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Battery cell, battery, power consumption device and manufacturing device and method for battery cell

Abstract

An embodiment of the present application provides a battery cell, a battery, a power consumption device, and a manufacturing equipment and method for a battery cell. The battery cell includes a housing, an electrode assembly, an end cover to cover the housing, and an electrode terminal installed on the end cover and electrically connected with the electrode assembly. The end cover includes a first body and a first convex portion, and the first convex portion extends from the first inner surface of the first body along a direction facing the electrode assembly, a position on the first body corresponding to the first convex portion is formed with a first concave portion recessed from the first outer surface opposite to the first inner surface along the direction facing the electrode assembly, the first concave portion is configured to accommodate the electrode terminal. The battery cell can effectively increase the battery capacity.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) This application is a continuation of International Application No. PCT/CN2021/076486, filed on Feb. 10, 2021, the disclosure of which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

(1) The present application relates to the technical field of batteries, and in particular, to a battery cell, a battery, and a power consumption device, and a manufacturing device and method for the battery cell.

BACKGROUND

(2) Currently, the most commonly used batteries in vehicles are lithium-ion batteries. As a kind of rechargeable battery, lithium-ion batteries have the advantages such as small size, high energy density, high power density, multiple cycles of use, and long storage time.

(3) The rechargeable battery includes a housing, an end cover assembly and an electrode assembly. The electrode assembly is located in the housing, and the end cover assembly covers at the housing, to provide a sealed environment for the electrode assembly.

(4) For a general rechargeable battery, a capacity of the battery may be affected by a structure of the battery cell. Therefore, how to improve the capacity of the battery is a technical problem to be solved urgently in the battery technology.

SUMMARY

(5) An embodiment of the present application provides a battery cell, which may effectively improve a capacity of the battery.

(6) In a first aspect, an embodiment of the present application provides a battery cell, including: a housing, including an opening; an electrode assembly, accommodated in the housing; and an end cover assembly, including an end cover and an electrode terminal, the end cover being used for covering at the opening, the electrode terminal being installed on the end cover, and being used for electrical connection with the electrode assembly; where, the end cover includes a first body and a first convex portion, the first body includes a first inner surface and a first outer surface arranged oppositely, and the first convex portion extends to a first end surface from the first inner surface along a direction facing the electrode assembly, a position on the first body corresponding to the first convex portion is formed with a first concave portion recessed from the first outer surface along the direction facing the electrode assembly, the first concave portion is configured to accommodate the electrode terminal, and the electrode terminal is located on a side of the first end surface away from the electrode assembly.

(7) In the above solution, the position on the first body of the end cover corresponding to the first convex portion is formed with the first concave portion recessed from the first outer surface along the direction facing the electrode assembly, the first concave portion may be used for accommodating the electrode terminal, to reduce a length of a part of the electrode terminal protruding from the outside of the first body. Since a position of the first convex portion and a position of the first concave portion are opposite, the first convex portion may recess the first concave portion as much as possible along the direction facing the electrode assembly, further reducing the length of the part of the electrode terminal protruding from the outside of the first body, which may effectively increase the capacity of the battery. In addition, since the electrode terminal is located on the side of the first end surface away from the electrode assembly, that is, the electrode terminal does not exceed the first end surface along the direction facing the electrode assembly, the electrode terminal does not occupy a space inside the housing and may make more space for the electrode assembly in the housing, which is beneficial to improve the capacity of the battery cell.

(8) In some embodiments, a bottom wall of the first concave portion exceeds the first inner surface along the direction facing the electrode assembly; or, the bottom wall of the first concave portion is flush with the first inner surface.

(9) In the above solution, the bottom wall of the first concave portion exceeds the first inner surface along the direction facing the electrode assembly, so that the first concave portion is recessed into the first convex portion, which further increases a recess depth of the first concave portion and

further reduces the length of the part of the electrode terminal protruding from the outside of the first body. Of course, the bottom wall of the first concave portion is flush with the first inner surface, which may also increase the recess depth of the first concave portion, to reduce the length of a part of the electrode terminal protruding from the outside of the first body.

(10) In some embodiments, the bottom wall of the first concave portion is provided with a groove recessed along a direction facing the electrode assembly, and the electrode terminal is partially accommodated in the groove.

(11) In the above solution, the arrangement of the groove on the bottom wall of the first concave portion may facilitate positioning and installation of the end cover of the electrode.

(12) In some embodiments, the electrode terminal includes a connection body and a terminal main body, the terminal main body is used for electrical connection with the electrode assembly, and the terminal main body is installed on the end cover through the connection body; where, the connection body is at least partially accommodated in the groove and fixed to a side wall or a bottom wall of the groove.

(13) In the above solution, the terminal main body is used for electrical connection with the electrode assembly, and a function of the terminal main body is to output electric energy of the battery cell. The connection body plays a role to connect the terminal main body and the end cover, and the connection body is at least partially accommodated in the groove and fixed to the side wall or the bottom wall of the groove, so as to fix the terminal main body.

(14) In some embodiments, a depth of the first concave portion is greater than a depth of the groove.

(15) In some embodiments, the end cover is provided with an electrode extraction hole communicating with the first concave portion and penetrating the first end surface, and the electrode terminal covers the electrode extraction hole.

(16) In the above solution, the electrode terminal covers the electrode extraction hole, so that the electrode terminal does not extend into the electrode extraction hole, which facilitates installation of the electrode terminal in the first concave portion.

(17) In some embodiments, the end cover assembly further includes an insulating member; the insulating member is located on a side of the end cover facing the electrode assembly, and the insulating member is used for separating the electrode assembly and the end cover.

(18) In the above solution, the insulating member is located on the side of the end cover facing the electrode assembly. The insulating member plays a role or separating the electrode assembly and the end cover, to reduce a risk of short circuit.

(19) In some embodiments, the insulating member includes a second body and a second concave portion, the second body is located on a side of the first body facing the electrode assembly, the second body includes a second inner surface and a second outer surface arranged oppositely, the second concave portion is recessed from the second outer surface along a direction facing the electrode assembly, and the second concave portion is configured to accommodate the first convex portion.

(20) In the above solution, the second concave portion of the insulating member may accommodate the first convex portion of the end cover, which may reduce a distance between the first body and the second body, so as to make more space for the electrode assembly, which is beneficial to improve the capacity of the battery cell.

(21) In some embodiments, the second outer surface abuts against the first inner surface.

(22) In the above solution, the second outer surface of the second body abuts against the first inner surface of the first body, so that the first convex portion may be completely accommodated in the second concave portion, so that the end cover and the insulating member are more compact, and may make more space for the electrode assembly, to further improve the capacity of the battery cell.

(23) In some embodiments, there is a gap between the first end surface and a bottom wall of the

second concave portion.
(24) In the above solution, there is the gap between the first end surface of the first convex portion and the bottom wall of the second concave portion, to ensure that the second outer surface of the second body may effectively abut against the first inner surface of the first body, reducing a risk of over-positioning between the insulating member and the end cover.
(25) In some embodiments, a position on the second body corresponding to the second concave portion is formed with a second convex portion, and the second convex portion extends to a second end surface from the second inner surface along the direction facing the electrode assembly.
(26) In the above solution, the position on the second body corresponding to the second concave portion is formed with the second convex portion, the arrangement of the second convex portion may recess the second concave portion as much as possible along the direction facing the electrode assembly, to further increase a recess depth of the second concave portion.
(27) In some embodiments, the electrode assembly includes a tab including a first connection portion; the battery cell further includes a current collecting member, the current collecting member includes a second connection portion for connecting to the first connection portion and a third connection portion for connecting to the electrode terminal; where, the second connection portion and the first connection portion are disposed in a stacking manner along a thickness direction of the end cover, and the third connection portion is located on a side of the second end surface facing the electrode assembly.
(28) In the above solution, the second connection portion of the current collecting member and the first connection portion of the tab are disposed in a stacking manner along a thickness direction of the end cover, which facilitates connecting the second connection portion and the first connection portion together, for example, welding the second connection portion and the first connection portion together.
(29) In some embodiments, the insulating member further includes a third concave portion, the third concave portion is recessed from the second end surface to the second inner surface along a direction away from the electrode assembly, and the third concave portion is configured to accommodate at least a part of the first connection portion and/or at least a part of the second connection portion.
(30) In the above solution, the third concave portion of the insulating member may be configured to accommodate at least a part of the first connection portion and/or at least a part of the second connection portion, which may reduce a space inside the housing occupied by a connection part of the tab and the current collecting member, and make more space for the electrode assembly, to improve the capacity of the battery cell.
(31) In some embodiments, the bottom wall of the second concave portion exceeds the second inner surface along a direction facing the electrode assembly.
(32) In the above solution, the bottom wall of the second concave portion exceeds the second inner surface of the second body along a direction facing the electrode assembly, to recess the second concave portion in the second convex portion, which may further increase the recess depth of the second concave portion, and increase a space of the second concave portion for accommodating the first convex portion, so that the first convex portion may extend to a deeper position of the second convex portion.
(33) In a second aspect, an embodiment of the present application provides a battery, including a box body, and the battery cell according to any one of the embodiments of the above first aspect; the battery cell being accommodated in the box body.
(34) In the above solution, the battery cell is accommodated in the box body. When an internal space of the box body is constant, the length of the part of the electrode terminal protruding from the outside of the first body is reduced, and the internal space of the box body occupied by the battery cell is reduced, which is beneficial to accommodate more battery cells in the box body, so as to effectively improve the capacity of the battery.

(35) In a third aspect, an embodiment of the present application provides a power consumption device, including the battery according to any one of the embodiments of the above second aspect.
(36) In a fourth aspect, an embodiment of the present application provides a manufacturing method for a battery cell, including: providing a housing, the housing including an opening; providing an electrode assembly; providing an end cover assembly, the end cover assembly including an end cover and an electrode terminal, the electrode terminal being installed on the end cover; accommodating the electrode assembly in the housing; electrically connecting the electrode terminal and the electrode assembly; covering the end cover at the opening; where, the end cover includes a first body and a first convex portion, the first body includes a first inner surface and a first outer surface arranged oppositely, and the first convex portion extends to a first end surface from the first inner surface along a direction facing the electrode assembly, a position on the first body corresponding to the first convex portion is formed with a first concave portion recessed from the first outer surface along the direction facing the electrode assembly, the first concave portion is configured to accommodate the electrode terminal, and the electrode terminal is located on a side of the first end surface away from the electrode assembly.
(37) In a fifth aspect, an embodiment of the present application provides a manufacturing device for a battery cell, including: a first providing apparatus, for providing a housing, the housing including an opening; a second providing apparatus, for providing an electrode assembly; a third providing apparatus, for providing an end cover assembly, the end cover assembly including an end cover and an electrode terminal, the electrode terminal being installed on the end cover; and an assembly apparatus, for accommodating the electrode assembly in the housing, the assembly apparatus being used for electrically connecting the electrode terminal and the electrode assembly, and the assembly apparatus being further used for covering the end cover at the opening; where, the end cover includes a first body and a first convex portion, the first body includes a first inner surface and a first outer surface arranged oppositely, and the first convex portion extends to a first end surface from the first inner surface along a direction facing the electrode assembly, a position on the first body corresponding to the first convex portion is formed with a first concave portion recessed from the first outer surface along the direction facing the electrode assembly, the first concave portion is configured to accommodate the electrode terminal, and the electrode terminal is located on a side of the first end surface away from the electrode assembly.

Description

BRIEF DESCRIPTION OF DRAWINGS
(1) In order to illustrate the technical solution in the embodiments of the present application more clearly, brief description will be made below to the drawings required in the embodiments of the present application, and apparently, the drawings described below are some embodiments of the present application only, and other drawings could be obtained based on these drawings by those ordinary skilled in this art without creative efforts.
(2) FIG. **1** is a schematic structural diagram of a vehicle provided by some embodiments of the present application;
(3) FIG. **2** is an exploded view of a battery provided by some embodiments of the present application;
(4) FIG. **3** is a schematic structural diagram of the battery module shown in FIG. **2**;
(5) FIG. **4** is an exploded view of a battery cell provided by some embodiments of the present application;
(6) FIG. **5** is a schematic structural diagram of an electrode assembly provided by some embodiments of the present application;
(7) FIG. **6** is a cross-sectional view of the battery cell shown in FIG. **4**;

(8) FIG. **7** is a partially enlarged view of the battery cell shown in FIG. **6**;
(9) FIG. **8** is a partially enlarged view of the end cover assembly shown in FIG. **7**;
(10) FIG. **9** is a positional relationship diagram of an insulating member, a current collecting member and a tab provided by some embodiments of the application;
(11) FIG. **10** is a positional relationship diagram of an insulating member, a current collecting member and a tab provided by some other embodiments of the present application;
(12) FIG. **11** is a positional relationship diagram of an insulating member, a current collecting member and a tab provided by some other embodiments of the application;
(13) FIG. **12** is a schematic structural diagram of the current collecting member shown in FIG. **8**;
(14) FIG. **13** is a flowchart of a manufacturing method for a battery cell provided by some embodiments of the present application; and
(15) FIG. **14** is a schematic block diagram of a manufacturing device for a battery cell provided by some embodiments of the present application.
(16) Marking description: **10**—box body; **11**—accommodating space; **12**—first portion; **13**—second portion; **20**—battery cell; **21**—housing; **22**—electrode assembly; **221**—tab; **2211**—first connection portion; **222**—positive electrode plate; **223**—negative electrode plate; **224**—separator; **23**—end cover assembly; **231**—end cover; **2311**—first body; **2311***a*—first inner surface; **2311***b*—first outer surface; **2312**—first convex portion; **2312***a*—first end surface; **2313**—first concave portion; **2313***a*—first bottom wall; **2313***b*—groove; **2314**—electrode extraction hole; **232**—electrode terminal; **2321**—terminal main body; **2322**—connection body; **233**—insulating member; **2331**—second body; **2331***a*—second inner surface; **2331***b*—second outer surface; **2332**—second concave portion; **2332***a*—second bottom wall; **2333**—second convex portion; **2333***a*—second end surface **2334**—third concave portion; **234**—pressure relief mechanism; **24**—current collecting member; **241**—second connection portion; **242**—third connection portion; **243**—fourth connection portion; **244**—protrusion; **25**—sealed space; **30**—battery module; **31**—bus component; **100**—battery; **200**—controller; **300**—motor; **1000**—vehicle; **1100**—first providing apparatus; **1200**—second providing apparatus; **1300**—third providing apparatus; **1400**—assembly apparatus; **2000**—manufacturing device; Z—thickness direction.

DESCRIPTION OF EMBODIMENTS

(17) To make the objectives, technical solutions and advantages of the embodiments of the present application clearer, the following clearly describes the technical solutions in the embodiments of the present application with reference to the accompanying drawings in the embodiments of the present application. Apparently, the described embodiments are merely some but not all of the embodiments of the present application. All the other embodiments obtained by those of ordinary skill in the art based on the embodiments of the present application without any inventive effort shall fall within the scope of protection of the present application.
(18) Unless otherwise defined, all technical and scientific terms used in the present application have the same meanings as those commonly understood by those skilled in the art to which the present application belongs. The terms used in the specification of the present application are merely for the purpose of describing specific embodiments, but are not intended to limit the present application. The terms “including” and “having” and any variations thereof in the specification and the claims of the present application as well as the foregoing description of the accompanying drawings are intended to cover non-exclusive inclusions. The terms “first”, “second” etc. in the specification and the claims of the present application as well as the above drawings are used for distinguishing different objects, rather than to describe a specific order or primary-secondary relationship.
(19) The phrase “embodiments” referred to in the present application means that the descriptions of specific features, structures, and characteristics in combination with the embodiments are included in at least an embodiment of the present application. The phrase at various locations in the specification does not necessarily refer to the same embodiment, or an independent or alternative

embodiment exclusive of another embodiment.
(20) In the description of the present application, it should be noted that unless otherwise explicitly specified and defined, the terms “mounting”, “connecting”, “connection” and “attaching” should be understood in a broad sense, for example, they may be a fixed connection, a detachable connection, or an integrated connection; may be a direct connection and may also be an indirect connection via an intermediate medium, or may be communication between the interiors of two elements. Those of ordinary skill in the art may appreciate the specific meanings of the foregoing terms in the present application according to specific circumstances.
(21) In the present application, the term “and/or” is only an association relation describing associated objects, which means that there may be three relations. For example, A and/or B may represent three situations: A exists alone, both A and B exist, and B exists alone. In addition, the character “/” in the present application generally indicates that the associated objects before and after the character are in an “or” relation.
(22) In the embodiments of the present application, same components are denoted by same reference numerals, and detailed description of the same components is omitted in different embodiments for brevity. It should be understood that dimensions such as thicknesses, lengths and widths of various components in embodiments of the present application shown in the drawings, as well as dimensions of the overall thickness, length and width of an integrated apparatus are merely illustrative, and should not constitute any limitation to the present application.
(23) In the present application, “a plurality of” means two or more (including two).
(24) In the present application, battery cells may include lithium-ion secondary batteries, lithium-ion primary batteries, lithium-sulfur batteries, sodium/lithium-ion batteries, sodium-ion batteries or magnesium-ion batteries, etc., which are not limited by the embodiments of the present application. The battery cells may be cylindrical, flat, and cuboid or in another shape, which is not limited by the embodiments of the present application. The battery cell is generally divided into three types according to the way of packaging: a cylindrical battery cell, a prismatic battery cell and a pouch battery cell, which are not limited by the embodiments of the present application.
(25) The battery mentioned in the embodiments of the present application refers to a single physical module that includes one or more battery cells to provide a higher voltage and capacity. For example, the battery mentioned in the present application may include a battery module or a battery pack. The battery generally includes a box body for enclosing one or more battery cells. The box body may prevent liquid or other foreign matters from affecting the charging or discharging of the battery cells.
(26) The battery cells includes an electrode assembly and an electrolytic solution, and the electrode assembly is composed of a positive electrode plate, a negative electrode plate and a separator. The operation of the battery cell mainly relies on the movement of metal ions between the positive electrode plate and the negative electrode plate. The positive electrode plate includes a positive electrode current collector and a positive active substance layer. The positive active substance layer is coated on a surface of the positive electrode current collector, and the positive electrode current collector not coated with the positive active substance layer protrudes from the positive electrode current collector coated with the positive active substance layer and is used as a positive electrode tab. Taking a lithium-ion battery as an example, a material of the positive electrode current collector may be aluminum, and the positive active substance may be lithium cobalt oxides, lithium iron phosphate, ternary lithium or lithium manganate, etc. The negative electrode plate includes a negative electrode current collector and a negative active substance layer. The negative active substance layer is coated on a surface of the negative electrode current collector, and the negative electrode current collector not coated with the negative active substance layer protrudes from the negative electrode current collector coated with the negative active substance layer and is used as a negative electrode tab. The material of the negative electrode current collector may be copper, and the negative active substance may be carbon or silicon, etc. In order to ensure that no fusing occurs

when a large current passes through, there are a plurality of positive electrode tabs which are stacked together, and there are a plurality of negative electrode tabs which are stacked together. A material of the separator may be polypropylene (PP) or polyethylene (PE), etc. In addition, the electrode assembly may be a winding structure or a stacked structure, and the embodiments of the present application are not limited thereto.

(27) The battery cell may also include a housing and an end cover assembly, the end cover assembly covers at the housing, to provide a sealed space for the electrode assembly and the electrolytic solution, and the electrode assembly is electrically connected to the electrode terminal of the end cover assembly.

(28) For a general battery, the battery includes a battery cell, and a capacity of the battery may be affected by a structure of the battery cell.

(29) The inventor found that in the battery cell, after the end cover of the end cover assembly covers at the housing, a size of a part of the electrode terminal of the end cover assembly protruding from the outside of the first body is long, so that the entire battery cell occupies a large space, which in turn reduces the capacity of the battery.

(30) In view of this, an embodiment of the present application provides a technical solution. By providing a first convex portion on a first body of the end cover, the first convex portion extends to a first end surface from the first inner surface of the first body along a direction facing the electrode assembly, a position on the first body corresponding to the first convex portion is formed with a first concave portion, the first concave portion is a first concave portion recessed from the first outer surface of the first body along the direction facing the electrode assembly, the first concave portion is used for accommodating the electrode terminal, and the electrode terminal is located on a side of the first end surface away from the electrode assembly, to reduce a length of the part of the electrode terminal protruding from the outside of the first body, to achieve the purpose of improve the capacity of the battery.

(31) The technical solution described in the embodiment of the present application is applicable to a battery and a power consumption device using the battery.

(32) The power consumption device may be vehicles, mobile phones, portable devices, notebook computers, ships, spacecraft, electric toys, electric tools, etc. The vehicle may be fuel vehicles, gas vehicles or new energy vehicles; new energy vehicles may be pure electric vehicles, hybrid vehicles or extended range vehicles, etc.; the spacecrafts include airplanes, rockets, space shuttles and spaceships, etc.; the electric toys include fixed or mobile electric toys, such as game consoles, electric vehicle toys, electric ship toys and electric airplane toys, etc.; the electric tools include metal cutting power tools, grinding power tools, assembly power tools and railway power tools, such as electric drills, electric grinders, electric wrenches, electric screwdrivers, electric hammers, impact drills, concrete vibrators, and electric planers, etc. The embodiment of the present application does not impose special restrictions on the above power consumption device.

(33) For the convenience of description, the following embodiments take a vehicle as an example of the power consumption device for description.

(34) Please refer to FIG. **1**. FIG. **1** is a schematic structural diagram of a vehicle **1000** provided by some embodiments of the present application. A battery **100** is provided inside the vehicle **1000**, and the battery **100** may be provided at the bottom, head, or tail of the vehicle **1000**. The battery **100** may be used for power supply of the vehicle **1000**, for example, the battery **100** may be used as an operating power source of the vehicle **1000**.

(35) The vehicle **1000** may further include a controller **200** and a motor **300**. The controller **200** is used for controlling the battery **100** to supply power to the motor **300**, for example, for working power requirements during starting, navigating, and driving of the vehicle **1000**.

(36) In some embodiments of the present application, the battery **100** may serve not only as an operation power source of the vehicle **1000**, but also as a driving power source of the vehicle **1000**, replacing or partially replacing fuel or natural gas to provide driving power for the vehicle **1000**.

(37) Please refer to FIG. **2**. FIG. **2** is an exploded view of a battery **100** provided by some embodiments of the present application. The battery **100** includes a box body **10** and a battery cell **20**, and the battery cell **20** is accommodated in the box body **10**.
(38) Among that, the box body **10** is used for providing an accommodating space **11** for the battery cell **20**, and the box body **10** may have various structures.
(39) In some embodiments, the box body **10** may include a first portion **12** and a second portion **13**, the first portion **12** and the second portion **13** are mutually covered, and the first portion **12** and the second portion **13** together define an accommodating space **11** for accommodating the battery cell **20**. The second portion **13** may be a hollow structure with one end open, the first portion **12** is a plate-shaped structure, and the first portion **12** covers at the opening side of the second portion **13**, so that the first portion **12** and the second portion **13** together define the accommodating space **11**. The first portion **12** and the second portion **13** may also both be hollow structures with one end open, and the opening side of the first portion **12** covers at the opening side of the second portion **13**. Of course, the box body **10** formed by the first portion **12** and the second portion **13** may have various shapes, such as a cylinder, a cuboid, etc.
(40) In the battery **100**, there may be a plurality of battery cells **20**, and the plurality of battery cells **20** may be connected in series or in parallel or in hybrid. The hybrid connection means that the plurality of battery cells **20** are both connected in series and in parallel. The plurality of battery cells **20** may be directly connected together in series or in parallel or in hybrid, and then a whole formed by the plurality of battery cells **20** may be accommodated in the box body **10**; of course, the plurality of battery cells **20** may also be first connected in series, or in parallel or in hybrid to form a battery module **30**; then a plurality of battery modules **30** are connected in series or in parallel or in hybrid to form as a whole, and are accommodated inside the box body **10**.
(41) In some embodiments, please refer to FIG. **3**. FIG. **3** is a schematic structural diagram of the battery module **30** shown in FIG. **2**. A battery **100** includes a plurality of battery module **30**. The battery module **30** includes a plurality of battery cells **20**. The plurality of battery cells **20** are first connected in series, or in parallel or in hybrid to form the battery module **30**. The plurality of battery modules **30** are then connected in series or in parallel or in hybrid to form as a whole, and are accommodated in the box body **10**.
(42) The plurality of battery cells **20** in the battery module **30** may be electrically connected through a bus component **31**, to achieve the connection of the plurality of battery cells **20** in the battery module **30** in series, or in parallel or in hybrid.
(43) Please refer to FIG. **4**. FIG. **4** is an exploded view of a battery cell **20** provided by some embodiments of the present application. The battery cell **20** includes a housing **21**, an electrode assembly **22** and an end cover assembly **23**. The housing **21** includes an opening. The electrode assembly **22** is accommodated in the housing **21**. The end cover assembly **23** includes an end cover **231** and an electrode terminal **232**, the end cover **231** is used for covering at an opening, the electrode terminal **232** is installed on the end cover **231**, the electrode terminal **232** is used for electrical connection with the electrode assembly **22**, and the electrode terminal **232** is used for outputting electric energy of the battery cell **20**.
(44) Among that, the housing **21** may have various shapes, such as a cylinder, a cuboid, etc. The shape of the housing **21** may be determined according to a specific shape of the electrode assembly **22**. For example, if the electrode assembly **22** has a cylindrical structure, the housing **21** may select a cylindrical structure; and if the electrode assembly **22** has a cuboid structure, the housing **21** may select a cuboid structure. In FIG. **4**, illustratively, the housing **21** and the electrode assembly **22** both have a cuboid structure.
(45) The housing **21** and the end cover **231** may be made of various materials, such as copper, iron, aluminum, stainless steel, aluminum alloy, plastic, etc., which are not particularly limited in the embodiment of the present application.
(46) There may be one or more electrode assemblies **22** accommodated in the housing **21**.

Illustratively, in FIG. **4**, there are two electrode assemblies **22** accommodated in the housing **21**.
(47) In some embodiments, the end cover assembly **23** may also include an insulating member **233**, the insulating member **233** is located on a side of the end cover **231** facing the electrode assembly **22**, and the insulating member **233** is used for separating the electrode assembly **22** and the end cover **231**, to reduce a risk of short circuit.
(48) Illustratively, the insulating member **233** may be plastic, rubber, etc.
(49) In some embodiments, the battery cell **20** may also include a current collecting member **24**, the current collecting member **24** is used for connecting a tab **221** of the electrode assembly **22** and the electrode terminal **232**, to achieve electrical connection between the electrode terminal **232** and the electrode assembly **22**.
(50) The current collecting member **24** is located on the side of the insulating member **233** facing the electrode assembly **22**, and the insulating member **233** may also play a role to separate the current collecting member **24** and the end cover **231**.
(51) Illustratively, the current collecting member **24** is a metal conductor, such as copper, iron, aluminum, steel, aluminum alloy, etc.
(52) In some embodiments, please refer to FIG. **5**. FIG. **5** is a schematic structural diagram of an electrode assembly **22** provided by some embodiments of the present application. The electrode assembly **22** may include a positive electrode plate **222**, a negative electrode plate **223** and a separator **224**. The electrode assembly **22** may be a winding structure formed by winding the positive electrode plate **222**, the separator **224** and a negative electrode plate **223**, and the electrode assembly **22** may also be a stacked structure formed by disposing the positive electrode plate **222**, the separator **224** and the negative electrode plate **223** in a stacking manner. FIG. **5** illustratively shows a condition that the electrode assembly **22** is a winding structure.
(53) The positive electrode plate **222** may include a positive electrode current collector and a positive electrode active substance layer. The positive electrode active substance layer is coated on a surface of the positive electrode current collector. The negative electrode plate **223** may include a negative electrode current collector and a negative electrode active substance layer. The negative electrode active substance layer is coated on a surface of the negative electrode current collector. The separator **224** is between the positive electrode plate **222** and the negative electrode plate **223**, and is used for separating the positive electrode plate **222** and the negative electrode plate **223**, to reduce the risk of short circuit between the positive electrode plate **222** and the negative electrode plate **223**.
(54) Among that, a material of the separator **224** may be polypropylene (PP) or polyethylene (PE), etc.
(55) The tab **221** in the electrode assembly **22** is divided into a positive electrode tab and a negative electrode tab. The positive electrode tab may be a part of the positive electrode current collector that is not coated with a positive electrode active substance layer; and the negative electrode tab may be a part of the negative electrode current collector that is not coated with a negative electrode active substance layer.
(56) In the embodiment of the present application, please refer to FIG. **6**. FIG. **6** is a cross-sectional view of the battery cell **20** shown in FIG. **4**. The end cover **231** of the end cover assembly **23** covers at the opening of the housing **21**, to form a sealed space **25** for accommodating the battery cell **20**. The sealed space **25** is further used for accommodating an electrolyte, such as an electrolytic solution. The electrode terminal **232** of the end cover assembly **23** is an output component for outputting electric energy of the battery cell **20**.
(57) There may be one or two openings of the housing **21**. If there is one opening of the housing **21**, there may be one end cover assembly **23**; and if there are two openings of the housing **21**, there may be two end cover assemblies **23**, and the end covers **231** in the two end cover assemblies **23** cover at the two openings, respectively.
(58) There may be one or two electrode terminals **232** in the end cover assembly **23**.

(59) In some embodiments, please continue to refer to FIG. **6**. There is one opening of the housing **21**, and there is also one end cover assembly **23**. The end cover assembly **23** may be provided with two electrode terminals **232**. One electrode terminal **232** in the end cover assembly **23** may electrically connect to one tab **221** (positive electrode tab) of the electrode assembly **22** through one current collecting member **24**; and another electrode terminal **232** in the end cover assembly **23** may electrically connect to another tab **221** (negative electrode tab) of the electrode assembly **22** through another current collecting member **24**.
(60) In some other embodiments, there are two openings of the housing **21**, the two openings are provided on opposite sides of the housing **21**. There are two end cover assemblies **23**, and the two end cover assemblies **23** cover at the two openings of the housing **21**, respectively. In this case, there may be one end cover **231** in the end cover assembly **23**. The electrode terminal **232** in one end cover assembly **23** may electrically connect to one tab **221** (positive electrode tab) of the electrode assembly **22** through one current collecting member **24**. The electrode terminal **232** of another end cover assembly **23** may be electrically connected to another tab **221** (negative electrode tab) of the electrode assembly **22** through another current collecting member **24**.
(61) In some embodiments, the end cover assembly **23** may also include a pressure relief mechanism **234**. The pressure relief mechanism **234** is installed on the end cover **231**. The pressure relief mechanism **234** is used for relieving an internal pressure of the battery cell **20** when the internal pressure or temperature of the battery cell **20** reaches a predetermined value.
(62) Of course, if there is one end cover assembly **23** in the battery cell **20**, the pressure relief mechanism **234** may be installed on the end cover **231** of the end cover assembly **23**; if there are two end cover assemblies **23** in the battery cell **20**, the pressure relief mechanism **234** may be installed on the end cover **231** of each of the end cover assemblies **23**, or the pressure relief mechanism **234** may be installed on the end cover **231** of only one end cover assembly **23**.
(63) Illustratively, the pressure relief mechanism **234** may be as an explosion-proof valve, a rupture disk, a gas valve, a pressure relief valve, or a safety valve, etc.
(64) In the embodiment of the present application, in order to improve the capacity of the battery **100**, please refer to FIG. **7**. FIG. **7** is a partially enlarged view of the battery cell **20** shown in FIG. **6**. The end cover **231** includes a first body **2311** and a first convex portion **2312**, the first body **2311** includes a first inner surface **2311***a* and a first outer surface **2311***b* arranged oppositely, and the first convex portion **2312** extends to a first end surface **2312***a* from the first inner surface **2311***a* along a direction facing the electrode assembly **22**, a position on the first body **2311** corresponding to the first convex portion **2312** is formed with a first concave portion **2313** recessed from the first outer surface **2311***b* along the direction facing the electrode assembly **22**, and the first concave portion **2313** is configured to accommodate the electrode terminal **232**.
(65) The position on the first body **2311** of the end cover **231** corresponding to the first convex portion **2312** is formed with the first concave portion **2313** recessed from the first outer surface **2311***b* along the direction facing the electrode assembly **22**, the first concave portion **2313** may be used for accommodating the electrode terminal **232**, to reduce a length of a part of the electrode terminal **232** protruding from the outside of the first body **2311**. Since a position of the first convex portion **2312** and a position of the first concave portion **2313** are opposite, the first convex portion **2312** may recess the first concave portion **2313** as much as possible along the direction facing the electrode assembly **22**, further reducing the length of the part of the electrode terminal **232** protruding from the outside of the first body **2311**. When an internal space of the box body **10** is constant, the length of the part of the electrode terminal **232** protruding from the outside of the first body **2311** is reduced, and the internal space of the box body **10** occupied by the battery cell **20** is reduced, which is beneficial to accommodate more battery cells **20** in the box body **10**, so as to effectively improve the capacity of the battery **100**. When the length of the battery cell **20** (the size of the battery cell **20** in the extending direction of the electrode terminal **232**) is constant, the length of the part of the electrode terminal **232** protruding from the outside of the first body **2311** may be

reduced, which may appropriately increase a length of the housing **21**, so as to increase a space of the housing **21** to accommodate the electrode assembly **22**, which may effectively increase the capacity of the battery cell **20**, and may further increase the capacity of the entire battery **100**.
(66) It should be noted that the first concave portion **2313** may accommodate all of the electrode terminal **232** or a part of the electrode terminal **232**.
(67) Among that, the first body **2311** is used for covering at the opening of the housing **21**. The electrode terminal **232** may be installed at the bottom of the first concave portion **2313**. The greater a recess depth of the first concave portion **2313** along the direction facing the electrode assembly **22**, the longer the length of the electrode terminal **232** extending into the first concave portion **2313**, and the shorter the length of the part of the electrode terminal **232** protruding from the outside of the first body **2311**.
(68) Illustratively, shapes of the first concave portion **2313** and the second concave portion **2332** may be a cylinder, a cuboid, etc.
(69) In some embodiments, the electrode terminal **232** is located on the side of the first end surface **2312***a* away from the electrode assembly **22**, that is, the electrode terminal **232** does not exceed the first end surface **2312***a* along the direction facing the electrode assembly **22**, the electrode terminal **232** does not occupy a space inside the housing **21** and may make more space for the electrode assembly **22** in the housing **21**, which is beneficial to improve the capacity of the battery cell **20**. In some other embodiments, the electrode terminal **232** may also exceed the first end surface **2312***a* along the direction facing the electrode assembly **22**.
(70) In some embodiments, as shown in FIG. **7**, a bottom wall of the first concave portion **2313** may exceed the first inner surface **2311***a* along the direction facing the electrode assembly **22**, that is, the bottom wall of the first concave portion **2313** is closer to the electrode assembly **22** than the first inner surface **2311***a*, to recess the first concave portion **2313** in the first convex portion **2312**, which further increases a recess depth of the first concave portion **2313**, and further reduces the length of the part of the electrode terminal **232** protruding from the outside of the first body **2311**. In some other embodiments, the bottom wall of the first concave portion **2313** may also be flush with the first inner surface **2311***a*, which may also increases the recess depth of the first concave portion **2313**, to reduce the length of the part of the electrode terminal **232** protruding from the outside of the first body **2311**. In some other embodiments, the bottom wall of the first concave portion **2313** may also exceed the first inner surface **2311***a* along the direction away from the electrode assembly **22**, that is, the first inner surface **2311***a* is closer to the electrode assembly **22** than the bottom wall of the first concave portion **2313**. Among that, the bottom wall of the first concave portion **2313** is the first bottom wall **2313***a*.
(71) In some embodiments, please continue to refer to FIG. **7**. The bottom wall of the first concave portion **2313** is provided with a groove **2313***b* recessed along a direction facing the electrode assembly **22**, and the electrode terminal **232** is partially accommodated in the groove **2313***b*.
(72) The groove **2313***b* may play a role to position the electrode terminal **232**, and may facilitate positioning and installation of the electrode terminal **232**. The groove **2313***b* may have a shape that may be matched with the electrode terminal **232**. For example, the electrode terminal **232** is cylindrical, and the groove **2313***b* is also cylindrical.
(73) Optionally, the depth of the first concave portion **2313** is greater than a depth of the groove **2313***b*, that is, a distance from the first outer surface **2311***b* to the first bottom wall **2313***a* is greater than a distance from the first bottom wall **2313***a* to a bottom wall of the groove **2313***b*.
(74) Optionally, the electrode terminal **232** may have a split structure. The electrode terminal **232** includes a connection body **2322** and a terminal main body **2321**. The terminal main body **2321** is used for electrical connection with the electrode assembly **22**, and the terminal main body **2321** is installed on the end cover **231** through the connection body **2322**; where, the connection body **2322** is at least partially accommodated in the groove **2313***b* and fixed to the side wall or the bottom wall of the groove **2313***b*.

(75) The terminal main body **2321** is used for electrical connection with the electrode assembly **22**, and a role of the terminal main body **2321** is to output electric energy of the battery cell **20**. The connection body **2322** plays a role to connect the terminal main body **2321** and the end cover **231**, and the connection body **2322** is at least partially accommodated in the groove **2313***b* and fixed to the side wall or the bottom wall of the groove **2313***b*, so as to fix the terminal main body **2321**.
(76) The connection body **2322** may be circumferentially coated around the outer circumference of the terminal main body **2321**, to achieve fixation of the connection body **2322** and the terminal main body **2321**. Illustratively, the connection body **2322** is a ring structure coated around the outer circumference of the terminal main body **2321**.
(77) After the connection body **2322** is partially accommodated in the groove **2313***b*, the connection body **2322** may be fixed to the side wall or the bottom wall of the groove **2313***b* by means of welding. Taking the connection body **2322** fixed to the side wall of the groove **2313***b* as an example, the connection body **2322** may abut against the bottom wall of the groove **2313***b*; and during the welding process, the connection body **2322** is fixed to the side wall of the groove **2313***b*.
(78) In order to facilitate the welding of the connection body **2322** and the end cover **231**, a distance may be made to exist between the side wall of the groove **2313***b* and the side wall of the first concave portion **2313** in a thickness direction Z perpendicular to the end cover **231**. Illustratively, the distance is no less than 1 mm.
(79) It should be noted that, in other embodiments, the electrode terminal **232** may also be an integral structure. For example, the electrode terminal **232** is an integral cylindrical structure.
(80) In some embodiments, please refer to FIG. **8**. FIG. **8** is a partially enlarged view of the end cover assembly **23** shown in FIG. **7**. The end cover **231** is provided with an electrode extraction hole **2314** communicating with the first concave portion **2313** and penetrating the first end surface **2312***a*, and the electrode terminal **232** covers the electrode extraction hole **2314**. This structure makes the electrode terminal **232** not to extend into the electrode extraction hole **2314**, which facilitates installing the electrode terminal **232** in the first concave portion **2313**.
(81) Illustratively, the electrode extraction hole **2314** communicates with the first concave portion **2313** through a groove **2313***b* on the first bottom wall **2313***a*. The terminal main body **2321** in the electrode terminal **232** covers the electrode extraction hole **2314**, so that the entire electrode terminal **232** covers the electrode extraction hole **2314**.
(82) In some embodiments, in the case that the end cover assembly **23** is provided with the insulating member **233**, the insulating member **233** includes a second body **2331** and a second concave portion **2332**, the second body **2331** is located on a side of the first body **2311** facing the electrode assembly **22** (refer to FIG. **7**), the second body **2331** includes a second inner surface **2331***a* and a second outer surface **2331***b* arranged oppositely, the second concave portion **2332** is recessed from the second outer surface **2331***b* along a direction facing the electrode assembly **22**, and the second concave portion **2332** is configured to accommodate the first convex portion **2312**.
(83) The second concave portion **2332** of the insulating member **233** may accommodate the first convex portion **2312** of the end cover **231**, which may reduce a distance between the first body **2311** and the second body **2331**, so as to make more space for the electrode assembly **22**, which is beneficial to improve the capacity of the battery cell **20**.
(84) Optionally, the first outer surface **2311***b* of the second body **2331** abuts against the first inner surface **2311***a* of the first body **2311**. This structure makes the first convex portion **2312** to be completely accommodated in the second concave portion **2332**, so that the end cover **231** and the insulating member **233** are more compact, and may make more space for the electrode assembly **22**, to further improve the capacity of the battery cell **20**.
(85) Further, there is the gap between the first end surface **2312***a* and the bottom wall of the second concave portion **2332**, to ensure that the second outer surface **2331***b* of the second body **2331** may effectively abut against the first inner surface **2311***a* of the first body **2311**, reducing a risk of over-positioning between the insulating member **233** and the end cover **231**. Among that, the bottom

wall of the second concave portion **2332** is the second bottom wall **2332***a*. Of course, in other embodiments, the first end surface **2312***a* may also directly abut against the bottom wall (the second bottom wall **2332***a*) of the second concave portion **2332**.

(86) In some embodiments, a position on the second body **2331** corresponding to the second concave portion **2332** is formed with a second convex portion **2333**, and the second convex portion **2333** extends to a second end surface **2333***a* from the second inner surface **2331***a* along the direction facing the electrode assembly **22**. The arrangement of the second convex portion **2333** may recess the second concave portion **2332** as much as possible along the direction facing the electrode assembly **22**, to further increase a recess depth of the second concave portion **2332**.

(87) Of course, the second bottom wall **2332***a* may be flush with the second inner surface **2331***a*; the second bottom wall **2332***a* may also exceed the second inner surface **2331***a* of the second body **2331** along the direction facing the electrode assembly **22**, that is, the second bottom wall **2332***a* is closer to the electrode assembly **22** than the second inner surface **2331***a*; and the second bottom wall **2332***a* may also exceed the second inner surface **2331***a* of the second body **2331** along the direction away from the electrode assembly **22**, that is, the second inner surface **2331***a* is closer to the electrode assembly **22** than the second bottom wall **2332***a*. In FIG. **8**, it illustratively shows that the second bottom wall **2332***a* exceeds the second inner surface **2331***a* along a direction facing the electrode assembly **22**, to recess the second concave portion **2332** in the second convex portion **2333**, which may further increase the recess depth of the second concave portion **2332**, and increase a space of the second concave portion **2332** for accommodating the first convex portion **2312**, so that the first convex portion **2312** may extend to a deeper position of the second convex portion **2333**.

(88) It should be noted that if the electrode terminal **232** exceeds the first end surface **2312***a* along the direction facing the electrode assembly **22**, for example, the terminal main body **2321** in the electrode terminal **232** exceeds the first end surface **2312***a* along the direction facing the electrode assembly **22**, in this case, the electrode terminal **232** may be located on a side of the second end surface **2333***a* facing away from the electrode assembly **22**, that is, if the electrode terminal **232** does not exceed the second end surface **2333***a* along the direction facing the electrode assembly **22**.

(89) In some embodiments, if the tab **221** of the electrode assembly **22** electrically connects to the electrode terminal **232** through the current collecting member **24**, the tab **221** may include a first connection portion **2211**. The current collecting member **24** may include a second connection portion **241** for connecting to the first connection portion **2211** and a third connection portion **242** for connecting to the electrode terminal **232**; where, the second connection portion **241** and the first connection portion **2211** are disposed in a stacking manner along a thickness direction Z of the end cover **231**, and the third connection portion **242** is located on a side of the second end surface **2333***a* facing the electrode assembly **22**.

(90) The second connection portion **241** of the current collecting member **24** and the first connection portion **2211** of the tab **221** are disposed in a stacking manner along a thickness direction Z of the end cover **231**, which facilitates connecting the second connection portion **241** and the first connection portion **2211** together, for example, welding the second connection portion **241** and the first connection portion **2211** together.

(91) The third connection portion **242** may abut against the second end surface **2333***a*, or may have a gap with the second end surface **2333***a*. If the third connection portion **242** abuts against the second end surface **2333***a*, on one hand, stability of the current collecting member **24** may be improved, and on the other hand, the current collecting member **24** and the insulating member **233** may be made more compact.

(92) In some embodiments, the insulating member **233** may also include a third concave portion **2334**, the third concave portion **2334** is recessed from the second end surface **2333***a* to the second inner surface **2331***a* along a direction away from the electrode assembly **22**, and the third concave portion **2334** is configured to accommodate at least a part of the first connection portion **2211**

and/or at least a part of the second connection portion **241**. The arrangement of the third concave portion **2334** may reduce an internal space of the housing **21** occupied by a connection part of the tab **221** and the current collecting member **24**, and make more space for the electrode assembly **22**, to improve the capacity of the battery cell **20**.

(93) Taking the electrode terminals **232** in the end cover assembly **23** as two as an example, positions on the second inner surface **2331***a* of the second body **2331** of the insulating member **233** corresponding to the two electrode terminals **232** respectively may be provided with two second convex portions **2333**, and the third concave portion **2334** may be formed on a side of the end cover **231** facing the electrode assembly **22** and located at an area between the two second convex portions **2333**.

(94) In some embodiments, please refer to FIG. **9**. FIG. **9** is a positional relationship diagram of an insulating member **233**, a current collecting member **24** and a tab **221** provided by some embodiments of the application. In the thickness direction Z of the end cover **231**, the first connection portion **2211** is closer to the electrode assembly **22** than the second connection portion **241** (refer to FIG. **7**), and the second connection portion **241** is accommodated in the third concave portion **2334**. In some other embodiments, please refer to FIG. **10**. FIG. **10** is a diagram of the positional relationship among the insulating member **233**, the current collecting member **24**, and the tab **221** provided by some other embodiments of the application.

(95) In the thickness direction Z of the end cover **231**, the second connection portion **241** is closer to the electrode assembly **22** than the first connection portion **2211**, and the first connection portion **2211** is accommodated in the third concave portion **2334**. In some other embodiments, please refer to FIG. **11**. FIG. **11** is a positional relationship diagram of an insulating member **233**, a current collecting member **24** and a tab **221** provided by some other embodiments of the application. The first connection portion **2211** and the second connection portion **241** are both accommodated in the third concave portion **2334**, to further make more space for the electrode assembly **22**.

(96) In some embodiments, please refer to FIG. **12**. FIG. **12** is a schematic structural diagram of the current collecting member **24** shown in FIG. **8**. The current collecting member **24** may further include a fourth connection portion **243**. A third connection portion **242** connects to a second connection portion **241** through the fourth connection portion **243**, and the third connection portion **242** and the second connection portion **241** are spaced apart in the thickness direction Z of the end cover **231**. For the current collecting member **24** of this structure, the second connection portion **241** may be accommodated in the third concave portion **2334**, and the third connection portion **242** may abut against the second end surface **2333***a* of the second convex portion **2333**.

(97) Illustratively, the second connection portion **241**, the fourth connection portion **243** and the third connection portion **242** are sequentially connected to form a “Z”-shaped plate structure. Among that, in the thickness direction Z of the end cover **231**, a side of the third connection portion **242** close to the second connection portion **241** is provided with a protrusion **244** for connecting and fixing with the electrode terminal **232**. Of course, the protrusion **244** on the third connection portion **242** may penetrate the electrode extraction hole **2314** on the end cover **231** to be connected and fixed to the terminal main body **2321** of the electrode terminal **232**. For example, the protrusion **244** is welded to the terminal main body **2321**.

(98) In some embodiments, the end cover assembly may not be provided with an insulating member. In this case, the end cover is made of a plastic material, and the current collecting member and the end cover may be in direct contact.

(99) Please refer to FIG. **13**. FIG. **13** is a flowchart of a manufacturing method for a battery cell **20** provided by some embodiments of the present application. The method includes: S**100**: providing a housing **21**, the housing **21** including an opening; S**200**: providing an electrode assembly **22**; S**300**: providing an end cover assembly **23**, the end cover assembly **23** including an end cover **231** and an electrode terminal **232**, the electrode terminal **232** being installed on the end cover **231**; S**400**: accommodating the electrode assembly **22** in the housing **21**; S**500**: electrically connecting the

electrode terminal **232** and the electrode assembly **22**; and S**600**: covering the end cover **231** at the opening; where, the end cover **231** includes a first body **2311** and a first convex portion **2312**, the first body **2311** includes a first inner surface **2311***a* and a first outer surface **2311***b* arranged oppositely, and the first convex portion **2312** extends to a first end surface **2312***a* from the first inner surface **2311***a* along a direction facing the electrode assembly **22**, a position on the first body **2311** corresponding to the first convex portion **2312** is formed with a first concave portion **2313** recessed from the first outer surface **2311***b* along the direction facing the electrode assembly **22**, the first concave portion **2313** is configured to accommodate the electrode terminal **232**, and the electrode terminal **232** is located on a side of the first end surface **2312***a* away from the electrode assembly **22**.

(100) In the above method, a sequential order of step S**100**, step S**200**, and step S**300** is not limited. For example, step S**300** may be performed first, then step S**200** is performed, and then step S**100** is performed. In addition, step S**500** may be performed before step S**400**, and step S**500** may also be performed after step S**400**.

(101) The related structure of the battery cell **20** manufactured by the above method may refer to the battery cell **20** provided in the above respective embodiment.

(102) Please refer to FIG. **14**. FIG. **14** is a schematic block diagram of a manufacturing device **2000** for a battery cell **20** provided by some embodiments of the present application. The manufacturing device **2000** includes a first providing apparatus **1100**, a second providing apparatus **1200**, a third providing apparatus **1300** and an assembly apparatus **1400**.

(103) The first providing apparatus **1100** is used for providing a housing **21**, and the housing **21** includes an opening. The second providing apparatus **1200** is used for providing an electrode assembly **22**. The third providing apparatus **1300** is used for providing an end cover assembly **23**, the end cover assembly **23** includes an end cover **231** and an electrode terminal **232**, and the electrode terminal **232** is installed on the end cover **231**. The assembly apparatus **1400** is used for accommodating the electrode assembly **22** in the housing **21**, the assembly apparatus **1400** is used for electrically connecting the electrode terminal **232** and the electrode assembly **22**, and the assembly apparatus **1400** is further used for covering at the end cover **231** at the opening.

(104) Among that, the end cover **231** includes a first body **2311** and a first convex portion **2312**, the first body **2311** includes a first inner surface **2311***a* and a first outer surface **2311***b* arranged oppositely, and the first convex portion **2312** extends to a first end surface **2312***a* from the first inner surface **2311***a* along a direction facing the electrode assembly **22**, a position on the first body **2311** corresponding to the first convex portion **2312** is formed with a first concave portion **2313** recessed from the first outer surface **2311***b* along the direction facing the electrode assembly **22**, the first concave portion **2313** is configured to accommodate the electrode terminal **232**, and the electrode terminal **232** is located on a side of the first end surface **2312***a* away from the electrode assembly **22**.

(105) The related structure of the battery cell **20** manufactured by the above manufacturing device **2000** may refer to the battery cell **20** provided in the above respective embodiments.

(106) It should be noted that, the embodiments in the present application and features in the embodiments may be mutually combined provided that no conflict is caused.

(107) The above embodiments are merely used for illustrating the technical solution of the present application, but are not intended to limit the present application. For those skilled in the art, the present application may have various amendments and modifications. Any modification, equivalent substitution, improvement etc., made within the spirit and principle of the present application shall fall within the protection scope of the present application.

Claims

1. A battery cell, comprising: a housing, comprising an opening; an electrode assembly, accommodated in the housing; and an end cover assembly, comprising an end cover and an electrode terminal, the end cover being used for covering at the opening, the electrode terminal being installed on the end cover, and being used for electrical connection with the electrode assembly; wherein, the end cover comprises a first body and a first convex portion, the first body comprises a first inner surface and a first outer surface arranged oppositely, and the first convex portion extends to a first end surface from the first inner surface along a direction facing the electrode assembly, a position on the first body corresponding to the first convex portion is formed with a first concave portion recessed from the first outer surface along the direction facing the electrode assembly, the first concave portion is configured to accommodate the electrode terminal, and the electrode terminal is located on a side of the first end surface away from the electrode assembly; wherein a bottom wall of the first concave portion is provided with a groove recessed along a direction facing the electrode assembly, the electrode terminal is partially accommodated in the groove, and a distance is made to exist between a side wall of the groove and a side wall of the first concave portion in a thickness direction perpendicular to the end cover.
2. The battery cell according to claim 1, wherein a bottom wall of the first concave portion exceeds the first inner surface along the direction facing the electrode assembly; or, the bottom wall of the first concave portion is flush with the first inner surface.
3. The battery cell according to claim 1, wherein the electrode terminal comprises a connection body and a terminal main body, the terminal main body is used for electrical connection with the electrode assembly, and the terminal main body is installed on the end cover through the connection body; wherein, the connection body is at least partially accommodated in the groove and fixed to a side wall or a bottom wall of the groove.
4. The battery cell according to claim 1, wherein a depth of the first concave portion is greater than a depth of the groove.
5. The battery cell according to claim 1, wherein the end cover is provided with an electrode extraction hole communicating with the first concave portion and penetrating the first end surface, and the electrode terminal covers the electrode extraction hole.
6. A battery, comprising: a box body; a battery cell, the battery cell being accommodated in the box body, the battery cell, comprising: a housing, comprising an opening; an electrode assembly, accommodated in the housing; and an end cover assembly, comprising an end cover and an electrode terminal, the end cover being used for covering at the opening, the electrode terminal being installed on the end cover, and being used for electrical connection with the electrode assembly; wherein, the end cover comprises a first body and a first convex portion, the first body comprises a first inner surface and a first outer surface arranged oppositely, and the first convex portion extends to a first end surface from the first inner surface along a direction facing the electrode assembly, a position on the first body corresponding to the first convex portion is formed with a first concave portion recessed from the first outer surface along the direction facing the electrode assembly, the first concave portion is configured to accommodate the electrode terminal, and the electrode terminal is located on a side of the first end surface away from the electrode assembly; wherein a bottom wall of the first concave portion is provided with a groove recessed along a direction facing the electrode assembly, the electrode terminal is partially accommodated in the groove, and a distance is made to exist between a side wall of the groove and a side wall of the first concave portion in a thickness direction perpendicular to the end cover.
7. The battery according to claim 6, wherein a bottom wall of the first concave portion exceeds the first inner surface along the direction facing the electrode assembly; or, the bottom wall of the first concave portion is flush with the first inner surface.
8. The battery according to claim 6, wherein the electrode terminal comprises a connection body and a terminal main body, the terminal main body is used for electrical connection with the

electrode assembly, and the terminal main body is installed on the end cover through the connection body; wherein, the connection body is at least partially accommodated in the groove and fixed to a side wall or a bottom wall of the groove.

9. The battery according to claim 6, wherein a depth of the first concave portion is greater than a depth of the groove.

10. A power consumption device, comprising the battery according to claim 6.

11. The battery cell according to claim 1, wherein the end cover assembly further comprises an insulating member; the insulating member is located on a side of the end cover facing the electrode assembly, and the insulating member is used for separating the electrode assembly and the end cover.

12. The battery cell according to claim 11, wherein the insulating member comprises a second body and a second concave portion, the second body is located on a side of the first body facing the electrode assembly, the second body comprises a second inner surface and a second outer surface arranged oppositely, the second concave portion is recessed from the second outer surface along a direction facing the electrode assembly, and the second concave portion is configured to accommodate the first convex portion.

13. The battery cell according to claim 12, wherein the second outer surface abuts against the first inner surface.

14. The battery cell according to claim 12, wherein there is a gap between the first end surface and a bottom wall of the second concave portion.

15. The battery cell according to claim 12, wherein a position on the second body corresponding to the second concave portion is formed with a second convex portion, and the second convex portion extends to a second end surface from the second inner surface along the direction facing the electrode assembly.

16. The battery cell according to claim 15, wherein the electrode assembly comprises a tab comprising a first connection portion; the battery cell further comprises a current collecting member, the current collecting member comprises a second connection portion for connecting to the first connection portion and a third connection portion for connecting to the electrode terminal; wherein, the second connection portion and the first connection portion are disposed in a stacking manner along a thickness direction of the end cover, and the third connection portion is located on a side of the second end surface facing the electrode assembly.

17. The battery cell according to claim 16, wherein the insulating member further comprises a third concave portion, the third concave portion is recessed from the second end surface to the second inner surface along a direction away from the electrode assembly, and the third concave portion is configured to accommodate at least a part of the first connection portion and/or at least a part of the second connection portion.

18. The battery cell according to claim 12, wherein the bottom wall of the second concave portion exceeds the second inner surface along a direction facing the electrode assembly.

19. The battery cell according to claim 1, wherein the distance is made to exist between the side wall of the groove and the side wall of the first concave portion in the thickness direction perpendicular to the end cover to facilitate a welding of the electrode terminal and the end cover.

20. The battery according to claim 6, wherein the distance is made to exist between the side wall of the groove and the side wall of the first concave portion in the thickness direction perpendicular to the end cover to facilitate a welding of the electrode terminal and the end cover.