hole corresponding to the support pillar 111. During the positioning plate 130 being connected with the support pillar 111, the support pillar 111 abuts against the plate body 132 of the positioning plate 130, and a stud passes through the connection hole and is in a threaded connection with the internal threaded hole. After the stud is tightened by a clamping tool, the plate body 132 may be positioned between the stud and the support pillar 111.

[0051] The boss 133 may be arranged on the plate body 132, and an end face of the boss 133 facing away from the plate body 132 is formed as the support surface 131.

[0052] In actual use, as shown in FIG. 1 to FIG. 5, the conducting bar 140 may pass through the avoidance hole of the plate body 132, the first section 141 of the conducting bar 140 is positioned above the plate body 132, and the first side portion of the first section 141 can be attached to the support surface 131 of the boss 133.

[0053] In the reactor 100 provided according to the embodiment of the present application, with the arrangement of the plate body 132 and the boss 133, a fixed

connection between the positioning plate 130 and the housing 110 is obtained. Meanwhile, the first section 141 is positioned at a higher level, thereby shortening the dimension chain from the conducting bar 140 to the external electrical component, and further improving the positioning accuracy of the reactor 100 in connection with the external electrical component.

[0054] In some embodiments, as shown in FIG. 2 and FIG. 5, the boss 133 may protrude in a direction away from the coil assembly 120 relative to the plate body 132, and a second side portion of the first section 141 may be used for electrical connection with the external electrical component.

[0055] In actual use, the conducting bar 140 passes through the avoidance hole of the plate body 132, and the first side portion of the first section 141 may be attached to the support surface 131 of the boss 133. When the reactor 100 is fitted in the electrical device 200, the support surface 131 of the boss 133 can be arranged toward the external electrical component, while the second side portion of the first section 141 is also arranged toward the external electrical component. The second side portion of the first section 141 is connected with the external electrical component, thus realizing the electrical connection between the conducting bar 140 and the external electrical component.

[0056] It should be noted that the boss 133 may also protrude in a direction close to the coil assembly 120 relative to the plate body 132, the first side portion of the first section 141 may be attached to the support surface 131 of the boss 133, and other sections of the conducting bar 140 may be connected with the external electrical component, thus realizing the electrical connection between the conducting bar 140 and the external electrical component.

[0057] In the reactor provided according to the embodiment of the present application, with the arrangement of location of the boss 133 and the design of the connection between the conducting bar 140 and the external electrical component, the lead-out form of the reactor 100 is more flexible, and the reliability and stability of the electrical connection between the conducting bar 140 and the external electrical component are improved without affecting the mounting accuracy.

[0058] In some embodiments, as shown in FIG. 1 to FIG. 2, the first section 141 may have a through hole 142, and the boss 133 may be provided with a threaded connection structure 135 facing the through hole 142, and the threaded connection structure 135 may be used for connection with the external electrical component.

[0059] The threaded connection structure 135 may be in at least one of the following structural forms.

[0060] First, the threaded connection structure 135 may be a nut.

[0061] In this embodiment, as shown in FIG. 1 to FIG. 2, an internal threaded hole of the threaded connection structure 135 may be concentrically arranged with the through hole 142 of the first section 141. When the reactor

100 is fitted in the target device, the threaded connection structure 135 may be positioned at the first side portion of the first section 141, and the external electrical component may be positioned at the second side portion of the first section 141. The stud sequentially passes through the external electrical component and the through hole 142 of the first section 141 and finally is in the threaded connection with the threaded connection structure 135.

[0062] Secondly, the threaded connection structure 135 may be a stud.

[0063] In this embodiment, when the reactor 100 is fitted into the target device, a first end portion of the threaded connection structure 135 may be positioned at the first side portion of the first section 141, while the external electrical component is positioned at the second side portion of the first section 141, and a second end portion of the threaded connection structure 135 sequentially passes through the through hole 142 of the first section 141 and the external electrical component and finally is in the threaded connection with the nut.

[0064] In the reactor 100 provided according to the embodiment of the present application, with the arrangement of the through hole 142 and the threaded connection structure 135 described above, the fixed connection between the conducting bar 140 and the external electrical component is realized, and the conducting bar 140 is in direct contact with the external electrical component to complete the electrical connection, so that the overall structure is simple, and the reliability of the connection is ensured, while the operators can perform the assembly and disassembly work more easily.

[0065] In some embodiments, as shown in FIG. 1 to FIG. 2, the boss 133 may be provided with a mounting groove, and a nut may be arranged in the mounting groove.

[0066] In other words, in the present application, the threaded connection structure 135 may be a nut, and a shape of the mounting groove may match with a shape of the nut, so that the nut may be fitted into the mounting groove of the boss 133.

[0067] In this embodiment, the internal threaded hole of the nut may be arranged concentrically with the through hole 142 of the first section 141. When the reactor 100 is fitted in the target device, the nut may be fitted in the mounting groove of the boss 133 and positioned at the first side portion of the first section 141, while the external electrical component is positioned at the second side portion of the first section 141, and the stud passes through the external electrical component and the through hole 142 of the first section 141 in sequence and finally is in the threaded connection with the nut.

[0068] Alternatively, the stud may be arranged in the mounted groove. In this case, the threaded connection structure 135 of the boss 133 may be a stud, where the first end portion of the stud may be placed in the mounting groove, and the second end portion of the stud passes through the through hole 142 of the first section 141 and

the external electrical component in sequence and finally is in the threaded connection with the nut.

[0069] In the reactor 100 provided according to the embodiment of the present application, with the arrangement of the mounting groove and the nut, the fixed connection between the conducting bar 140 and the external electrical component is realized, while the cooperation between the nut and the boss 133 is more stable, thus avoiding a joint between the nut and the boss 133 from being broken under external force, and improving the strength of the fixed connection between the conducting bar 140 and the external electrical component.

[0070] In some embodiments, as shown in FIG. 2 to FIG. 3 and FIG. 5, the conducting bar 140 may include a second section 143 connected with a first end portion of the first section 141, where the first section 141 and the second section 143 form a bent structure, and the second section 143 is provided with a first fitting groove 144. The positioning plate 130 may include a first buckle 134 arranged on the plate body 132, and the first buckle 134 may be engaged with the first fitting groove 144.

[0071] The first buckle 134 and the plate body 132 may be integrally formed, bolted connected or bonded with each other. For example, in some embodiments, the first buckle 134 is integrated with the plate body 132.

[0072] The first section 141 and the second section 143 may be integrally formed, bolted connected or bonded with each other. For example, in some embodiments, the first section 141 is integrated with the second section 143.

[0073] As shown in FIG. 3, a bending angle between the first section 141 and the second section 143 may be 90 degree, and the second section 143 may be configured to fix the conducting bar 140 and the positioning plate 130.

[0074] It can be understood that after the first side portion of the first section 141 is attached to the support surface 131 of the boss 133, the through hole 142 of the first section 141 faces the internal threaded hole of the nut. Since no fastener is provided for fixing, the first section 141 is movable, which results in a spatial position changing of the through hole 142 of the first section 141. However, after the first fitting groove 144 of the second section 143 is clamped and fixed with the first buckle of the positioning plate 130, the first end portion of the first section 141 can be fixed.

[0075] In the reactor 100 provided according to the embodiment of the present application, with the arrangement of the second section 143, the first buckle 134 and the first fitting groove 144, a substantial fixation between the conducting bar 140 and the positioning plate 130 is obtained, and a large-scale movement of the first section 141 is reduced by fixation of the first section 141 from its first end, so that a risk that the conducting bar 140 is broken due to a force reduction of the stud on the through hole 142 after the movement is avoided, and the mounting difficulty is decreased.

[0076] In some embodiments, as shown in FIG. 2, the

first fitting groove 144 may be arranged at an end portion of the second section 143 connected with the first section 141.

[0077] In actual use, the first buckle 134 may be spaced apart from a side wall of the boss 133. When the first buckle 134 is fixed with the first fitting groove 144, the clamping force between the first buckle 134 and the first fitting groove 144 is relatively large considering the fixing effect. If the first buckle 134 is closely attached to the side wall of the boss 133, the first buckle 134 abuts against the side wall of the boss 133, and it will be difficult for users to easily fit a head portion of the first buckle 134 into the first fitting groove 144. In case that the first buckle 134 is spaced apart from the side wall of the boss 133, a gap is provided between the first buckle 134 and the side wall of the boss 133, and thus it is easier for the users to fit the first buckle 134 with the first fitting groove 144 by moving the head portion of the first buckle 134 to be slightly leaned toward the boss 133.

[0078] It should be noted that the first fitting groove 144 may also be arranged at other portions of the second section 143. In actual use, during the first buckle 134 is fixed with the first fitting groove 144, the conducting bar 140 may be slightly pulled to enable the first fitting groove 144 on the conducting bar 140 being slightly leaned towards the head portion of the first buckle 134, so that the first buckle 134 can be easily snap fitted with the first fitting groove 144.

[0079] In the reactor 100 provided according to the embodiment of the present application, through the position design of the first fitting groove 144 and the first buckle 134, firstly, the fixing effect on the first end of the first section 141 is optimized by selecting a position with the smallest error for clamping, and secondly, space for the operators to operate has been remained, so that a lot of manpower on the snap-fitting structure can be saved, thus decreasing the mounting time of the relevant operators.

[0080] In some embodiments, as shown in FIG. 3 and FIG. 5, the conducting bar 140 may further include a third section 147 which is connected with the second section 143 and forms a bent structure with the second section 143. The third section 147 is parallel to the first section 141 and extends in an opposite direction relative to the second section 143, and the lead-out end of the coil assembly 120 may have a copper bar 121, with which the third section 147 is lap jointed.

[0081] The third section 147 and the second section 143 may be integrally formed, bolted connected or bonded with each other. For example, in some embodiments, the third section 147 is integrated with the second section 143.

[0082] The third section 147 may be connected with the copper bar 121 by welding, hot melting or adhesive bonding or the like. For example, in some embodiments, the third section 147 is connected with the copper bar 121 by welding.

[0083] In actual use, the conducting bar 140 may in-

clude the third section 147, the second section 143, the first section 141 that are connected in sequence and a flange 145. The third section 147 may be arranged in parallel with the support surface 131 of the positioning plate 130 and may be lap jointed with the coil assembly 120 by the copper bar 121. The second section 143 may be arranged perpendicular to the third section 147 and may be snap fitted with the first buckle 134 of the positioning plate 130. The first section 141 may be arranged in parallel with the third section 147, in other words, the first section 141 may be perpendicular to the second section 143. The first section 141 may be further attached to the boss 133 of the positioning plate 130 and connected with the external electrical component, so that the reactor 100 can be electrically connected with the external electrical component. The flange 145 may be arranged perpendicular to the third section 147, that is, the flange 145 is parallel to the second section 143, and the flange 145 may be snap fitted with the second buckle 136 of the positioning plate 130.

[0084] In the reactor 100 provided according to the embodiment of the present application, with the arrangement of the third section 147 and the copper bar 121, the electrical connection between the conducting bar 140 and the coil assembly 120 is obtained, and the port is led out by using the rigid conducting bar 140, without being led out through the conventional cables and crimping terminals, thus simplifying the overall design of the reactor 100 and further reducing the manufacturing cost.

[0085] In some embodiments, as shown in FIG. 2 and FIG. 5, the conducting bar 140 may further include a flange 145 connected with the second end portion of the first section 141. The first section 141 and the flange 145 may form a bent structure, and the flange 145 may be provided with a second fitting groove 146. The positioning plate 130 may include a second buckle 136 arranged on the plate body 132, and the second buckle 136 may be snap fitted with the second fitting groove 146.

[0086] The second buckle 136 and the plate body 132 may be integrally formed, bolted connected or bonded with each other. For example, in some embodiments, the second buckle 136 may be integrated with the plate body 132.

[0087] The first section 141 and the flange 145 may be integrally formed, bolted connected or bonded with each other. For example, in some embodiments, the first section 141 is integrated with the flange 145.

[0088] It can be understood that after the first side portion of the first section 141 is attached to the support surface 131 of the boss 133, the through hole 142 of the first section 141 faces the internal threaded hole of the nut. Since no fastener is provided for fixing, the first section 141 is movable, which results in the spatial position changing of the through hole 142 of the first section 141. However, after the second fitting groove 146 of the flange 145 is snap fitted and fixed with the second buckle 136 of the positioning plate 130, the second end portion of the first section can be fixed.

[0089] In the reactor 100 provided according to the embodiment of the present application, with the arrangement of the flange 145, the second buckle 136 and the second fitting groove 146, as well as the arrangement of the second section 143, the first buckle 134 and the first fitting groove 144, a further fixation between the conducting bar 140 and the positioning plate 130 is obtained, the large-scale movement of the first section 141 is decreased, and the risk that the conducting bar 140 is broken due to a force reduction of the stud on the through hole 142 after the movement is avoided, thus reducing the mounting difficulty.

[0090] In some embodiments, as shown in FIG. 1, FIG. 4 and FIG. 6 to FIG. 7, the number of the coil assembly 120 may be multiple, and multiple sets of conductive bars 140 may be provided corresponding to the multiple coil assemblies 120, respectively. The positioning plate 130 may be provided with multiple sets of support surfaces 131 arranged in parallel with each other, and the first sections 141 of the multiple sets of conductive bars 140 may be supported on the multiple sets of support surface 131, respectively.

[0091] Multiple may refer to two or more. For example, in some embodiments, the number of the coil assembly 120 may be seven, and correspondingly, seven sets of conductive bars 140 are provided corresponding to the seven coil assemblies 120, respectively. The positioning plate 130 may be provided with seven sets of bosses 133 corresponding to the seven sets of conductive bars 140, where each of the seven sets of bosses 133 is provided with a set of support surfaces 131 arranged in parallel, and the third sections 147 of the seven sets of conductive bars 140 may be supported on the seven sets of support surfaces 131, respectively.

[0092] A set of conductive bars 140 may include multiple conductive bars, and multiple may refer to two or more. For example, in some embodiments, a set of conductive bars 140 includes two conductive bars. Accordingly, a set of bosses 133 also includes two bosses, and a set of support surfaces 131 also includes two support surfaces.

[0093] In this embodiment, multiple reactors 100 may be assembled into a whole, and then multiple coil assemblies 120 in the multiple reactors 100 are assembled correspondingly. One reactor 100 has one set of conductive bars 140 and one set of bosses 133. Similarly, multiple sets of conductive bars 140 correspond to multiple reactors 100, and multiple sets of bosses 133 correspond to multiple reactors 100.

[0094] In the reactor 100 provided according to the embodiment of the present application, by setting the number of the reactors 100, a combination of the multiple coil assemblies 120 and the lead-out of multiple ports are obtained, and the multiple reactors 100 are uniformly assembled and integrated into a whole, so that the overall structural layout of the reactors 100 is simplified, the mounting is easily, the overall volume of the reactors 100 is reduced, and the system integration is improved. Also,

encapsulation of the multiple reactors 100 can be completed at one time, which improves the production efficiency and reduces the manufacturing cost compared with a single encapsulation.

[0095] An electrical device 200 is disclosed according to the present application.

[0096] In some embodiments, as shown in FIG. 6 to FIG. 8, the electrical device 200 includes a case 300, a circuit board 400 and the reactor 100 as described in any one of the above.

[0097] A bottom wall of the case 300 is provided with an avoidance opening 310.

[0098] The case 300 may be used as a main frame to hold various electrical components in the electrical device 200. The case 300 may be made of plastic material or metal material, where the plastic material may include but not limited to ABS (acrylonitrile butadiene styrene), HIP (High Impact Polystyrene) and PC (Polycarbonate), and the metal material may include but not limited to aluminum alloy, stainless steel, sheet metal or titanium alloy or the like. For example, in some embodiments, the case 300 is made of plastic material.

[0099] The circuit board 400 is mounted on the case 300.

[0100] The circuit board 400 may be used as a carrier for the electrical connection of the electrical components. As shown in FIG. 6 to FIG. 8, the circuit board 400 may be mounted in the case 300 of the electrical device 200.

[0101] Connection manner between the circuit board 400 and the case 300 may include, but not limited to bolted connection, adhesive bonding, welding connection or the like. For example, in some embodiments, the circuit board 400 is bolted connected with the case 300.

[0102] The housing 110 is connected to the case 300, and the conducting bar 140 is extended into the case 300 through the avoidance opening 310 and is electrically connected with the circuit board 400.

[0103] As shown in FIG. 6 to FIG. 8, the conducting bar 140 may be arranged on one side, close to the bottom wall of the case 300, of the reactor 100, and the reactor 100 may be fixedly connected to the bottom wall of the case 300, and thus the contact between the conducting bar 140 and the circuit board 400 is achieved.

[0104] In the actual use, the circuit board 400 is mounted on the bottom wall of the case 300, and the conducting bar 140 of the reactor 100 is aligned with the avoidance opening 310 in the bottom wall. The conducting bar 140 of the reactor 100 passes through the avoidance opening in the bottom wall and abuts against the circuit board 400, and in that case the case 300 and the reactor 100 are fixed with each other. After the case 300 and the reactor 100 has been fixed, the circuit board 400 is in electrical connection with the conducting bar 140 of the reactor 100, and a fastening operation can be performed at the connection position between the conducting bar 140 of the reactor 100 and the circuit board 400.

[0105] In the embodiment of the present application, firstly, common cables are replaced by the conductive

bars 140, so that the phenomenon of electric leakage caused by cable breakage in the event of long-term use is avoided, and the number of parts is also reduced. Secondly, the circuit board 400 can be arranged in the case 300, the reactor 100 can be arranged outside the case 300, and the conductive bars 140 directly pass through the avoidance opening 310 of the bottom wall of the case 300 to be electrically connected with the circuit board 400, enabling the reactor 100 to be freed from the limited space in the case 300, preventing the reactor 100 from occupying too much space in the case 300, and also simplifying the structural layout in the case 300.

[0106] In the electrical device provided according to the embodiment of the present application, with the arrangement of the case, the circuit board and the reactor as well as the connection design of the conductive bar, the risk of electric leakage caused by damaged wire sheath during the mounting and use is eliminated, so that the system is simplified and more reliable. The phenomenon of an increased overall volume of the case caused by large-volume components being piled up in the case can be avoided, thus improving the utilization rate of the overall space inside the case.

[0107] A photovoltaic energy storage system is further disclosed according to the present application.

[0108] In some embodiments, the photovoltaic energy storage system includes a photovoltaic module, a battery, and an electrical device 200 as described above.

[0109] The photovoltaic module can be electrically connected to the electrical device 200, and the battery can be electrically connected to the electrical device 200.

[0110] The photovoltaic module is configured to convert solar energy into electric energy, and the electrical device 200 may be a photovoltaic inverter. The electrical device 200 can convert the direct current generated by photovoltaic modules into a usable alternating current, and finally, it can store the alternating current into batteries or connect the alternating current to the power grid.

[0111] In the photovoltaic energy storage system provided according to the embodiment of the present application, with the arrangement of the electrical device 200 described above, the power generation of the system is more stable and persistent, efficiency of the electricity utilization is improved, and cost of the electricity utilization is reduced. Also, the failure risk of the energy storage system is reduced, so that the safety is greatly improved and the working performance of the whole system is optimized. In this specification and the claims of the present application, the terms "first", "second", and so on are intended to distinguish similar objects but do not necessarily indicate a specific order or sequence. It should be understood that data used in this way is interchangeable in a suitable case, so that the embodiments of the present application described herein can be implemented in a sequence in addition to the sequence shown or described herein. The objects distinguished by "first", "second" and so on usually belong to a same class, and the number of objects is not limited, for example, the number of the

first object may be one or multiple. In addition, "and/or" in the specification and claims means at least one of the connected objects, and symbol "/" generally indicates that a former object and a latter object are associated by an "or" relationship.

[0112] In the description of the present application, it is required to understand that the orientation or position relationship indicated by the terms "up", "down", "top", "bottom", "inside", "outside", and so on is based on an orientation or position relationship shown in the drawings. The terms are only for convenience of describing the present application and simplifying the description, but not for indicating or implying that a device or element referred to is required to have a specific orientation, be constructed and operated in a specific orientation, so that the terms cannot be understood as a limitation of the present application.

[0113] In the description of the present application, "the first feature" and "the second feature" may include one or more of the features.

[0114] In the description of the present application, "multiple" means two or more.

[0115] In the description of the present application, the first feature "on" or "under" the second feature may include direct contact between the first feature and second feature, and may also include that the first feature and second feature are not in direct contact but through another feature contact between them.

[0116] In the description of the present application, the first feature "above", "over" and "on" the second feature includes that the first feature is directly above and obliquely above the second feature, or simply indicates that the first feature is higher in horizontal height than the second feature.

[0117] Any reference in this specification to "an embodiment", "some embodiments", "exemplary embodiment", "example", "specific example" or "some examples", and so on means that a particular feature, structure, material or characteristic described in connection with the embodiment is included in at least one embodiment of the present application. In the specification, the schematic expressions of the above terms do not necessarily refer to the same embodiment or example. Furthermore, the specific features, structures, materials or characteristics described may be combined in any one or more embodiments or examples in a suitable manner.

[0118] Although the embodiments of the present application are shown and described, those skilled in the art should understand that various changes, modifications, substitutions and alterations may be made to these embodiments without departing from the principle and spirit of the present application, and the scope of the present application is defined by the claims and their equivalents..

Claims**1.** A reactor, comprising:

a housing, which is provided with a support pillar; 5
 a coil assembly, which is fitted in the housing;
 a positioning plate, which is mounted on the support pillar and is provided with a support surface; and
 a conductive bar, which is electrically connected 10
 with a lead-out end of the coil assembly, wherein the conducting bar has a first section, and a first side portion of the first section is supported on the support surface.

2. The reactor according to claim 1, wherein the positioning plate comprises:

a plate body, which is connected with the support pillar; and 20
 a boss, which is arranged on the plate body, wherein an end face of the boss away from the coil assembly forms the support surface.

3. The reactor according to claim 2, wherein the boss protrudes away from the coil assembly relative to the plate body, and a second side portion of the first section is configured for electrical connection with an external electrical component. 25**4.** The reactor according to claim 2, wherein the first section has a through hole, the boss is provided with a threaded connection structure facing the through hole, and the threaded connection structure is configured for being connected with the external electrical component. 30 35**5.** The reactor according to claim 2, wherein the boss is provided with a mounting groove, and a nut is arranged in the mounting groove. 40**6.** The reactor according to claim 1, wherein the conducting bar comprises a second section connected with a first end portion of the first section, and the first section and the second section form a bent structure, wherein the second section is provided with a first fitting groove, the positioning plate comprises a first buckle arranged on the plate body, and the first buckle is snap fitted with the first fitting groove. 45 50**7.** The reactor according to claim 5, wherein the first fitting groove is arranged at the end portion of the second section connected with the first section.**8.** The reactor according to claim 5, wherein the conducting bar further comprises a third section, which is connected with the second section and forms a bent structure with the second section, and the third 55

section is parallel to the first section and extends in an opposite direction about the second section, wherein the lead-out end of the coil assembly is provided a copper bar, and the third section is lap jointed with the copper bar.

9. The reactor according to claim 1, wherein the conducting bar further comprises a flange connected with the second end portion of the first section, the first section and the flange form a bent structure, and the flange is provided with a second fitting groove, wherein the positioning plate comprises a second buckle arranged on the plate body, and the second buckle is snap fitted with the second fitting groove.**10.** The reactor according to any one of claims 1 to 8, wherein the number of the coil assembly is a plurality, and a plurality of sets of conductive bars are provided corresponding to the plurality of coil assemblies, respectively, wherein the positioning plate is provided with a plurality of sets of support surfaces arranged in parallel with each other, and the first sections of the plurality of sets of conductive bars are supported on the plurality of sets of support surfaces, respectively.**11.** An electrical device, comprising:

a case, a bottom wall of which is provided with an avoidance opening;
 a circuit board, which is mounted on the case; and
 the reactor according to any one of claims 1 to 10, wherein the housing is connected with the case, and the conducting bar extends into the case through the avoidance opening and is electrically connected with the circuit board.

12. A photovoltaic energy storage system, comprising:

the electrical device according to claim 11;
 a photovoltaic module, where the photovoltaic module is electrically connected with the electrical device; and
 a battery, wherein the battery is electrically connected with the electrical device.

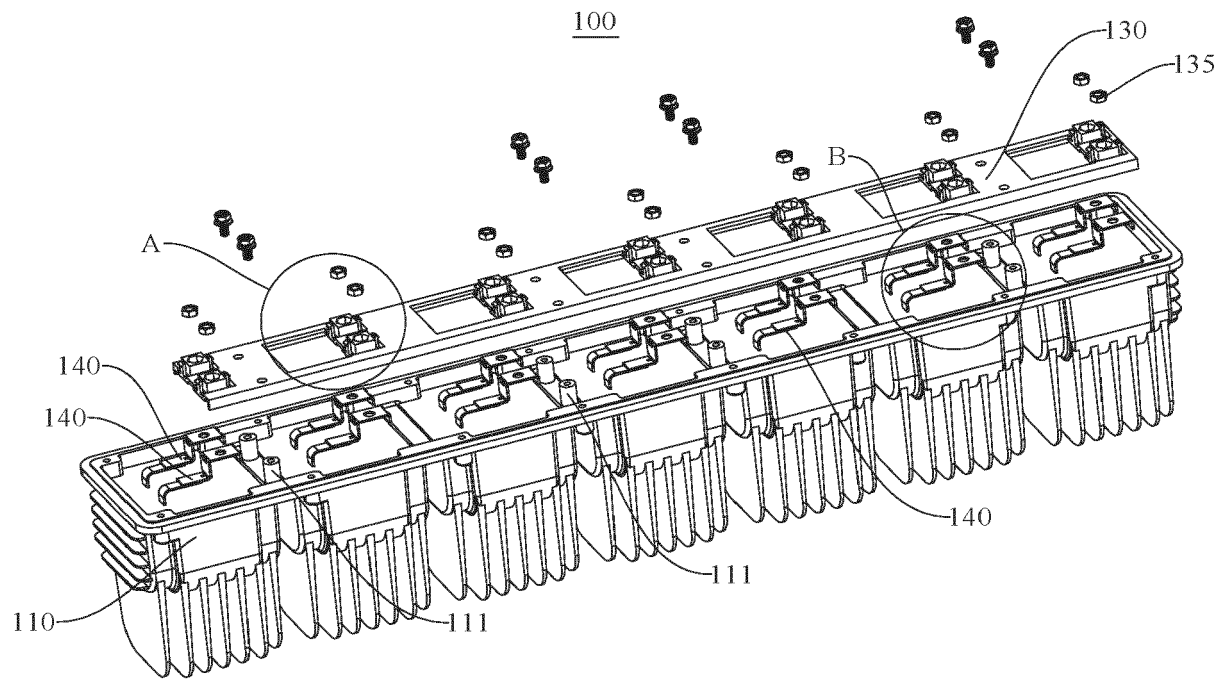


FIG. 1

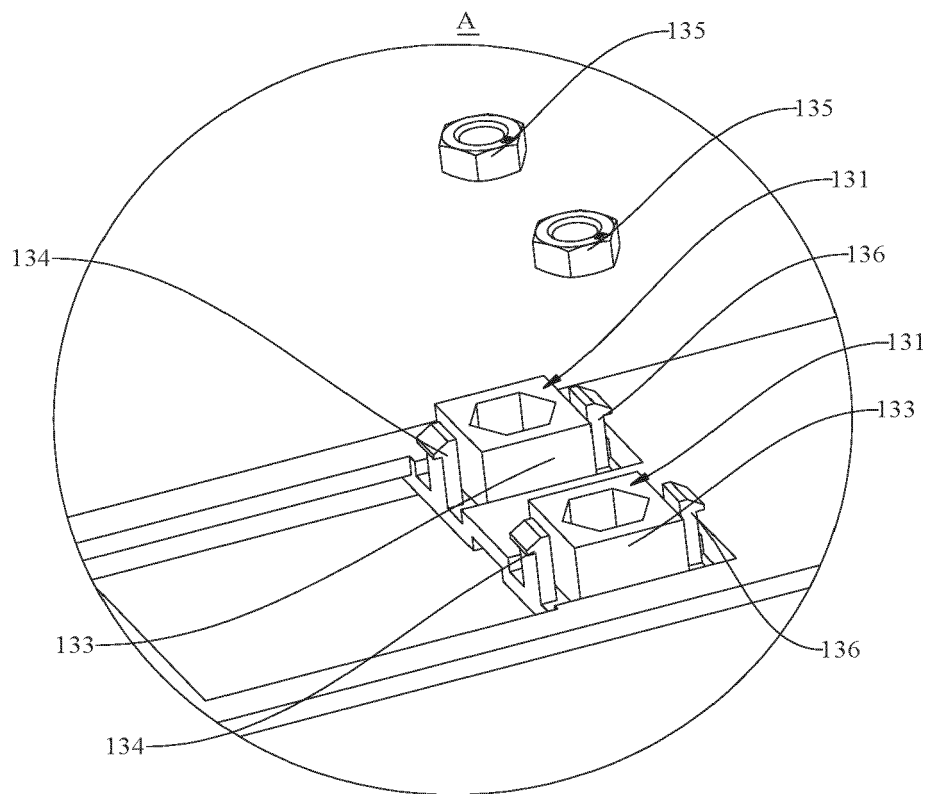


FIG. 2

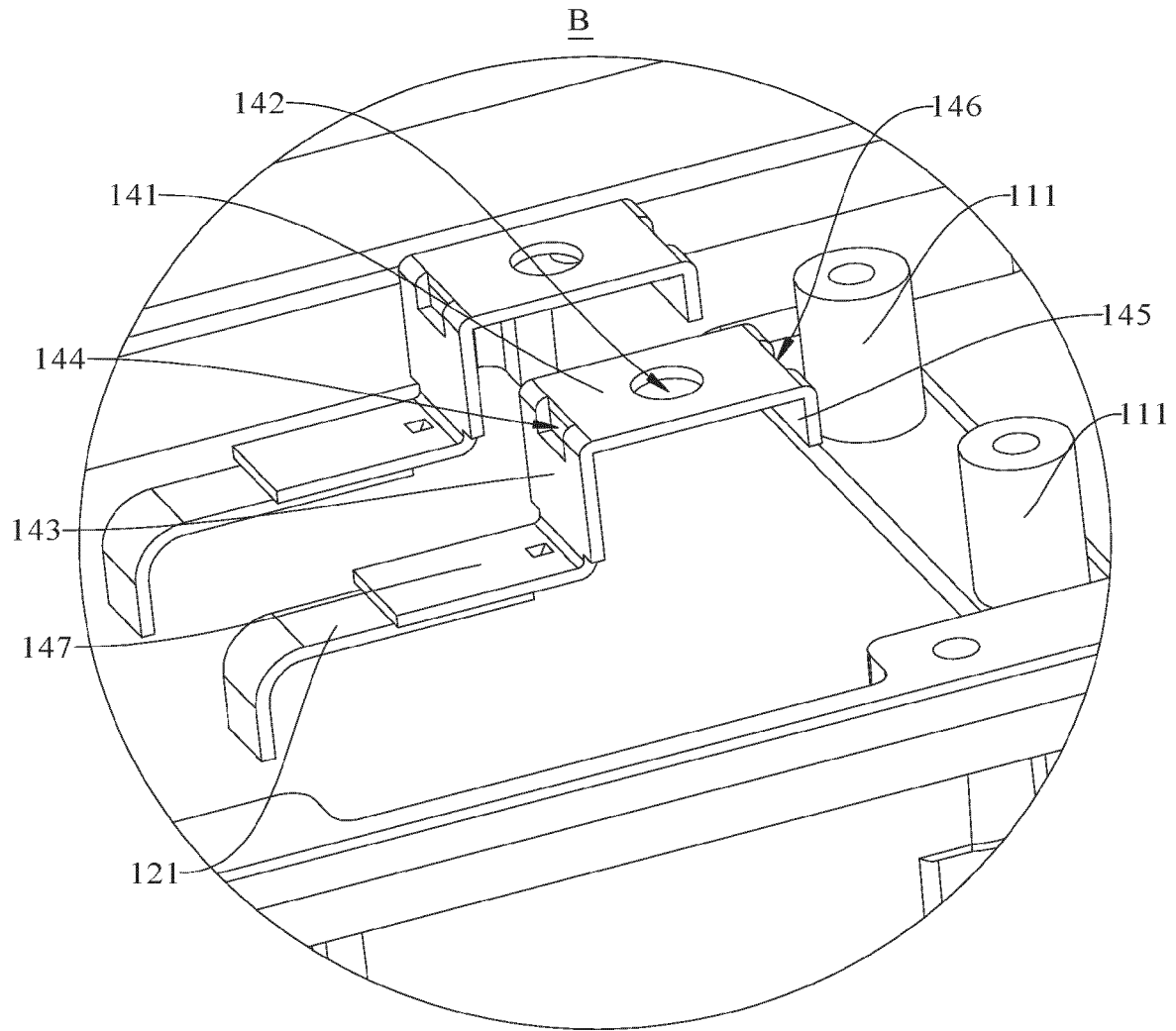


FIG. 3

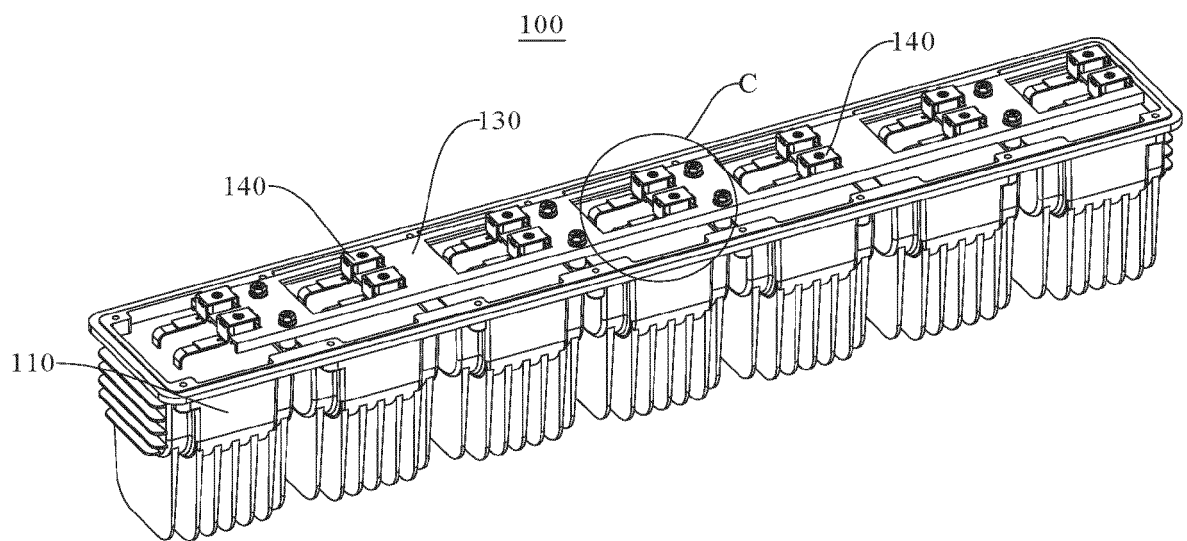


FIG. 4

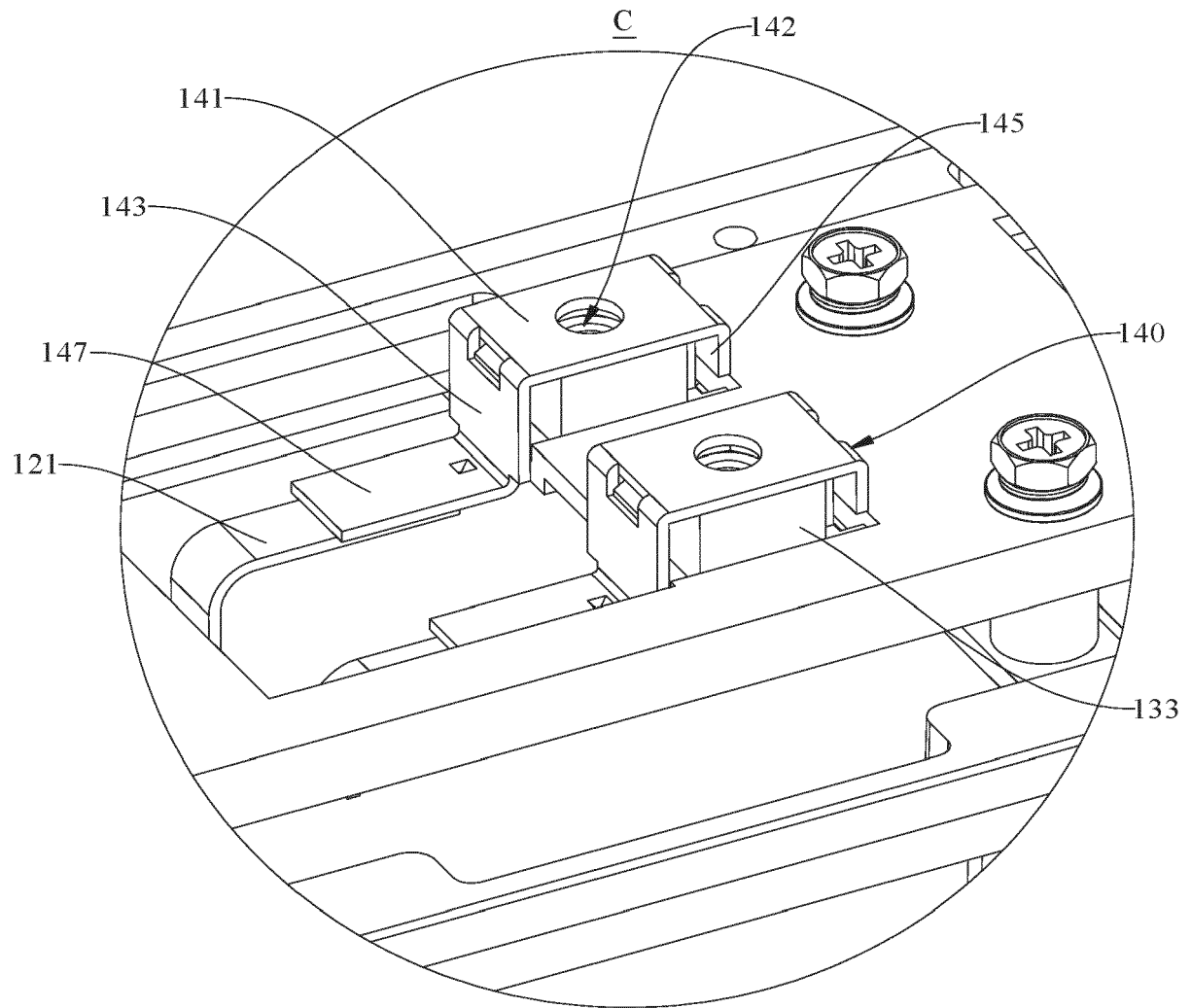


FIG. 5

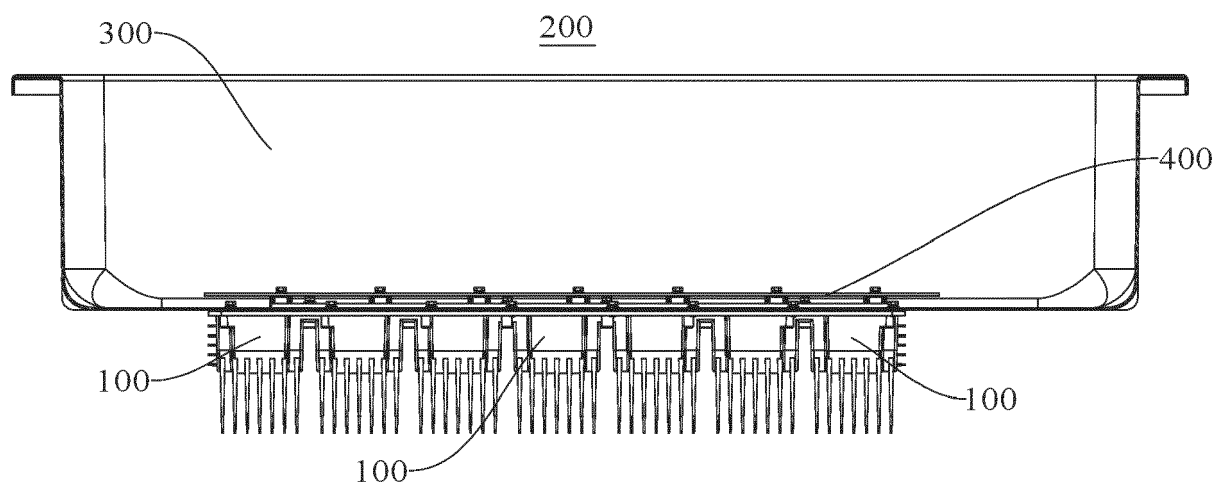


FIG. 6

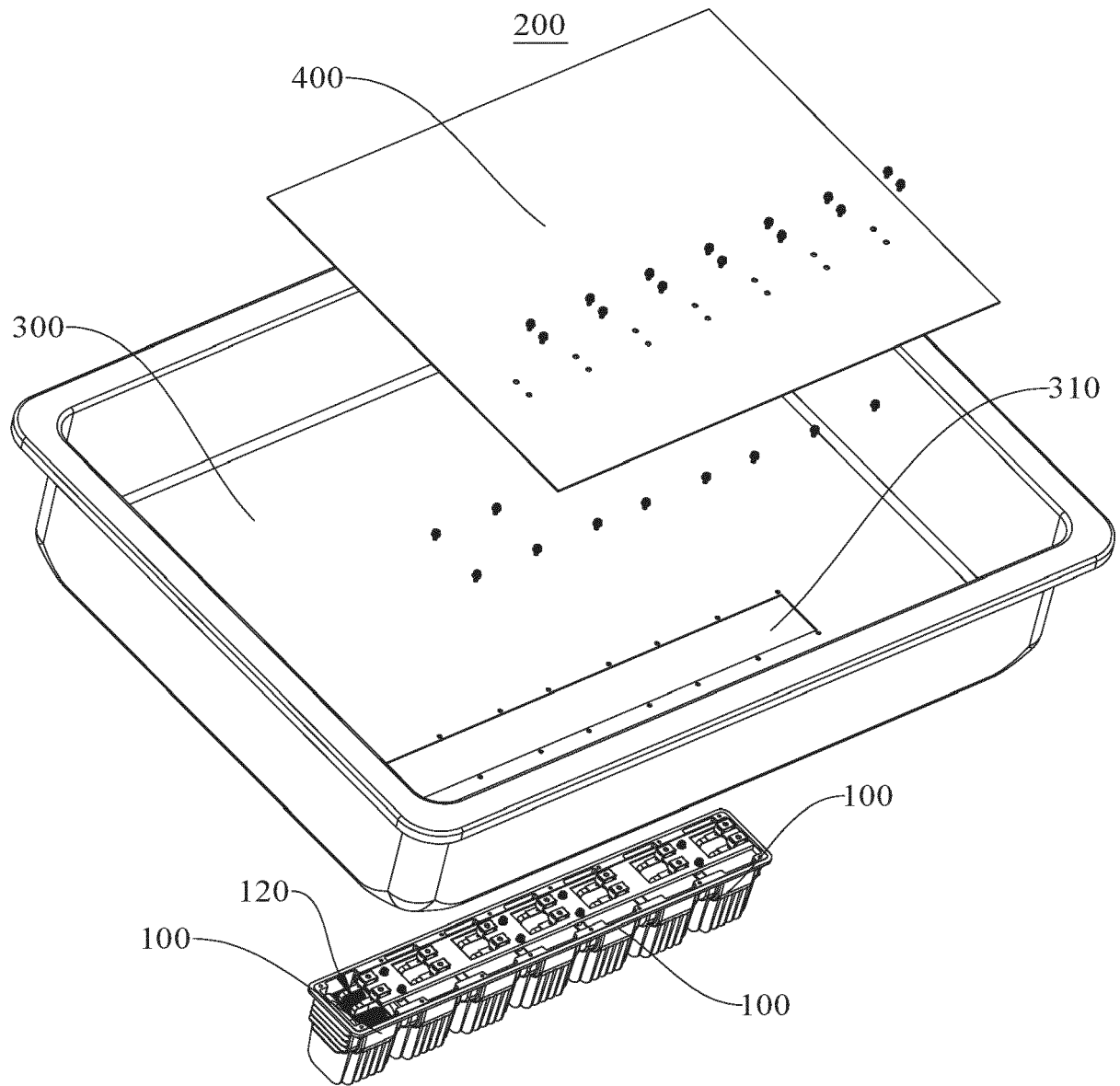


FIG. 7

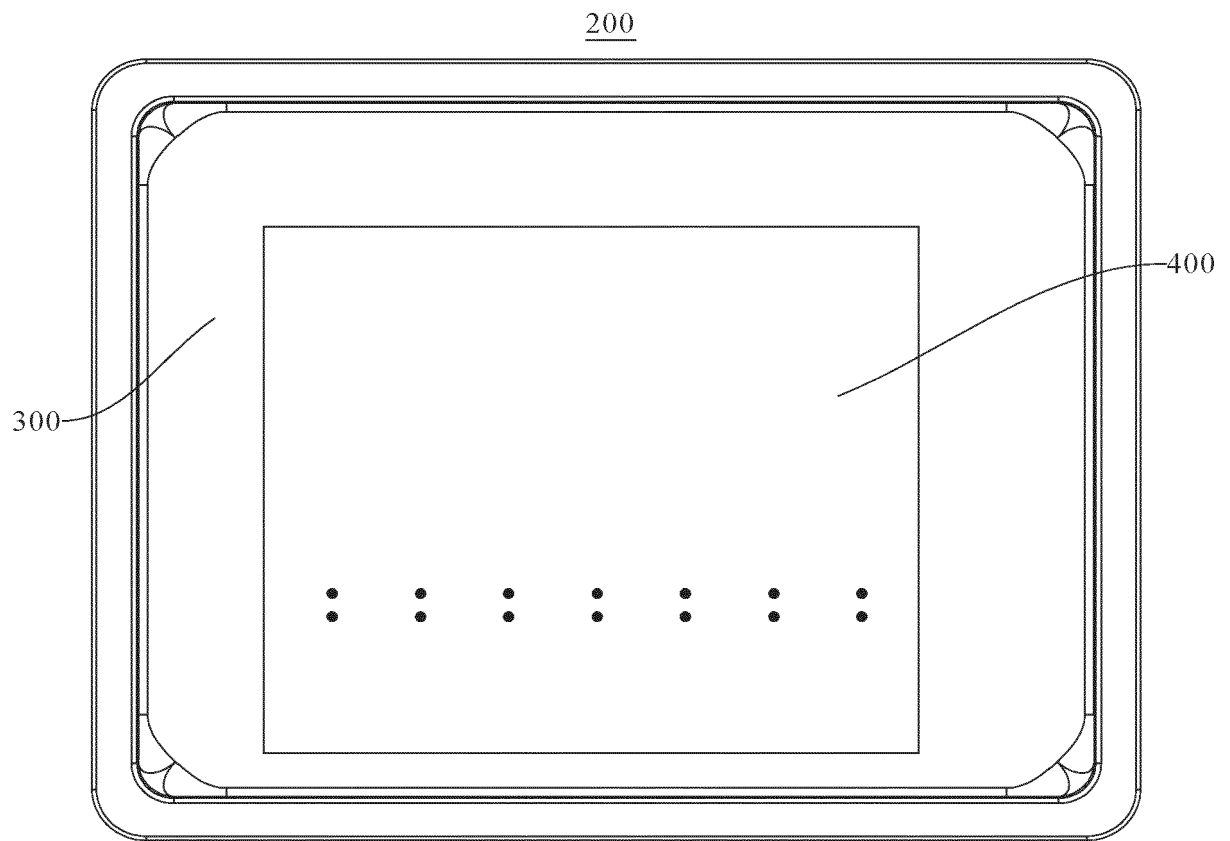


FIG. 8



EUROPEAN SEARCH REPORT

Application Number

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A	* abstract *	8	H01F5/04
	* paragraph [0019] - paragraph [0031];		H01F27/02
	figures 1-5 *		H01F27/06
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A	* abstract *	8	H05K5/02
	* column 3, line 12 - column 4, line 39;		
	figures 2, 7, 8 *		
	* column 6, line 26 - column 7, line 59 *		

A	US 2018/077792 A1 (HORIE TAKASHI [JP] ET AL) 15 March 2018 (2018-03-15)	1-12	
	* abstract *		
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H01F
H05K

The present search report has been drawn up for all claims

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Place of search

Munich

Date of completion of the search

20 March 2024

Examiner

Warneck, Nicolas

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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L : document cited for other reasons

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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