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Inventor(s)	CHEN; Yifeng et al.

ISOLATING PLATE ASSEMBLY, BATTERY MODULE, BATTERY PACK, AND ELECTRICAL DEVICE

Abstract

An isolating plate assembly, a battery module, a battery pack, and an electrical device. The isolating plate assembly includes an isolating plate, provided with a plurality of busbar mounting positions; busbars, mounted at the busbar mounting positions; an output electrode, having a first fixing portion and a second fixing portion, the first fixing portion being electrically connected to at least one busbar; and an insulating plate, having a first connecting portion and a second connecting portion, the first connecting portion being connected to the isolating plate, and the second connecting portion being connected to the second fixing portion.

Inventors: **CHEN; Yifeng (Ningde, CN), PENG; Chenqin (Ningde, CN), LI; Jinfeng (Ningde, CN), CHEN; Kaihua (Ningde, CN), HUANG; Yangzhi (Ningde, CN)**

Applicant: **CONTEMPORARY AMPEREX TECHNOLOGY (HONG KONG) LIMITED** (Hong Kong, CN)

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation of International Application No. PCT/CN2022/138067, filed on Dec. 9, 2022, which claims priority to Chinese patent application 202222868612.5 entitled “ISOLATING PLATE ASSEMBLY, BATTERY MODULE, BATTERY PACK, AND ELECTRICAL DEVICE” and filed on Oct. 31, 2022, which are incorporated herein by reference in their entirety.

TECHNICAL FIELD
[0002] This application relates to the field of battery technologies, and specifically, to an isolating plate assembly, a battery module, a battery pack, and an electrical device.
BACKGROUND
[0003] A distance between an output electrode of a battery module or a battery pack and a cell assembly is not fixed. When the distance is long, the output electrode is excessively long, and is likely to crack and fail during transportation and latching.
SUMMARY
[0004] In view of the foregoing problem, this application provides an isolating plate assembly, a battery module, a battery pack, and an electrical device, to provide a more stable connection to an output electrode, thereby preventing occurrence of the problem that the output electrode cracks and fails.
[0005] According to a first aspect, this application provides an isolating plate assembly, including:
[0006] an isolating plate, provided with a plurality of busbar mounting positions; [0007] busbars, a busbar being mounted at each of the busbar mounting positions; [0008] an output electrode, having a first fixing portion and a second fixing portion, the first fixing portion being electrically connected to at least one busbar; and [0009] an insulating plate, having a first connecting portion and a second connecting portion, the first connecting portion being connected to the isolating plate, and the second connecting portion being connected to the second fixing portion.
[0010] In the technical solution of this embodiment of this application, the insulating plate is connected to the output electrode, the isolating plate is connected to the insulating plate, and the output electrode is electrically connected to the busbar, so that fixing of the output electrode can be strengthened, and occurrence of the problem that the output electrode cracks and fails during transportation and latching can be effectively prevented.
[0011] In some embodiments, the second connecting portion is bonded to the second fixing portion, and a glue layer is disposed between the second connecting portion and the second fixing portion.
[0012] Therefore, the output electrode can be more stably connected to the insulating plate, to prevent occurrence of the problem that the output electrode cracks and fails due to a relatively large torque that occurs during transportation and latching.
[0013] In some embodiments, the isolating plate includes: [0014] a first insulating plate body; and [0015] a second insulating plate body, the second insulating plate body and the first insulating plate body being stacked, the busbars being disposed between the first insulating plate body and the

second insulating plate body, and the first connecting portion being located between the first insulating plate body and the second insulating plate body.
[0016] Therefore, the first connecting portion may be sandwiched between the first insulating plate body and the second insulating plate body, to implement a securer connection.
[0017] In some embodiments, the first connecting portion is connected to the first insulating plate body; and/or the first connecting portion is connected to the second insulating plate body.
[0018] Therefore, reliability of the connection between the insulating plate and the isolating plate can be further improved.
[0019] In some embodiments, at least one busbar of the plurality of busbars presses the first connecting portion against the first insulating plate body or the second insulating plate body.
[0020] Therefore, the insulating plate can be more securely fixed.
[0021] In some embodiments, the second fixing portion is a plate-shaped structure, and the second fixing portion is disposed above the second connecting portion in a transverse direction.
[0022] Therefore, the volume of the output electrode in a thickness direction of the isolating plate can be reduced, so that the battery module or the battery pack is more compact.
[0023] In some embodiments, an upper surface of the isolating plate is provided with a glue storage groove, the glue storage groove is located at a bottom of the output electrode, and the glue storage groove is configured to store glue, so that the bottom of the output electrode is bonded to the insulating plate.
[0024] Glue is injected into the glue storage groove. When the glue storage groove is filled with the glue, the second fixing portion of the output electrode can be fixedly bonded to the second connecting portion, so that the second fixing portion of the output electrode is more securely fixed.
[0025] In some embodiments, in a thickness direction of the isolating plate, the insulating plate is provided with a through glue injection hole, and the glue injection hole is configured to deliver glue to a top of a battery cell, so that a bottom of the insulating plate is fixedly bonded to the top of the battery cell.
[0026] The glue injection hole runs through the insulating plate, and glue may be injected into the glue injection hole from the top of the insulating plate, so that glue is injected after the isolating plate assembly is mounted, thereby facilitating mounting.
[0027] In some embodiments, an upper surface of the insulating plate is provided with a glue injection groove, a groove bottom of the glue injection groove is shallower than a groove bottom of the glue storage groove in the thickness direction of the isolating plate, the glue injection groove is provided with a glue discharge port, and the glue discharge port is in communication with the glue storage groove and is configured to discharge glue to the glue storage groove.
[0028] The groove bottom of the glue injection groove is shallower than the groove bottom of the glue storage groove. When glue is injected into the glue injection groove, the glue flows into the glue storage groove under the gravity of the glue, so that the bottom of the output electrode is insulatively fixedly bonded to the insulating plate. The disposition of the glue injection groove may better facilitate glue injection, and the isolating plate and the insulating plate do not need to be first applied with glue and then mounted together, thereby simplifying an assembly process.
[0029] In some embodiments, the glue injection hole is located in the glue injection groove.
[0030] Glue may be injected into the glue injection hole or the glue injection groove or into both the glue injection hole and the glue injection groove, to implement bonding and fixing between the insulating plate and the battery cell and between the insulating plate and the output electrode, so that operations are easier and more convenient.
[0031] In some embodiments, a reinforcing rib is disposed in the glue injection hole.
[0032] Therefore, the connection between the glue and the insulating plate can be implemented, thereby improving the strength of the insulating plate.
[0033] In some embodiments, a glue injection observation window is provided on the insulating plate, and the glue injection observation window runs through the insulating plate in a thickness

direction of the insulating plate.
[0034] Therefore, it can be determined, by using the glue injection observation window, whether the amount of glue flowing from the glue injection hole to the battery cell is excessively large.
[0035] According to a second aspect, this application provides a battery module, including: [0036] at least one battery cell; and [0037] the isolating plate assembly of the first aspect, located at a top of the battery cell, the battery cell being connected to the insulating plate.
[0038] The battery module of this application includes the technical feature of the isolating plate assembly of the first aspect, and achieves an effect the same as that described above, and details are not described herein again.
[0039] In some embodiments, the top of the battery cell is fixedly bonded to a bottom of the insulating plate.
[0040] Therefore, the insulating plate can be made securer. Further, the second fixing portion of the output electrode is more reliably fixed, and occurrence of the problem that the output electrode cracks and fails during transportation and latching can be prevented.
[0041] According to a third aspect, this application provides a battery pack including the foregoing battery module.
[0042] The battery pack of this application includes the technical feature of the isolating plate assembly of the first aspect, and achieves an effect the same as that described above, and details are not described herein again.
[0043] According to a fourth aspect, this application provides an electrical device, including the battery module of the second aspect, the battery module being configured to supply electric energy; or including the battery pack of the third aspect, the battery pack being configured to supply electric energy.
[0044] In the technical solution of this embodiment of this application, the electrical device includes the technical feature of the isolating plate assembly, and achieves a technical effect the same as that described above, and details are not described herein again.
[0045] The above description only refers to an overview of the technical solution of this application. In order to understand the technical means of this application more clearly, it can be implemented according to the content of the description. In order to make the above-mentioned and other purposes, features and advantages of this application more apparent, the specific implementations of this application are listed below.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0046] Various other advantages and benefits will become apparent to those of ordinary skill in the art upon reading the following detailed description of implementations. The accompanying drawings are only for the purpose of illustrating some implementations and are not construed as limiting this application. In addition, in all the accompanying drawings, same parts are indicated by the same reference numerals. In the accompanying drawings:
[0047] FIG. **1** is a schematic diagram of a structure of a vehicle as an electrical device according to some embodiments of this application;
[0048] FIG. **2** is a schematic diagram of an exploded structure of a battery pack according to some embodiments of this application;
[0049] FIG. **3** is a schematic diagram of an exploded structure of a battery cell according to some embodiments of this application; and
[0050] FIG. **4** is a schematic diagram of a locally exploded structure of a battery pack according to some embodiments of this application, where a first insulating plate body is omitted in the figure;
[0051] FIG. **5** is a locally schematic diagram of a battery pack according to some embodiments of

this application;
[0052] FIG. **6** is an axonometric drawing of an insulating plate of an isolating plate assembly according to some embodiments of this application; and
[0053] FIG. **7** is a locally cross-sectional view of an insulating plate of an isolating plate assembly according to some embodiments of this application.
[0054] Reference numerals in the specific implementations are as follows: [0055] vehicle **1000**; [0056] battery pack **100**; [0057] battery pack housing **10**, box **11**, and upper cover **12**; [0058] battery cell **20**, top cover assembly **21**, electrode terminal **21***a*, housing **22**, electrode assembly **23**, positive electrode tab **23***a*, and negative electrode tab **23***b;* [0059] isolating plate **31**, first insulating plate body **311**, second insulating plate body **312**, busbar **32**, output electrode **33**, first fixing portion **331**, second fixing portion **332**, insulating plate **34**, first connecting portion **34***a*, second connecting portion **34***b*, glue injection hole **341**, glue injection groove **342**, glue storage groove **343**, enclosure **344**, glue injection observation window **345**, and thickness direction A of the isolating plate **31**; [0060] controller **200**; [0061] motor **300**.

DETAILED DESCRIPTION

[0062] The embodiments of the technical solutions of this application will be described in detail below with reference to the accompanying drawings. The following embodiments are only used to illustrate the technical solutions of this application more explicitly, and are thus only interpreted as examples, rather than used to limit the protection scope of this application.
[0063] Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by those skilled in the technical filed to which this application belongs. The terminology used herein is for the purpose of describing particular embodiments only and is not intended to limit this application. The terms “including” and “having” and any variations thereof in the description and claims of this application and the above description of the accompanying drawings are intended to cover non-exclusive inclusions.
[0064] In the description according to the embodiments of this application, the technical terms “first”, “second”, and the like are only used to distinguish different objects, and should not be understood as indicating or implying relative importance or implying the number, specific order or primary and secondary relationship of indicated technical features. In the description according to the embodiments of this application, “a plurality of” means two or more, unless otherwise expressly and specifically defined.
[0065] Reference herein to an “embodiment” means that a specific feature, structure, or characteristic described in connection with the embodiment can be included in at least one embodiment of this application. The appearances of the phrase in various places in the specification are not necessarily all referring to the same embodiment, nor a separate or alternative embodiment that is mutually exclusive of other embodiments. It shall be explicitly and implicitly understood by those skilled in the art that the embodiments described herein may be combined with other embodiments.
[0066] In the description of this application, the term “and/or” is merely an association to describe the associated objects. It can mean that there are three kinds of relationships, such as A and/or B, which means that A exists alone, A and B exist at the same time, and B exists alone. In addition, in this specification, the character “/” usually indicates an “or” relationship between the associated objects.
[0067] In the description of the embodiments of this application, the term “a plurality of” means two or more (including two). Similarly, “a plurality of groups” means two or more groups (including two groups), and “a plurality of pieces” means two or more pieces (including two pieces).
[0068] In the description according to the embodiments of this application, the directions or positional relationships indicated by the technical terms such as “center”, “longitudinal”, “transverse”, “length”, “width”, “thickness”, “upper”, “lower”, “front”, “rear”, “left”, “right”,

“vertical”, “horizontal”, “top”, “bottom”, “inside”, “outside”, “clockwise”, “counterclockwise”, “axial”, “radial”, and “circumferential”, are only for the convenience of describing this application and simplifying the description, rather than indicating or implying that the involved apparatus or element should have a specific orientation or should be configured or operated in the specific orientation, therefore, they cannot be understood as limiting this application.

[0069] In the description according to the embodiments of this application, unless otherwise expressly specified and defined, the technical terms “mounted”, “connected to”, “connected with”, “fixed”, or the like should be interpreted in a broad sense. For example, a connection may refer to a fixed connection, a disassembly connection or an integral connection; or may refer to a mechanical connection or an electrical connector; or may refer to a direct connection or an indirect connection through an intermediate medium; or may refer to an internal communication between the two elements or the interaction relationship between the two elements. For those of ordinary skill in the art, the specific meanings of the above terms in this application may be interpreted according to specific situations.

[0070] The applicant notes that after an output electrode and an output bar of a battery module or a battery pack are electrically connected, a part of the output electrode is suspended, to become a cantilever structure. During transportation and latching, the cantilever is far relative to a connection position of the output electrode and the output bar, and is subject to a large force, and the output electrode is prone to crack and fail during transportation and latching.

[0071] To resolve the foregoing problem, the applicant finds through research that an insulating plate may be disposed between a second fixing portion **332** of the output electrode and an isolating plate **31**, and the second fixing portion **332** of the output electrode and the isolating plate **31** are separately fixed to the insulating plate, which can strengthen the output electrode, and can avoid occurrence of the problem that the output electrode is prone to crack and fail during transportation and latching.

[0072] An embodiment of this application provides an electrical device, including a battery cell, a battery module, or a battery pack. The battery module, the battery cell, or the battery pack supplies power to the electrical device. The electrical device may be, but is not limited to, a mobile phone, a tablet computer, a notebook computer, an electric toy, a power tool, an electric bike, an electric vehicle, a ship, a spacecraft, or the like. The electric toy may include a fixed or mobile electric toy, for example, a game console, an electric car toy, an electric ship toy, and an electric airplane toy. The spacecraft may include an airplane, a rocket, a space shuttle, a spaceship, and the like.

[0073] For ease of description, the following embodiments are described by using an example in which an electrical device according to some embodiments of this application is a vehicle **1000**.

[0074] Referring to FIG. **1**, FIG. **1** is a schematic diagram of a structure of a vehicle **1000** according to some embodiments of this application. The vehicle **1000** may be a fuel powered vehicle, a gas powered vehicle, or a new energy vehicle. The new energy vehicle may be a pure electric vehicle, a hybrid electric vehicle, or an extended range vehicle, etc. The inner part of the vehicle **1000** is provided with a battery pack **100**. The battery pack **100** may be arranged at the bottom, head, or tail of the vehicle **1000**. The battery pack **100** may be configured to supply power to the vehicle **1000**. For example, the battery pack **100** may be used as a power supply for operating the vehicle **1000**. The vehicle **1000** may further include a controller **200** and a motor **300**. The controller **200** is configured to control the battery pack **100** to supply power to the motor **300**, for example, to meet working power requirements during starting, navigation, and traveling of the vehicle **1000**.

[0075] In some embodiments of this application, the battery pack **100** can not only serve as a power supply for operating the vehicle **1000**, but can also serve as a power supply for driving the vehicle **1000**, in place of or partially in place of fuel or natural gas, to provide driving power for the vehicle **1000**.

[0076] Referring to FIG. **2**, FIG. **2** is a schematic diagram of an exploded structure of a battery

pack **100** according to some embodiments of this application. The battery pack **100** includes a battery pack housing **10** and at least one battery cell **20**, and the battery cell **20** is accommodated in the battery pack housing **10**. The battery pack housing **10** is configured to provide an accommodating space for the battery cells **20**. The battery pack housing **10** may use a variety of structures. In some embodiments, the battery pack housing **10** may include a box **11** and an upper cover **12**, the box **11** and the upper cover **12** cover each other, and the box **11** and the upper cover **12** jointly define the accommodating space for accommodating the battery cells **20**. The upper cover **12** may be a hollow structure with one end being a guide entry, the box **11** may be a plate-like structure, and the box **11** covers a guide entry side of the upper cover **12**, so that the box **11** and the upper cover **12** jointly define the accommodating space. Alternatively, the box **11** and the upper cover **12** each may be a hollow structure with one side being a guide entry, and a guide entry side of the box **11** covers a guide entry side of the upper cover **12**. Certainly, the battery pack housing **10** formed by the box **11** and the upper cover **12** may be in various shapes, such as a shape of T, and a cuboid.

[0077] In the battery pack **100**, there may be a plurality of battery cells **20**, and the plurality of battery cells **20** can be connected in series, parallel, or series-parallel. Series-parallel connection means that both series connection and parallel connection exist among the plurality of battery cells **20**. The plurality of battery cells **20** may be directly connected in series, parallel, or series-parallel together, and then the whole formed by the plurality of battery cells **20** may be accommodated in the box **11**. Certainly, the battery pack **100** may also be in the form of a battery module formed by the plurality of battery cells **20** that are first connected in series, parallel, or series-parallel. The plurality of battery modules are then connected in series, parallel, or series-parallel to form a whole and accommodated in the box **11**. The battery pack **100** may also include other structures, for example, the battery pack **100** may also include a busbar component for achieving the electrical connection between the plurality of battery cells **20**.

[0078] Each battery cell **20** may be a secondary battery or a primary battery, or may be a Li—S battery, a Na-ion battery, or a Mn-ion battery, but is not limited thereto. The battery cell **20** may be cylindrical, flat, cuboid, or in other shapes.

[0079] Referring to FIG. **3**, FIG. **3** is a schematic diagram of an exploded structure of a battery cell **20** according to some embodiments of this application. The battery cell **20** is a smallest unit forming a battery pack. The battery cell **20** includes a top cover assembly **21**, a housing **22**, an electrode assembly **23**, and other functional components.

[0080] The top cover assembly **21** refers to a component that covers a guide entry of the housing **22** to isolate an internal environment of the battery cell **20** from an external environment. A shape of the top cover assembly **21** is not limited and may be adapted to a shape of the housing **22** to fit the housing **22**. Optionally, the top cover assembly **21** may be made of a material with specified hardness and strength (for example, aluminum alloy), so that the top cover assembly **21** is less likely to deform under extrusion and collision, enabling the battery cell **20** to have a higher structural strength and enhanced safety performance. Functional components such as electrode terminals **21***a* may be arranged on the top cover assembly **21**. The electrode terminals **21***a* may be configured to electrically connect to the electrode assembly **23** to output or input electrical energy of the battery cell **20**. In some embodiments, the top cover assembly **21** may also be provided with a pressure relief mechanism configured to relieve internal pressure when the internal pressure or temperature in the battery cell **20** reaches a threshold. The top cover assembly **21** may also be made of various materials, such as copper, iron, aluminum, stainless steel, aluminum alloy, and plastic, which are not particularly limited in the embodiments of this application. In some embodiments, an insulator may also be arranged on an inner side of the top cover assembly **21**. The insulator can be configured to isolate electrical connecting portions in the housing **22** from the top cover assembly **21**, reducing a risk of short circuit. For example, the insulator may be made of plastic or rubber.

[0081] The housing **22** is an assembly configured to form an internal environment of the battery

cells **20** together with the top cover assembly **21**, where the formed internal environment may be configured to accommodate the electrode assembly **23**, an electrolyte, and other components. The housing **22** and the top cover assembly **21** may be separate components, a guide entry may be provided in the housing **22**, and the top cover assembly **21** covers the guide entry to form the internal environment of the battery cell **20**. Without limitation, the top cover assembly **21** and the housing **22** may also be integrated. Specifically, the top cover assembly **21** and the housing **22** may form a shared connection surface before other components are arranged inside the case, and then the top cover assembly **21** covers the housing **22** when inside of the housing **22** needs to be enclosed. The housing **22** may be of various shapes and sizes, such as a rectangular shape, a cylindrical shape, and a hexagonal prism shape. Specifically, the shape of the housing **22** may be determined based on a specific shape and size of an electrode assembly **23**. The housing **22** may be made of various materials, such as copper, iron, aluminum, stainless steel, aluminum alloy, and plastic, which are not particularly limited in the embodiments of this application.

[0082] The electrode assembly **23** is a component in the battery cell **20** that undergoes electrochemical reactions. The housing **22** may include one or more electrode assemblies **23**. The electrode assembly **23** is mainly formed by winding or laminating a positive electrode plate and a negative electrode plate, and an isolating plate is generally provided between the positive electrode plate and the negative electrode plate. Parts of the positive electrode plate and the negative electrode plate with active substances constitute a body portion of the electrode assembly, while parts of the positive electrode plate and the negative electrode plate without active substances separately constitute a tab. A positive electrode tab **23***a* and a negative electrode tab **23***b* may be located at one end of the body portion together or at two ends of the body portion separately. During charging and discharging of the battery, a positive electrode active substance and a negative electrode active substance react with an electrolyte, and the tabs are connected to the electrode terminals to form a current loop.

[0083] For ease of description, the following embodiments are described by using an isolating plate assembly according to some embodiments of this application as an example.

[0084] Referring to FIG. **4** to FIG. **6**, the isolating plate assembly includes an isolating plate **31**, busbars **32**, an output electrode **33**, and an insulating plate **34**. The isolating plate **31** is provided with a plurality of busbar mounting positions. The busbars **32** are mounted at the busbar mounting positions. The output electrode **33** has a first fixing portion **331** and a second fixing portion **332**, and the first fixing portion **331** is electrically connected to at least one busbar **32**. The insulating plate **34** has a first connecting portion **34***a* and a second connecting portion **34***b*, the first connecting portion **34***a* is connected to the isolating plate **31**, and the second connecting portion **34***b* is connected to the second fixing portion **332**.

[0085] The isolating plate **31** may be a plate made of an insulating material, and may be specifically an insulating plastic plate.

[0086] The first fixing portion **331** and the second fixing portion **332** refer to different mounting positions of the output electrode **33**.

[0087] The first connecting portion **34***a* and the second connecting portion **34***b* of the insulating plate **34** refer to different positions of the insulating plate **34**.

[0088] The insulating plate **34** is connected to the output electrode **33**, the isolating plate **31** is connected to the insulating plate **34**, and the output electrode **33** is electrically connected to the busbar **32**, so that fixing of the output electrode **33** can be strengthened, and occurrence of the problem that the output electrode **33** cracks and fails during transportation and latching can be effectively prevented.

[0089] In some embodiments, referring to FIG. **5** and FIG. **6**, the second connecting portion **34***b* is bonded to the second fixing portion **332**, and a glue layer is disposed between the second connecting portion and the second fixing portion.

[0090] Therefore, the second fixing portion **332** of the output electrode **33** can be more stably

connected to the insulating plate **34**, to prevent occurrence of the problem that the output electrode **33** cracks and fails due to a relatively large torque that occurs during transportation and latching.

[0091] In some embodiments, referring to FIG. **4** and FIG. **6**, the first insulating plate body **311** in FIG. **5** is relatively thin, and is a profiled structure. The profiled structure is similar to or the same as an outer shape of the busbar **32**. The isolating plate **31** includes a first insulating plate body **311** and a second insulating plate body **312**. The second insulating plate body **312** and the first insulating plate body **311** are stacked, the busbars **32** are disposed between the first insulating plate body **311** and the second insulating plate body **312**, and the first connecting portion **34***a* is located between the first insulating plate body **311** and the second insulating plate body **312**.

[0092] The second insulating plate body **312** and the first insulating plate body **311** are stacked, and may be welded together through hot melting, or may be fixed together through screwing or riveting, which is not specifically limited herein.

[0093] Therefore, the first connecting portion **34***a* may be sandwiched between the first insulating plate body **311** and the second insulating plate body **312**, to implement a securer connection.

[0094] In some embodiments, the first connecting portion **34***a* is connected to the first insulating plate body **311**; and/or the first connecting portion **34***a* is connected to the second insulating plate body **312**.

[0095] That the first connecting portion **34***a* is connected to the first insulating plate body **311** means that the first connecting portion **34***a* and the first insulating plate body **311** are relatively immovable. A fixed connection manner may be, but is not limited to, a connection manner such as screwing, riveting, hot-melting, or integral injection-molding. That is, the first connecting portion **34***a* and the first insulating plate body **311** may be connected in a detachable manner, or may be connected in a non-detachable manner.

[0096] That the first connecting portion **34***a* is connected to the second insulating plate body **312** means that the first connecting portion **34***a* and the second insulating plate body **312** are relatively immovable. A fixed connection manner may be, but is not limited to, a connection manner such as screwing, riveting, hot-melting, or integral injection-molding. That is, the first connecting portion **34***a* and the second insulating plate body **312** may be connected in a detachable manner, or may be connected in a non-detachable manner.

[0097] Therefore, reliability of the connection between the insulating plate **34** and the isolating plate **31** can be further improved.

[0098] In some embodiments, referring to FIG. **4**, at least one busbar **32** of the plurality of busbars **32** presses the first connecting portion **34***a* against the first insulating plate body **311** or the second insulating plate body **312**.

[0099] There may be one, two, or more busbars **32** pressing the first connecting portion **34***a* against the first insulating plate body **311** or the second insulating plate body **312**.

[0100] Therefore, the insulating plate **34** can be more securely fixed.

[0101] In some embodiments, the second fixing portion **332** is a plate-shaped structure, and the second fixing portion **332** is disposed above the second connecting portion **34***b* in a transverse direction.

[0102] The transverse direction may be any direction perpendicular to the thickness direction of the isolating plate **31**, or may form an angle of approximately 90° with the thickness direction of the isolating plate **31**. For example, the transverse direction may form any value between 75° and 90° with the thickness direction of the isolating plate **31**, which is not specifically limited herein.

[0103] The second fixing portion **332** is disposed above the second connecting portion **34***b* in the transverse direction, that is, the second fixing portion and the second connecting portion are stacked. Therefore, space occupied by the output electrode **33** in a thickness direction A of the isolating plate **31** can be reduced, so that the battery module or the battery pack is more compact.

[0104] In some embodiments, referring to FIG. **4** and FIG. **6**, an upper surface of the second connecting portion **34***b* is provided with a glue storage groove **343**, the glue storage groove **343** is

located at a bottom of the second fixing portion **332**, and the glue storage groove **343** is configured to store glue, so that the bottom of the second fixing portion **332** is bonded to the second connecting portion **34***b*.

[0105] The shape of the glue storage groove **343** may be any shape, which is not specifically limited herein.

[0106] The upper surface of the second connecting portion **34***b* is a surface facing a side of the second fixing portion **332** of the output electrode **33**.

[0107] Glue is injected into the glue storage groove **343**. When the glue storage groove is filled with the glue, the second fixing portion **332** of the output electrode **33** can be fixedly bonded to the second connecting portion **34***b*, so that the output electrode **33** is more securely fixed.

[0108] In some embodiments, referring to FIG. **4**, FIG. **6**, and FIG. **7**, in the thickness direction A of the isolating plate **31**, the insulating plate **34** is provided with a glue injection hole **341** formed therethrough, and the glue injection hole **341** is configured to deliver glue to a top of the battery cell **20**, so that the bottom of the insulating plate **34** is fixedly bonded to the top of the battery cell **20**.

[0109] The glue injection hole **341** may be, but is not limited to, a square hole, a circular hole, or the like.

[0110] The glue injection hole **341** runs through the insulating plate **34**, and glue may be injected into the glue injection hole **341** from the top of the insulating plate **34**, so that glue is injected after the isolating plate assembly is mounted, thereby facilitating mounting.

[0111] In some embodiments, referring to FIG. **6**, an upper surface of the insulating plate **34** is provided with a glue injection groove **342**, a groove bottom of the glue injection groove **342** is shallower than a groove bottom of the glue storage groove **343** in the thickness direction A of the isolating plate **31**, the glue injection groove **342** is provided with a glue discharge port, and the glue discharge port is in communication with the glue storage groove **343** and is configured to discharge glue to the glue storage groove **343**.

[0112] Specifically, optionally, the upper surface of the insulating plate **34** may be provided with an enclosure **344** having an opening, an inner space of the enclosure **344** may form the glue injection groove **342**, and the opening of the enclosure **344** is used as a glue discharge port. Alternatively, the enclosure **344** may not be disposed, and a groove is cut on the upper surface of the insulating plate **34** to serve as the glue injection groove **342**.

[0113] The groove bottom of the glue injection groove **342** is shallower than the groove bottom of the glue storage groove **343**, and a step is formed by bottom surfaces of the glue injection groove and the glue storage groove. When glue is injected into the glue injection groove **342**, the glue can flow into the glue storage groove **343** from top to bottom, so that the output electrode **33** is bonded to the insulating plate **34**. The disposition of the glue injection groove **342** may better facilitate bonding between the insulating plate **34** and the output electrode **33**, and the isolating plate **31** and the insulating plate **34** do not need to be first applied with glue and then mounted together, thereby facilitating operations.

[0114] In some embodiments, referring to FIG. **6**, the glue injection hole **341** is located in the glue injection groove **342**.

[0115] A height of the top of the glue injection hole **341** may be greater than, equal to, or less than a height of a top edge of the glue injection groove **342**.

[0116] For example, a height of the top of the glue injection hole **341** may be greater than a height of a top edge of the glue injection groove **342**. Glue may be first injected into the glue injection hole **341**. After the glue injection hole **341** is filled with the glue, the glue overflows from the glue injection hole **341** to the glue injection groove **342**, and flows from the glue injection groove **342** into the glue storage groove **343**. Alternatively, glue may be separately injected into the glue injection hole **341** and the glue injection groove **342**.

[0117] For example, a height of the top of the glue injection hole **341** may be equal to a height of a

top edge of the glue injection groove **342**. Glue may be first injected into the glue injection hole **341**. After the glue injection hole **341** is filled with the glue, the glue overflows from the glue injection hole **341** to the glue injection groove **342**, and flows from the glue injection groove **342** into the glue storage groove **343**. Alternatively, glue may be separately injected into the glue injection hole **341** and the glue injection groove **342**.

[0118] For example, a height of the top of the glue injection hole **341** is less than a height of a top edge of the glue injection groove **342**. Glue may be first injected into the glue injection groove **342**, and the glue flows to both the glue injection hole **341** and the glue storage groove **343**.

[0119] Glue may be injected into the glue injection hole **341** or the glue injection groove **342** or into both the glue injection hole **341** and the glue injection groove **342**, to implement bonding and fixing between the insulating plate **34** and the battery cell **20** and between the insulating plate **34** and the output electrode **33**, so that operations are easier and more convenient.

[0120] In some embodiments, referring to FIG. **6**, a reinforcing rib is disposed in the glue injection hole **341**.

[0121] The reinforcing rib may be, but is not limited to, a cross-shaped reinforcing rib, an X-shaped reinforcing rib, or the like.

[0122] Therefore, the connection between the glue and the insulating plate **34** can be implemented, thereby improving the strength of the insulating plate **34**.

[0123] In some embodiments, referring to FIG. **6**, a glue injection observation window **345** is provided on the insulating plate **34**, and the glue injection observation window **345** runs through the insulating plate **34** in a thickness direction of the insulating plate **34**.

[0124] The glue injection observation window **345** may be disposed at a side of the glue injection hole **341**. Glue is injected into the battery cell **20** from the glue injection hole **341**, and the glues flows in a transverse direction. When the glue flows to the glue injection observation window **345**, it may be determined that too much glue has been injected, and the glue injection may be stopped.

[0125] Therefore, it can be determined, by using the glue injection observation window **345**, whether the amount of glue flowing from the glue injection hole **341** to the battery cell **20** is excessively large.

[0126] For ease of description, the following embodiments are described by using a battery module according to some embodiments of this application as an example.

[0127] The battery module in this application includes the foregoing isolating plate assembly and at least one battery cell **20**. The isolating plate assembly is located at a top of the battery cell **20**, and the battery cell **20** is connected to the insulating plate **34**.

[0128] That the battery cell **20** is connected to the insulating plate **34** means that the battery cell **20** and the insulating plate **34** are relatively fixed or immovable.

[0129] The battery module of this application includes the technical feature of the foregoing isolating plate assembly, and achieves an effect the same as that described above, and details are not described herein again.

[0130] In some embodiments, the top of the battery cell **20** is fixedly bonded to a bottom of the insulating plate **34**.

[0131] Specifically, optionally, the battery cell **20** may be fixedly bonded to the insulating plate **34** by injecting glue into the glue injection hole **341** of the insulating plate **34**.

[0132] Therefore, the insulating plate **34** can be made securer. Further, the second fixing portion **332** of the output electrode **33** is more reliably fixed, and occurrence of the problem that the second fixing portion **332** of the output electrode **33** cracks and fails during transportation and latching can be prevented.

[0133] For ease of description, the following embodiments are described by using a battery pack according to some embodiments of this application as an example.

[0134] The battery pack in this application includes a battery module.

[0135] Specifically, the battery module is disposed in a box of the battery pack.

[0136] Because the battery module includes the technical feature of the foregoing isolating plate assembly, and achieves an effect the same as that described above, details are not described herein again.
[0137] For ease of description, the following embodiments are described by using an isolating plate assembly according to some embodiments of this application as an example.
[0138] Referring to FIG. **4** to FIG. **7**, the isolating plate assembly includes an isolating plate **31**, busbars **32**, an output electrode **33**, and an insulating plate **34**. The isolating plate **31** is provided with a plurality of busbar mounting positions. A busbar **32** is insulatively mounted at each busbar mounting position. The output electrode **33** has a first fixing portion **331** and a second fixing portion **332**, the first fixing portion **331** is electrically connected to one busbar **32** of the plurality of busbars **32**, and the second fixing portion **332** is disposed further away from the busbar **32** than the first fixing portion **331** is. The insulating plate **34** has a first connecting portion **34***a* and a second connecting portion **34***b*, the first connecting portion **34***a* is connected to the isolating plate **31**, and the second connecting portion **34***b* is insulatively connected to the second fixing portion **332**.
[0139] The second connecting portion **34***b* is bonded to the second fixing portion **332**, and a glue layer is disposed between the second connecting portion and the second fixing portion.
[0140] The isolating plate **31** includes a first insulating plate body **311** and a second insulating plate body **312**. The second insulating plate body **312** and the first insulating plate body **311** are stacked, and the first connecting portion **34***a* is located between the first insulating plate body **311** and the second insulating plate body **312**.
[0141] At least one busbar **32** of the plurality of busbars **32** presses the first connecting portion **34***a* against the first insulating plate body **311** or the second insulating plate body **312**.
[0142] The first connecting portion **34***a* is connected to the first insulating plate body **311**; and/or the first connecting portion **34***a* is connected to the second insulating plate body **312**.
[0143] The second fixing portion **332** is a plate-shaped structure, and the second fixing portion **332** is disposed above the second connecting portion **34***b* in a transverse direction.
[0144] An upper surface of the second connecting portion **34***b* is provided with a glue storage groove **343**, the glue storage groove **343** is located at a bottom of the second fixing portion **332**, and the glue storage groove **343** is configured to store glue, so that the bottom of the second fixing portion **332** is bonded to the second connecting portion **34***b*.
[0145] In the thickness direction A of the isolating plate **31**, the insulating plate **34** is provided with a glue injection hole **341** formed therethrough, and the glue injection hole **341** is configured to deliver glue to the top of the battery cell **20**, so that the bottom of the insulating plate **34** is fixedly bonded to the top of the battery cell **20**.
[0146] An upper surface of the insulating plate **34** is provided with a glue injection groove **342**, a groove bottom of the glue injection groove **342** is shallower than a groove bottom of the glue storage groove **343** in the thickness direction A of the isolating plate **31**, the glue injection groove **342** is provided with a glue discharge port, and the glue discharge port is in communication with the glue storage groove **343** and is configured to discharge glue to the glue storage groove **343**.
[0147] The glue injection hole **341** is located in the glue injection groove **342**.
[0148] Optionally, a reinforcing rib is disposed in the glue injection hole **341**.
[0149] Optionally, a glue injection observation window **345** is provided on the insulating plate **34**, and the glue injection observation window **345** runs through the insulating plate **34** in a thickness direction of the insulating plate **34**.
[0150] In conclusion, it should be noted that the foregoing embodiments are for description of the technical solutions of this application only rather than for limiting this application. Although this application has been described in detail with reference to the foregoing embodiments, those of ordinary skill in the art should appreciate that they can still make modifications to the technical solutions described in the embodiments or make equivalent replacements to some or all technical features thereof without departing from the scope of the technical solutions of the embodiments of

this application. All such modifications and equivalent replacements shall fall within the scope of claims and specification of this application. Especially, as long as there is no structural conflict, the various technical features mentioned in each embodiment can be combined in any way. This application is not limited to the particular embodiments disclosed herein, but includes all technical solutions that fall within the scope of the claims.

Claims

1. An isolating plate assembly, comprising: an isolating plate, provided with a plurality of busbar mounting positions; busbars, mounted at the busbar mounting positions; an output electrode, having a first fixing portion and a second fixing portion, the first fixing portion being electrically connected to at least one busbar; and an insulating plate, having a first connecting portion and a second connecting portion, the first connecting portion being connected to the isolating plate, and the second connecting portion being connected to the second fixing portion.
2. The isolating plate assembly according to claim 1, wherein the second connecting portion is bonded to the second fixing portion.
3. The isolating plate assembly according to claim 1, wherein the isolating plate comprises: a first insulating plate body; and a second insulating plate body, the second insulating plate body and the first insulating plate body being stacked, the busbars being disposed between the first insulating plate body and the second insulating plate body, and the first connecting portion being located between the first insulating plate body and the second insulating plate body.
4. The isolating plate assembly according to claim 3, wherein the first connecting portion is connected to the first insulating plate body and/or the second insulating plate body.
5. The isolating plate assembly according to claim 3, wherein at least one busbar of the plurality of busbars presses the first connecting portion against the first insulating plate body or the second insulating plate body.
6. The isolating plate assembly according to claim 1, wherein the second fixing portion is a plate-shaped structure, and the second fixing portion is disposed above the second connecting portion in a transverse direction.
7. The isolating plate assembly according to claim 6, wherein an upper surface of the second connecting portion is provided with a glue storage groove, the glue storage groove is located at a bottom of the second fixing portion, and the glue storage groove is configured to store glue.
8. The isolating plate assembly according to claim 7, wherein in a thickness direction of the isolating plate, the insulating plate is provided with a glue injection hole formed therethrough, and the glue injection hole is configured to deliver glue to a top of a battery cell.
9. The isolating plate assembly according to claim 8, wherein an upper surface of the insulating plate is provided with a glue injection groove, a groove bottom of the glue injection groove is shallower than a groove bottom of the glue storage groove in the thickness direction of the isolating plate, the glue injection groove is provided with a glue discharge port, and the glue discharge port is in communication with the glue storage groove and is configured to discharge glue to the glue storage groove.
10. The isolating plate assembly according to claim 9, wherein the glue injection hole is located in the glue injection groove.
11. The isolating plate assembly according to claim 10, wherein a reinforcing rib is disposed in the glue injection hole.
12. The isolating plate assembly according to claim 9, wherein a glue injection observation window is provided on the insulating plate, and the glue injection observation window runs through the insulating plate in a thickness direction of the insulating plate.
13. A battery module, comprising: at least one battery cell; and the isolating plate assembly according to claim 1, located at a top of the battery cell, the battery cell being connected to the

insulating plate.

14. The battery module according to claim 13, wherein the top of the battery cell is fixedly bonded to a bottom of the insulating plate.

15. A battery pack, comprising the battery module according to claim 13.

16. An electrical device, comprising the battery module according to claim 13, the battery cell being configured to supply electric energy.