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BATTERY AND ELECTRIC APPARATUS

Abstract

A battery includes a box, at least one battery cell group, reinforcing pieces, and a connecting piece. The box includes first and second limiting portions disposed opposite each other in a first direction. The at least one battery cell group is disposed in the box and located between the first limiting portion and the second limiting portion, and the battery cell group includes battery cells arranged in the first direction. The reinforcing pieces are disposed in the box and located between the first limiting portion and the second limiting portion. The reinforcing pieces are spaced apart in the first direction, and at least one of the battery cells is disposed between two adjacent ones of the reinforcing pieces. One end of the connecting piece is connected to the first limiting portion, and the other end of the connecting piece is connected to the second limiting portion.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation of International Application No. PCT/CN2023/111817, filed on Aug. 8, 2023, which claims priority to Chinese Patent Application No. 2023105005354, filed on May 6, 2023 and entitled “BATTERY AND ELECTRIC APPARATUS”, which are incorporated herein by reference in their entirety.

TECHNICAL FIELD
[0002] This application relates to the field of battery technologies, and specifically, to a battery and an electric apparatus.
BACKGROUND
[0003] Energy saving and emission reduction are crucial to sustainable development of the automobile industry. Electric vehicles have become an important part of the sustainable development of the automobile industry due to advantages of the electric vehicles in energy saving and environmental protection. For the electric vehicles, a battery technology is an important factor related to their development.
[0004] In the battery technology, how to reduce a degree of damage to a battery cell after a collision is an urgent technical problem to be resolved.
SUMMARY
[0005] Embodiments of this application provide a battery and an electric apparatus, which can effectively improve force-bearing performance of an overall structure of the battery, thereby reducing a degree of damage to a battery cell after a collision.
[0006] According to a first aspect, this application provides a battery, including: a box including a first limiting portion and a second limiting portion disposed opposite each other in a first direction; at least one battery cell group that is disposed in the box and located between the first limiting portion and the second limiting portion, where the battery cell group includes a plurality of battery cells arranged in the first direction; a plurality of reinforcing pieces that are disposed in the box and located between the first limiting portion and the second limiting portion, where the plurality of reinforcing pieces are spaced apart in the first direction, and at least one of the battery cells is disposed between two adjacent ones of the reinforcing pieces; and a connecting piece, where one end of the connecting piece is connected to the first limiting portion, and the other end of the connecting piece is connected to the second limiting portion.
[0007] In the technical solutions of this application, the box includes the first limiting portion and the second limiting portion disposed opposite each other in the first direction. The at least one battery cell group is disposed in the box and located between the first limiting portion and the second limiting portion, and the battery cell group includes the plurality of battery cells arranged in the first direction, so that the first limiting portion and the second limiting portion can play a role in limiting the plurality of battery cells in the first direction, thereby limiting expansion of the battery cells in the first direction. This can improve internal cycle performance of the battery cells, and prolong a service life of the battery cells. The plurality of reinforcing pieces are disposed in the box and located between the first limiting portion and the second limiting portion, the plurality of reinforcing pieces are spaced apart in the first direction, and at least one of the battery cells is disposed between two adjacent ones of the reinforcing pieces. This can improve rigidity of the box,

protect the battery cells when the battery collides, and reduce a degree of damage to the battery cells. One end of the connecting piece is connected to the first limiting portion, and the other end of the connecting piece is connected to the second limiting portion. This can strengthen the box in the first direction, resist deformation of the box in the first direction, further improve the rigidity of the box, and improve force-bearing performance of the box, thereby reducing a degree of damage to the battery cells after a collision, improving stability of an overall structure of the battery, and prolonging a service life of the battery.

[0008] According to some embodiments of this application, the connecting piece is located at an end of the battery cell in a third direction, a projection of the reinforcing piece intersects with a projection of the connecting piece in the third direction, and the third direction is perpendicular to the first direction.

[0009] In the foregoing technical solution, the connecting piece is located at an end of the battery cell in the third direction, and does not occupy arrangement space of the battery cells, thereby reducing occupation of space used for accommodating the battery cells in the box, and further reducing impact on energy density of the battery. The projection of the reinforcing piece intersects with the projection of the connecting piece in the third direction, so that the reinforcing piece and the connecting piece can strengthen the rigidity of the box in two intersecting directions, and the force-bearing performance of the box can be further improved, thereby reducing the degree of damage to the battery cells after a collision, and improving the stability of the overall structure of the battery.

[0010] According to some embodiments of this application, the first direction is perpendicular to a surface with a largest area of the battery cell.

[0011] In the foregoing technical solution, insertion and extraction of metal ions in an electrode active material during charging and discharging of the battery cell cause expansion and contraction of the battery cell. In an ideal state, a size change of the material should be reversible in a process of insertion and extraction of the metal ions. However, in an actual situation, some metal ions cannot be completely extracted from an anode due to a change in balance of the battery cell, or are deposited on a surface of the anode as an insoluble by-product during cycling. This causes irreversible expansion of the battery cell. Impurities in an electrolyte inside the battery cell or a low electrochemical window of the electrolyte may cause the electrolyte to decompose, generating gas and causing expansion of the battery cell. A manufacturing process of the battery cell may also cause expansion of the battery cell. For example, poor packaging that may allow moisture to enter the battery cell and other reasons also cause expansion of the battery cell. Therefore, after being used for a period of time, the battery cell expands, and the expansion of the battery cell is mainly reflected on the surface with the largest area of the battery cell. The first direction is perpendicular to the surface with the largest area of the battery cell, so that the reinforcing piece can limit expansion of the surfaces with the largest area of the plurality of battery cells, and the connecting piece can also strengthen the rigidity of the box in the first direction. Therefore, the expansion of the surfaces with the largest area of the plurality of battery cells can be further limited, and the reinforcing piece and the connecting piece have a better limiting effect on the expansion of the battery cells. This can further improve the internal cycle performance of the battery cells, prolong the service life of the battery cells, and improve the stability of the overall structure of the battery.

[0012] According to some embodiments of this application, a length direction of the connecting piece is parallel to the first direction.

[0013] In the foregoing technical solution, the length direction of the connecting piece is parallel to the first direction, so that an acting force of the connecting piece connected between the first limiting portion and the second limiting portion is parallel to the first direction. That is, the acting force of the connecting piece all acts in the first direction, thereby reducing a problem that the force in the first direction is small due to acting of the acting force of the connecting piece in another direction. This can better limit the expansion of the plurality of battery cells in the first direction,

further improve the internal cycle performance of the battery cells, prolong the service life of the battery cells, and improve the stability of the overall structure of the battery.

[0014] According to some embodiments of this application, a length direction of the reinforcing piece is a second direction, and the second direction intersects with the first direction.

[0015] In the foregoing technical solution, the length direction of the reinforcing piece is the second direction, so that the reinforcing piece and the connecting piece can strengthen the rigidity of the box in the first direction and the second direction that intersect, thereby improving the force-bearing performance of the box, reducing the degree of damage to the battery cells after a collision, and having a good limiting effect on the expansion of the battery cells. This can improve the internal cycle performance of the battery cells, prolong the service life of the battery cells, and improve the stability of the overall structure of the battery.

[0016] According to some embodiments of this application, the second direction is perpendicular to the first direction.

[0017] In the foregoing technical solution, the second direction is perpendicular to the first direction, so that the reinforcing piece and the connecting piece can strengthen the rigidity of the box in the first direction and the second direction that are perpendicular, thereby further improving the force-bearing performance of the box, reducing the degree of damage to the battery cells after a collision, and having a better limiting effect on the expansion of the battery cells. This can further improve the internal cycle performance of the battery cells, prolong the service life of the battery cells, and improve the stability of the overall structure of the battery.

[0018] According to some embodiments of this application, the box further includes a mounting wall, both the first limiting portion and the second limiting portion are connected to the mounting wall, and the connecting piece is located at an end of the battery cell facing away from the mounting wall.

[0019] In the foregoing technical solution, the box further includes the mounting wall, to jointly form space for accommodating the battery cells. The first limiting portion and the second limiting portion are connected to the mounting wall, to play a role in strengthening the rigidity of the box in the first direction. The connecting piece is located at the end of the battery cell facing away from the mounting wall, to reduce occupation of the space for accommodating the battery cells in the box, thereby reducing the impact on the energy density of the battery, and helping improve the energy density of the battery.

[0020] According to some embodiments of this application, the battery cell includes a housing and an electrode terminal. The housing has a first wall facing away from the mounting wall, the electrode terminal is disposed on the first wall, and the connecting piece abuts against the first wall.

[0021] In the foregoing technical solution, the battery cell includes the housing and the electrode terminal, the housing has the first wall facing away from the mounting wall, the electrode terminal is disposed on the first wall, and the connecting piece abuts against the first wall that is of the housing and that faces away from the mounting wall. This can play a role in limiting the battery cells, make locations of the battery cells more stable, and improve the stability of the overall structure of the battery.

[0022] According to some embodiments of this application, the projection of the connecting piece does not overlap with a projection of the electrode terminal in the third direction, and the third direction is parallel to a thickness direction of the mounting wall.

[0023] In the foregoing technical solution, the projection of the connecting piece does not overlap with the projection of the electrode terminal in the third direction, so that a possibility that the connecting piece blocks the electrode terminal can be reduced, a connection between the electrode terminal and another component is facilitated, and reliability of a connection between the battery cell and another component is improved. In addition, a possibility that an external force applied to the connecting piece acts on the electrode terminal can be reduced, so that a role in protecting the electrode terminal is played.

[0024] According to some embodiments of this application, the battery cell further includes a pressure relief mechanism. The pressure relief mechanism is disposed on the first wall, the projection of the connecting piece does not overlap with a projection of the pressure relief mechanism in the third direction, and the third direction is parallel to a thickness direction of the mounting wall.

[0025] In the foregoing technical solution, the projection of the connecting piece does not overlap with the projection of the pressure relief mechanism in the third direction, so that a possibility that the connecting piece blocks the pressure relief mechanism can be reduced, the pressure relief mechanism is facilitated to perform pressure relief, and reliability of the pressure relief mechanism is improved. In addition, a possibility that an external force applied to the connecting piece acts on the pressure relief mechanism can be reduced, so that a possibility of early pressure relief caused by damage to the pressure relief mechanism is reduced, and a role in protecting the pressure relief mechanism is played.

[0026] According to some embodiments of this application, the battery cell further includes a pressure relief mechanism. The pressure relief mechanism and the electrode terminal are disposed on different walls of the battery cell.

[0027] In the foregoing technical solution, the pressure relief mechanism and the electrode terminal are disposed on different walls of the battery cell, so that the connecting piece does not block the pressure relief mechanism, the pressure relief mechanism is facilitated to perform pressure relief, and reliability of the pressure relief mechanism is improved.

[0028] According to some embodiments of this application, the connecting piece abuts against an end portion of the first wall in the second direction, and the second direction intersects with the first direction.

[0029] In the foregoing technical solution, the connecting piece abuts against the end portion of the first wall in the second direction, so that a possibility that the connecting piece blocks components on the first wall of the battery cell can be reduced, and a role in limiting the battery cell can be well played. In addition, because the end portion of the first wall in the second direction has better force-bearing performance, the connecting piece abuts against the end portion of the first wall in the second direction, so that when the connecting piece is stressed and acts on the end portion of the first wall in the second direction, the battery cell is less likely to be damaged, and the degree of damage to the battery cell after a collision can be reduced.

[0030] According to some embodiments of this application, the connecting piece is bonded to the first wall.

[0031] In the foregoing technical solution, the connecting piece is bonded to the first wall, so that locations of the connecting piece and the battery cell can be more stable, the connecting piece can play a better role in limiting the battery cell in a plurality of directions (the first direction, the second direction and the third direction), and the connecting piece can better limit the expansion of the battery cell. This can further improve the internal cycle performance of the battery cell, prolong the service life of the battery cell, and improve the stability of the overall structure of the battery. In addition, an adhesive used for bonding the connecting piece and the first wall can also play a buffering role, to reduce a possibility that an external force applied to the connecting piece acts on the first wall to cause damage to the battery cell.

[0032] According to some embodiments of this application, the battery includes a plurality of battery cell groups arranged in the second direction, a projection of each reinforcing piece overlaps with a projection of a battery cell in each battery cell group in the first direction, and the second direction intersects with the first direction.

[0033] In the foregoing technical solution, the battery includes the plurality of battery cell groups arranged in the second direction, so that the energy density of the battery can be increased. The projection of each reinforcing piece overlaps with the projection of the battery cell in each battery cell group in the first direction, so that each reinforcing piece can support and structurally

strengthen a plurality of battery cells, and the stability of the overall structure of the battery is further improved.

[0034] According to some embodiments of this application, a gap is present between two adjacent battery cell groups in the second direction, and the connecting piece covers the gap.

[0035] In the foregoing technical solution, a gap is present between two adjacent battery cell groups in the second direction, so that locations of battery cells can be conveniently adjusted, and a possibility that the battery cells expand to squeeze adjacent battery cells can be reduced. The connecting piece covers the gap, so that a possibility that metal particles fall into the gap and cause damage or a short circuit to the battery cells can be reduced.

[0036] According to some embodiments of this application, a part of the connecting piece extends into the gap.

[0037] In the foregoing technical solution, a part of the connecting piece extends into the gap, so that the connecting piece can further play a role in limiting the battery cells in the second direction, the locations of the battery cells are more stable, and the stability of the overall structure of the battery is improved.

[0038] According to some embodiments of this application, one end of the connecting piece is threadedly connected or riveted to the first limiting portion, and the other end of the connecting piece is threadedly connected or riveted to the second limiting portion.

[0039] In the foregoing technical solution, one end of the connecting piece is threadedly connected or riveted to the first limiting portion, and the other end of the connecting piece is threadedly connected or riveted to the second limiting portion, so that a connection structure between the connecting piece and each of the first limiting portion and the second limiting portion is simple, mounting is convenient, and costs are saved. In addition, the connecting piece can be stably connected to each of the first limiting portion and the second limiting portion.

[0040] According to some embodiments of this application, the connecting piece is provided in plurality, the plurality of connecting pieces are spaced apart in the second direction, and the second direction intersects with the first direction.

[0041] In the foregoing technical solution, the connecting piece is provided in plurality, and the plurality of connecting pieces are spaced apart in the second direction, so that the rigidity of the box can be further strengthened, thereby better limiting the expansion of the plurality of battery cells in the first direction. This improves the internal cycle performance of the battery cells, prolongs the service life of the battery cells, and improves the stability of the overall structure of the battery.

[0042] According to some embodiments of this application, a chamber for accommodating a heat exchange medium is formed inside the reinforcing piece, and the chambers of the plurality of reinforcing pieces communicate with each other.

[0043] In the foregoing technical solution, the chamber for accommodating the heat exchange medium is formed inside the reinforcing piece, and the chambers of the plurality of reinforcing pieces communicate with each other, so that fluidity of the heat exchange medium in the chambers can be effectively improved, thereby further improving heat exchange efficiency of the reinforcing pieces. In addition, the chambers of the plurality of reinforcing pieces communicate with each other, so that quantities of liquid inlet pipes and liquid outlet pipes can be reduced, and space occupied by the liquid inlet pipes and the liquid outlet pipes can be further reduced. This helps further improve the energy density of the battery.

[0044] According to a second aspect, this application provides an electric apparatus, including the battery described in any one of the foregoing solutions, where the battery is used for providing electric energy.

Description

BRIEF DESCRIPTION OF DRAWINGS

[0045] To describe the technical solutions in embodiments of this application more clearly, the following briefly describes the accompanying drawings used for describing embodiments of this application. It should be understood that the accompanying drawings below show only some embodiments of this application, and therefore should not be considered as a limitation on the scope. A person of ordinary skill in the art may still derive other related drawings from these accompanying drawings without creative efforts.

[0046] FIG. **1** is a diagram of a structure of a vehicle according to some embodiments of this application;

[0047] FIG. **2** is an exploded view of a structure of a battery according to some embodiments of this application;

[0048] FIG. **3** is a diagram of a three-dimensional structure of a battery according to some embodiments of this application;

[0049] FIG. **4** is a partially enlarged diagram of the battery in FIG. **3** at a position A;

[0050] FIG. **5** is an exploded view of a structure of a battery according to some embodiments of this application;

[0051] FIG. **6** is a diagram of a three-dimensional structure of a battery cell according to some embodiments of this application; and

[0052] FIG. **7** is a schematic front view of a part of a structure of a battery according to some embodiments of this application.

REFERENCE SIGNS

[0053] **1000**: vehicle; **100**: battery; **110**: box; **111**: first sub-box; **1111**: first surface; **1112**: mounting wall; **112**: second sub-box; **113**: first limiting portion; **114**: second limiting portion; **120**: battery cell group; **121**: battery cell; **122**: housing; **1221**: main shell; **1222**: first wall; **123**: electrode terminal; **124**: pressure relief mechanism; **130**: reinforcing piece; **140**: connecting piece; **200**: controller; **300**: motor; X: first direction; Y: second direction; Z: third direction.

DESCRIPTION OF EMBODIMENTS

[0054] To make the objectives, technical solutions, and advantages of embodiments of this application clearer, the following clearly describes the technical solutions in embodiments of this application with reference to the accompanying drawings in embodiments of this application. It is clear that the described embodiments are merely some rather than all of embodiments of this application. All other embodiments obtained by a person of ordinary skill in the art based on embodiments of this application without creative efforts shall fall within the protection scope of this application.

[0055] Unless otherwise defined, all technical and scientific terms used in this application have same meanings as those usually understood by a person skilled in the art of this application. The terms used in the specification of this application are merely intended to describe the specific embodiments rather than to limit this application. The terms “include”, “have”, and any variants thereof in the specification, claims, and brief description of drawings of this application are intended to cover a non-exclusive inclusion.

[0056] In the specification, claims, or accompanying drawings of this application, the terms “first”, “second”, and the like are intended to distinguish between different objects rather than to describe a particular order or a primary-secondary relationship.

[0057] An “embodiment” mentioned in this application indicates that a particular feature, structure, or characteristic described with reference to this embodiment may be included in at least one embodiment of this application. The phrase shown in various locations in this specification does not necessarily refer to a same embodiment, and is not an independent or optional embodiment exclusive from another embodiment.

[0058] In the description of this application, it should be noted that, unless otherwise expressly

specified and limited, terms “mount”, “interconnect”, “connect”, and “attach” should be understood in a broad sense. For example, the terms may indicate a fixed connection, a detachable connection, or an integral connection, or may indicate a direct connection, an indirect connection through an intermediate medium, or internal communication between two elements. For a person of ordinary skill in the art, a specific meaning of the foregoing terms in this application may be understood based on a specific situation.

[0059] In this application, “a plurality of” means two or more (including two).

[0060] In this application, a battery cell may include a lithium-ion secondary battery, a lithium-ion primary battery, a lithium-sulfur battery, a sodium-ion battery, a magnesium ion battery, or the like. This is not limited in embodiments of this application. The battery cell may be flat, rectangular, or in another shape. This is also not limited in embodiments of this application.

[0061] The battery mentioned in embodiments of this application is a single physical module that includes a plurality of battery cells to provide a higher voltage and capacity. For example, the battery mentioned in this application may include a battery module, a battery pack, or the like. The battery generally may further include a box for packaging one or more battery cells or a plurality of battery modules. The box can prevent a liquid or another foreign matter from affecting charging or discharging of the battery cells.

[0062] The battery cell includes an electrode assembly and an electrolyte. The electrode assembly includes a positive electrode plate, a negative electrode plate, and a separator. Working of the battery cell mainly relies on migration 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 electrode active substance layer. The positive electrode active substance layer is applied on a surface of the positive electrode current collector, and the current collector that is not coated with the positive electrode active substance layer serves as a positive electrode tab. A lithium-ion battery is used as an example. The positive electrode current collector may be made of aluminum, and the positive electrode active substance may be lithium cobalt oxide, lithium iron phosphate, ternary lithium, lithium manganese oxide, or the like. The negative electrode plate includes a negative electrode current collector and a negative electrode active substance layer. The negative electrode active substance layer is applied on a surface of the negative electrode current collector, and the current collector that is not coated with the negative electrode active substance layer serves as a negative electrode tab. The negative electrode current collector may be made of copper, and the negative electrode active substance may be carbon, silicon, or the like. To allow a high current to pass through without any fusing, a plurality of positive electrode tabs are provided and stacked together, and a plurality of negative electrode tabs are provided and stacked together. The separator may be made of PP (polypropylene, polypropylene), PE (polyethylene, polyethylene), or the like.

[0063] The battery has outstanding advantages such as high energy density, low environmental pollution, high power density, a long service life, a wide application range, and a low self-discharge coefficient, and is an important part of new energy development nowadays. Development of the new energy industry drives the battery to gradually develop in the direction of large scale and integration.

[0064] However, when a large quantity of battery cells are stacked together, a requirement for force-bearing performance of the box of the battery becomes higher. The poor force-bearing performance of the box of the battery leads to deformation or damage because the box is susceptible to an external force. In addition, a role in limiting expansion of the battery cells cannot be well played, resulting in deformation or damage of the battery and a short service life.

[0065] Based on the foregoing considerations, this application provides a battery. The battery includes a box, at least one battery cell group, a plurality of reinforcing pieces, and a connecting piece. The box includes a first limiting portion and a second limiting portion disposed opposite each other in a first direction. The at least one battery cell group is disposed in the box and located

between the first limiting portion and the second limiting portion, and the battery cell group includes a plurality of battery cells arranged in the first direction. The plurality of reinforcing pieces are disposed in the box and located between the first limiting portion and the second limiting portion, the plurality of reinforcing pieces are spaced apart in the first direction, and at least one of the battery cells is disposed between two adjacent ones of the reinforcing pieces. One end of the connecting piece is connected to the first limiting portion, and the other end of the connecting piece is connected to the second limiting portion.

[0066] In the technical solution of this application, the box includes the first limiting portion and the second limiting portion disposed opposite each other in the first direction. The at least one battery cell group is disposed in the box and located between the first limiting portion and the second limiting portion, and the battery cell group includes the plurality of battery cells arranged in the first direction, so that the first limiting portion and the second limiting portion can play a role in limiting the plurality of battery cells in the first direction, thereby limiting expansion of the battery cells in the first direction. This can improve internal cycle performance of the battery cells, and prolong a service life of the battery cells. The plurality of reinforcing pieces are disposed in the box and located between the first limiting portion and the second limiting portion, the plurality of reinforcing pieces are spaced apart in the first direction, and at least one of the battery cells is disposed between two adjacent ones of the reinforcing pieces. This can improve rigidity of the box, protect the battery cells when the battery collides, and reduce a degree of damage to the battery cells. One end of the connecting piece is connected to the first limiting portion, and the other end of the connecting piece is connected to the second limiting portion. This can strengthen the box in the first direction, resist deformation of the box in the first direction, further improve the rigidity of the box, and improve force-bearing performance of the box, thereby reducing a degree of damage to the battery cells after a collision, improving stability of an overall structure of the battery, and prolonging a service life of the battery.

[0067] The battery disclosed in embodiments of this application may be used in, but is not limited to, electric apparatuses such as vehicles, ships, or aircrafts. The battery disclosed in this application may be used to constitute a power supply system of the electric apparatus.

[0068] An embodiment of this application provides an electric apparatus using a battery as a power supply. The electric apparatus may be, but is not limited to, an electric tool, a battery driven vehicle, an electric vehicle, a ship, a spacecraft, and the like. The spacecraft may include an airplane, a rocket, a space shuttle, a spaceship, and the like.

[0069] The battery described in embodiments of this application is not merely limited to being applicable to the foregoing electric apparatus, but is further applicable to all electric apparatuses using batteries. However, for the sake of brevity, an example in which an electric apparatus is a vehicle is used for description in the following embodiments.

[0070] FIG. **1** is a diagram of a structure of a vehicle according to some embodiments of this application. A vehicle **1000** may be a fuel vehicle, a gas vehicle, or a new energy vehicle, and the new energy vehicle may be a battery electric vehicle, a hybrid electric vehicle, an extended-range vehicle, or the like. A battery **100** is disposed inside the vehicle **1000**, and the battery **100** may be disposed at a bottom, a head, or a tail of the vehicle **1000**. The battery **100** may be configured to supply power to the vehicle **1000**. For example, the battery **100** may serve as an operational power supply for 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 **100** to supply power to the motor **300**, for example, to meet working power requirements for starting, navigation, and driving of the vehicle **1000**.

[0071] In some embodiments of this application, the battery **100** cannot only serve as the operational power supply for the vehicle **1000**, but also as a driving power supply for the vehicle **1000**, to replace or partially replace fuel or natural gas to provide driving power for the vehicle **1000**.

[0072] FIG. **2** is an exploded view of a structure of a battery according to some embodiments of this application. A battery **100** includes a box **110** and battery cells **121**, and the battery cells **121** are accommodated in the box **110**. The box **110** is configured to provide accommodating space for the battery cells **121**, and the box **110** may use a variety of structures. In some embodiments, the box **110** may include a first sub-box **111** and a second sub-box **112**. The first sub-box **111** and the second sub-box **112** fit together, and the first sub-box **111** and the second sub-box **112** jointly define the accommodating space for accommodating the battery cells **121**. The first sub-box **111** may be a hollow structure having an opening at one end, the second sub-box **112** may be a plate structure, and the second sub-box **112** covers an opening side of the first sub-box **111**, so that the first sub-box **111** and the second sub-box **112** jointly define the accommodating space. Both the first sub-box **111** and the second sub-box **112** may alternatively be hollow structures having an opening at one side, and an opening side of the second sub-box **112** covers an opening side of the first sub-box **111**.
[0073] In some embodiments, the box **110** may be a cuboid.
[0074] In some other embodiments, the box **110** may alternatively be a cylinder.
[0075] In some embodiments, the box **110** can be made of aluminum, an aluminum alloy, or another metal material, so that the box **110** has high force-bearing performance.
[0076] In some other embodiments, the box **110** can alternatively be made of a non-metallic material with high strength, such as carbon fiber or rigid plastic.
[0077] Refer to FIG. **3** to FIG. **5**. FIG. **3** is a diagram of a three-dimensional structure of a battery according to some embodiments of this application. FIG. **4** is a partially enlarged diagram of the battery in FIG. **3** at a position A. FIG. **5** is an exploded view of a structure of a battery according to some embodiments of this application. Some embodiments of this application provide a battery **100**, including a box **110**, at least one battery cell group **120**, a plurality of reinforcing pieces **130** and a connecting piece **140**. The box **110** includes a first limiting portion **113** and a second limiting portion **114** disposed opposite each other in a first direction X. The at least one battery cell group **120** is disposed in the box **110** and located between the first limiting portion **113** and the second limiting portion **114**, and the battery cell group **120** includes a plurality of battery cells **121** arranged in the first direction X. The plurality of reinforcing pieces **130** are disposed in the box **110** and located between the first limiting portion **113** and the second limiting portion **114**, the plurality of reinforcing pieces **130** are spaced apart in the first direction X, and at least one of the battery cells **121** is disposed between two adjacent ones of the reinforcing pieces **130**. One end of the connecting piece **140** is connected to the first limiting portion **113**, and the other end of the connecting piece **140** is connected to the second limiting portion **114**.
[0078] In some embodiments, the battery cells **121** may be cuboid-shaped, so that the plurality of battery cells **121** can be arranged in a matrix closely. This helps improve energy density of the battery **100**.
[0079] In some other embodiments, the battery cells **121** may alternatively be flat, cylindrical, or in another shape.
[0080] In some embodiments, in the battery cell group **120**, the plurality of battery cells **121** may be connected in series or in parallel, or in a parallel-series connection. The parallel-series connection means a combination of a series connection and a parallel connection of the plurality of battery cells **121**. The plurality of battery cells **121** may be directly connected in series or in parallel, or in a parallel-series connection, and then the battery cell group **120** including the plurality of battery cells **121** is accommodated in the box **110**. Certainly, the battery cell group **120** may alternatively be in a form that the plurality of battery cells **121** are first connected in series or in parallel, or in a parallel-series connection to form battery cell group modules, and then the plurality of battery cell group modules are connected in series or in parallel, or in a parallel-series connection to form a whole that is then accommodated in the box **110**. The battery **100** may further include another structure. For example, the battery **100** may further include a busbar component,

configured to implement an electrical connection between the plurality of battery cells **121**.
[0081] In some embodiments, a surface that is on a periphery of the first sub-box **111** and that faces the second sub-box **112** is a first surface **1111**, and the first surface **1111** is configured to connect to the second sub-box **112** in a sealed manner. The first limiting portion **113** and the second limiting portion **114** are located, in a third direction Z, on a side that is of a plane in which the first surface **1111** is located and that is away from the second sub-box **112**, so that a possibility of interference between the connecting piece **140** and the second sub-box **112** can be reduced, thereby reducing impact on assembly of the battery **100**.
[0082] In some embodiments, the first limiting portion **113** and the second limiting portion **114** may be limiting beams, limiting plates, and the like disposed in the box **110**. The first limiting portion **113** and the second limiting portion **114** may be fastened in the box **110** through welding.
[0083] In some embodiments, the reinforcing piece **130** may be a thermal management component, and a chamber for accommodating a heat exchange medium is formed inside the reinforcing piece **130**.
[0084] The battery **100** presents different electric cycle performance at different ambient temperatures. When the ambient temperature is too high or too low, the cycle performance of the battery **100** is reduced, and even a service life of the battery **100** is shortened. Battery thermal management is a technology to resolve a problem of thermal dissipation or thermal runaway caused by working of the battery **100** at a too high or too low temperature through a reasonable design based on impact of a temperature on performance of the battery **100** and an optimal charging and discharging temperature range of the specific battery **100** in combination with electrochemical characteristics and a heat generation mechanism of the battery **100**, to improve overall performance of the battery **100**. Thermal management of the battery **100** may be implemented by disposing a thermal management component.
[0085] The heat exchange medium may be liquid or gas, the liquid may include water, ethanol, and the like, and the gas may be air. Thermal management means to cool or heat the battery cells **121**. For example, when the battery cells **121** generate heat or the battery **100** is in a hot environment, the battery cells **121** may be cooled. For another example, when the battery **100** is in a cold environment, the battery cells **121** may be heated.
[0086] In some other embodiments, the reinforcing piece **130** may alternatively be a heat exchange plate, and heat exchange of the battery cells **121** may be implemented directly by changing a temperature of the reinforcing piece **130**.
[0087] In some other embodiments, the reinforcing piece **130** may alternatively be an air-cooled component, and communicates with the outside of the battery **100**, so that air outside the battery **100** can flow through the reinforcing piece **130**, to implement heat exchange of the battery cells **121**.
[0088] In some other embodiments, the reinforcing piece **130** may be a metal plate, such as a steel plate or an aluminum plate, or a non-metallic plate with high strength, such as carbon fiber or rigid plastic.
[0089] In some embodiments, the reinforcing piece **130** is bonded to the battery cell **121**, so that locations of the reinforcing piece **130** and the battery cell **121** can be more stable.
[0090] In some embodiments, the reinforcing piece **130** may be fastened to the box **110** through welding, a threaded connection, riveting, or bonding, so that a location of the reinforcing piece **130** in the box **110** is more stable.
[0091] In some embodiments, the connecting piece **140** may be disposed in a plate shape.
[0092] In some other embodiments, the connecting piece **140** may alternatively be made of a hollow profile or a special-shaped profile. For example, in a cross section perpendicular to the first direction X, the connecting piece **140** may be divided into a first part and a second part (not shown in the figure), the first part extends in a second direction Y, and the second part extends in the third direction Z and is connected to the first part.

[0093] For example, both a quantity of first parts and a quantity of second parts are one, and the second part is connected to an end portion of the first part, so that the connecting piece **140** is L-shaped in the cross section perpendicular to the first direction X. Alternatively, both a quantity of first parts and a quantity of second parts are one, and the second part is connected to a middle portion of the first part, so that the connecting piece **140** is T-shaped (as shown in FIG. **7**) in the cross section perpendicular to the first direction X.
[0094] For another example, a quantity of first parts is one, and a quantity of second parts is three, where two second parts are respectively connected to two ends of the first part, and one second part is connected to a middle portion of the first part, so that the connecting piece **140** is E-shaped in the cross section perpendicular to the first direction X.
[0095] For another example, a quantity of first parts is two, the two first parts are spaced apart in the third direction Z, and a quantity of second parts is three, where two second parts each are connected to two ends of the two first parts, and one second part is connected to middle portions of the two first parts, so that the connecting piece **140** is in a shape resembling a Chinese character for “sun” in the cross section perpendicular to the first direction X.
[0096] For another example, a quantity of first parts is three, the three first parts are spaced apart in the third direction Z, and a quantity of second parts is three, where two second parts each are connected to two ends of the three first parts, and one second part is connected to middle portions of the three first parts, so that the connecting piece **140** is in a 2×2 grid shape in the cross section perpendicular to the first direction X.
[0097] In some embodiments, the connecting piece **140** may be made of aluminum, an aluminum alloy, or another metal material, so that the battery **100** can have higher force-bearing performance. The connecting piece **140** may be coated with an insulation layer, so that a possibility that the plurality of battery cells **121** are short-circuited through the connecting piece **140** can be reduced.
[0098] In some other embodiments, the connecting piece **140** may alternatively be made of a non-metallic material with high strength, such as carbon fiber or rigid plastic, so that a possibility that the plurality of battery cells **121** are short-circuited through the connecting piece **140** can be reduced.
[0099] The box **110** includes the first limiting portion **113** and the second limiting portion **114** disposed opposite each other in the first direction X. The at least one battery cell group **120** is disposed in the box **110** and located between the first limiting portion **113** and the second limiting portion **114**, and the battery cell group **120** includes the plurality of battery cells **121** arranged in the first direction X, so that the first limiting portion **113** and the second limiting portion **114** can play a role in limiting the plurality of battery cells **121** in the first direction X, thereby limiting expansion of the battery cells **121** in the first direction X. This can improve internal cycle performance of the battery cells **121**, and prolong a service life of the battery cells **121**. The plurality of reinforcing pieces **130** are disposed in the box **110** and located between the first limiting portion **113** and the second limiting portion **114**, the plurality of reinforcing pieces **130** are spaced apart in the first direction X, and at least one of the battery cells **121** is disposed between two adjacent ones of the reinforcing pieces **130**. This can improve rigidity of the box **110**, protect the battery cells **121** when the battery **100** collides, and reduce a degree of damage to the battery cells **121**. One end of the connecting piece **140** is connected to the first limiting portion **113**, and the other end of the connecting piece **140** is connected to the second limiting portion **114**. This can strengthen the box **110** in the first direction X, resist deformation of the box **110** in the first direction X, further improve the rigidity of the box **110**, and improve the force-bearing performance of the box **110**, thereby reducing a degree of damage to the battery cells **121** after a collision, improving stability of an overall structure of the battery **100**, and prolonging a service life of the battery **100**.
[0100] In some embodiments, the connecting piece **140** is located at one end of the battery cell **121** in the third direction Z. A projection of the reinforcing piece **130** intersects with a projection of the

connecting piece **140** in the third direction Z, and the third direction Z is perpendicular to the first direction X.

[0101] In some embodiments, the connecting piece **140** is disposed at one end of the battery cell **121** in the third direction Z, and does not occupy arrangement space of the battery cells **121**, thereby reducing occupation of space used for accommodating the battery cells **121** in the box **110**, and further reducing impact on energy density of the battery **100**. The projection of the reinforcing piece **130** intersects with the projection of the connecting piece **140** in the third direction Z, so that the reinforcing piece **130** and the connecting piece **140** can strengthen the rigidity of the box **110** in two intersecting directions (such as the first direction X and the second direction Y), and the force-bearing performance of the box **110** can be further improved, thereby reducing the degree of damage to the battery cells **121** after a collision, and improving the stability of the overall structure of the battery **100**.

[0102] A projection means to project a shape of an object onto a plane by using a set of light. The light in embodiments is light emitted by a light source located at one end of the reinforcing piece **130** and the connecting piece **140** in the third direction Z. An emission direction of the light source is parallel to the third direction Z, the projected plane is a plane located at the other end of the reinforcing piece **130** and the connecting piece **140** in the third direction Z, and the plane is perpendicular to the third direction Z. That is, a center line of a projection line is perpendicular to a projection plane, and “projection” in this application means an orthographic projection.

[0103] In some embodiments, the first direction X is perpendicular to a surface with a largest area of the battery cell **121**.

[0104] Insertion and extraction of metal ions in an electrode active material during charging and discharging of the battery cell **121** cause expansion and contraction of the battery cell **121**. In an ideal state, a size change of the material should be reversible in a process of insertion and extraction of the metal ions. However, in an actual situation, some metal ions cannot be completely extracted from an anode due to a change in balance of the battery cell **121**, or are deposited on a surface of the anode as an insoluble by-product during cycling. This causes irreversible expansion of the battery cell **121**. Impurities in an electrolyte inside the battery cell **121** or a low electrochemical window of the electrolyte may cause the electrolyte to decompose, generating gas and causing expansion of the battery cell **121**. A manufacturing process of the battery cell **121** may also cause expansion of the battery cell **121**. For example, poor packaging that may allow moisture to enter the battery cell **121** and other reasons also cause expansion of the battery cell **121**.

[0105] Therefore, after being used for a period of time, the battery cell **121** expands, and the expansion of the battery cell **121** is mainly reflected on the surface with the largest area of the battery cell **121**. The first direction X is perpendicular to the surface with the largest area of the battery cell **121**, so that the reinforcing piece **130** can limit expansion of the surfaces with the largest area of the plurality of battery cells **121**, and the connecting piece **140** can also strengthen the rigidity of the box **110** in the first direction X. Therefore, the expansion of the surfaces with the largest area of the plurality of battery cells **121** can be further limited, and the reinforcing piece **130** and the connecting piece **140** have a better limiting effect on the expansion of the battery cells **121**. This can further improve the internal cycle performance of the battery cells **121**, prolong the service life of the battery cells **121**, and improve the stability of the overall structure of the battery **100**.

[0106] In some other embodiments, the first direction X may alternatively be perpendicular to a surface with a small area of the battery cell **121**, and can also play a role in limiting the expansion of the battery cells **121**, thereby improving the internal cycle performance of the battery cells **121**, prolonging the service life of the battery cells **121**, and improving the stability of the overall structure of the battery **100**.

[0107] In some embodiments, the reinforcing piece **130** is bonded to the surface with the largest area of the battery cell **121**, so that locations of the reinforcing piece **130** and the battery cell **121**

can be more stable.
[0108] In some embodiments, a length direction of the connecting piece **140** is parallel to the first direction X.
[0109] The length direction of the connecting piece **140** may be a direction in which a size of the connecting piece **140** is the largest.
[0110] The length direction of the connecting piece **140** is parallel to the first direction X, so that an acting force of the connecting piece **140** connected between the first limiting portion **113** and the second limiting portion **114** is parallel to the first direction X. That is, the acting force of the connecting piece **140** all acts in the first direction X, thereby reducing a problem that the force in the first direction X is small due to acting of acting force of the connecting piece **140** in another direction. This can better limit the expansion of the plurality of battery cells **121** in the first direction X, further improve the internal cycle performance of the battery cells **121**, prolong the service life of the battery cells **121**, and improve the stability of the overall structure of the battery **100**.
[0111] In some other embodiments, the length direction of the connecting piece **140** may alternatively be inclined relative to the first direction X, so that a part of a component force of the connecting piece **140** is parallel to the first direction X, and a role in limiting the expansion of the battery cells **121** can be played, thereby improving the internal cycle performance of the battery cells **121**, prolonging the service life of the battery cells **121**, and improving the stability of the overall structure of the battery **100**.
[0112] In some embodiments, a length direction of the reinforcing piece **130** is the second direction Y, and the second direction Y intersects with the first direction X.
[0113] The length direction of the reinforcing piece **130** may be a direction in which a size of the reinforcing piece **130** is the largest.
[0114] The length direction of the reinforcing piece **130** is the second direction Y, so that the reinforcing piece **130** and the connecting piece **140** can strengthen the rigidity of the box **110** in the first direction X and the second direction Y that intersect, thereby improving the force-bearing performance of the box **110**, reducing the degree of damage to the battery cells **121** after a collision, and having a good limiting effect on the expansion of the battery cells **121**. This can improve the internal cycle performance of the battery cells **121**, prolong the service life of the battery cells **121**, and improve the stability of the overall structure of the battery **100**.
[0115] In some embodiments, the second direction Y is perpendicular to the first direction X, so that the reinforcing piece **130** and the connecting piece **140** can strengthen the rigidity of the box **110** in the first direction X and the second direction Y that are perpendicular, thereby further improving the force-bearing performance of the box **110**, reducing the degree of damage to the battery cells **121** after a collision, and having a better limiting effect on the expansion of the battery cells **121**. This can further improve the internal cycle performance of the battery cells **121**, prolong the service life of the battery cells **121**, and improve the stability of the overall structure of the battery **100**.
[0116] In some other embodiments, the second direction Y may be inclined relative to the first direction X.
[0117] In some embodiments, the box **110** further includes a mounting wall **1112**, both the first limiting portion **113** and the second limiting portion **114** are connected to the mounting wall **1112**, and the connecting piece **140** is located at an end that is of the battery cell **121** and that faces away from the mounting wall **1112**.
[0118] In some embodiments, the mounting wall **1112** may be a bottom wall of the box **110**. This facilitates mounting of the battery cells **121**.
[0119] In some other embodiments, the mounting wall **1112** may alternatively be a top wall of the box **110**.
[0120] In some embodiments, the first limiting portion **113** and the second limiting portion **114**

may be fastened to the mounting wall **1112** by fasteners, screws, and the like.
[0121] In some other embodiments, the first limiting portion **113** and the second limiting portion **114** may alternatively be fastened to the mounting wall **1112** through welding, bonding, and the like.
[0122] In some other embodiments, the first limiting portion **113** and the second limiting portion **114** may alternatively be integrally formed with the mounting wall **1112**.
[0123] Both the first limiting portion **113** and the second limiting portion **114** are connected to the mounting wall **1112** of the box **110**. This can play a role in strengthening the rigidity of the box **110** in the first direction X. The connecting piece **140** is located at the end that is of the battery cell **121** and that faces away from the mounting wall **1112**. This can reduce occupation of the space used for accommodating the battery cells **121** in the box **110**, thereby reducing the impact on the energy density of the battery **100**, and helping improve the energy density of the battery.
[0124] Refer to FIG. **3** and FIG. **6**. FIG. **6** is a diagram of a three-dimensional structure of a battery cell according to some embodiments of this application. In some embodiments, the battery cell **121** includes a housing **122** and electrode terminals **123**. The housing **122** has a first wall **1222** facing away from the mounting wall **1112**, the electrode terminals **123** are disposed on the first wall **1222**, and the connecting piece **140** abuts against the first wall **1222**.
[0125] The housing **122** is provided with accommodating space used for accommodating an electrode assembly and an electrolyte. In some embodiments, the housing **122** may include a main shell **1221** and an end cover (namely, the first wall **1222** in this embodiment). The main shell **1221** is a hollow structure having an opening at one end, the end cover is a plate structure and covers an opening side of the main shell **1221**, and the main shell **1221** and the end cover jointly define the accommodating space used for accommodating the electrode assembly and the electrolyte.
[0126] In some other embodiments, both the main shell **1221** and the end cap may be hollow structures having an opening at one side, and an opening side of the end cap covers an opening side of the main shell **1221** to jointly form the accommodating space.
[0127] In some embodiments, the main shell **1221** and the end cover may be connected through welding.
[0128] In some other embodiments, the main shell **1221** and the end cover may alternatively be fastened through bonding, interference fit, and the like.
[0129] In some embodiments, the housing **122** may be a cuboid.
[0130] In some other embodiments, the housing **122** may alternatively be a cylinder.
[0131] In some embodiments, the housing **122** may be made of aluminum, an aluminum alloy, or another metal material, so that the battery cells **121** can have higher force-bearing performance.
[0132] The electrode terminal **123** is a metal component disposed on the housing **122**, may be made of metal materials such as silver-plated copper, zinc-plated copper, copper, aluminum, and iron, and can play a role in conducting electricity and transmitting an electrical signal.
[0133] In some embodiments, the electrode terminal **123** may be disposed in the shape of a cuboid.
[0134] In some other embodiments, the electrode terminal **123** may alternatively be disposed in the shape of a cylinder, an elliptical cylinder, or the like.
[0135] The battery cell **121** includes the housing **122** and the electrode terminals **123**. The housing **122** has the first wall **1222** facing away from the mounting wall **1112**, the electrode terminals **123** are disposed on the first wall **1222**, and the connecting piece **140** abuts against the first wall **1222**. This can play a role in limiting the battery cells **121**, make locations of the battery cells **121** more stable, and improve the stability of the overall structure of the battery **100**.
[0136] In some other embodiments, the connecting piece **140** may alternatively be spaced apart from the first wall **1222**, so that an external force applied to the battery **100** may act on the connecting piece **140** instead of directly acting on the battery cells **121**, and a role in protecting the battery cells **121** is played.
[0137] In some embodiments, the projection of the connecting piece **140** does not overlap a

projection of the electrode terminal **123** in the third direction Z, and the third direction Z is parallel to a thickness direction of the mounting wall **1112**.

[0138] The projection of the connecting piece **140** does not overlap with the projection of the electrode terminal **123** in the third direction Z, so that a possibility that the connecting piece **140** blocks the electrode terminal **123** can be reduced, a connection between the electrode terminal **123** and another component is facilitated, and reliability of a connection between the battery cell **121** and another component is improved. In addition, a possibility that an external force applied to the connecting piece **140** acts on the electrode terminal **123** can be reduced, so that a role in protecting the electrode terminal **123** is played.

[0139] In some embodiments, the battery cell **121** further includes a pressure relief mechanism **124**. The pressure relief mechanism **124** is disposed on the first wall **1222**, the projection of the connecting piece **140** does not overlap with a projection of the pressure relief mechanism **124** in the third direction Z, and the third direction Z is parallel to a thickness direction of the mounting wall **1112**.

[0140] The pressure relief mechanism **124** is a structure that is disposed on the housing **122** for pressure relief. When the battery cell **121** is in normal use, the pressure relief mechanism **124** is in a closed state. When pressure in the battery cell **121** is too high, the pressure relief mechanism **124** is opened, so that the inside and the outside of the battery cell **121** communicate with each other through an opening of the pressure relief mechanism **124**, and gas in the battery cell **121** can flow to the outside of the battery cell **121** through the opening, thereby allowing the battery cell **121** to release pressure in time.

[0141] In some embodiments, the pressure relief mechanism **124** may be fastened to the housing **122** through welding, bonding, and the like, or may be integrally formed with the housing **122**.

[0142] The projection of the connecting piece **140** does not overlap with the projection of the pressure relief mechanism **124** in the third direction Z, so that a possibility that the connecting piece **140** blocks the pressure relief mechanism **124** can be reduced, the pressure relief mechanism **124** is facilitated to perform pressure relief, and reliability of the pressure relief mechanism **124** is improved. In addition, a possibility that an external force applied to the connecting piece **140** acts on the pressure relief mechanism **124** can be reduced, so that a possibility of early pressure relief caused by damage to the pressure relief mechanism **124** is reduced, and a role in protecting the pressure relief mechanism **124** is played.

[0143] In some embodiments, the pressure relief mechanism **124** may be disposed in a middle portion of the first wall **1222** and located between the two electrode terminals **123**, to facilitate relief of the gas in the battery cell **121** through the pressure relief mechanism **124** when the pressure in the battery cell **121** is too high.

[0144] In some other embodiments, the pressure relief mechanism **124** may alternatively be disposed at an end portion of the first wall **1222**.

[0145] In some other embodiments, the pressure relief mechanism **124** and the electrode terminals **123** may alternatively be disposed on different walls of the battery cell **121**, and the connecting piece **140** does not block the pressure relief mechanism **124**. This facilitates pressure relief of the pressure relief mechanism **124**, and improves the reliability of the pressure relief mechanism **124**.

[0146] In some embodiments, the connecting piece **140** abuts against an end portion of the first wall **1222** in the second direction Y, and the second direction Y intersects with the first direction X.

[0147] The connecting piece **140** abuts against the end portion of the first wall **1222** in the second direction Y, so that a possibility that the connecting piece **140** blocks components on the first wall **1222** of the battery cell **121** can be reduced, and a role in limiting the battery cell **121** can be well played. In addition, because the end portion of the first wall **1222** in the second direction Y has better force-bearing performance, the connecting piece **140** abuts against the end portion of the first wall **1222** in the second direction Y, so that when the connecting piece **140** is stressed and acts on the end portion of the first wall **1222** in the second direction Y, the battery cell **121** is less likely to

be damaged, and the degree of damage to the battery cell **121** after a collision can be reduced.
[0148] In some other embodiments, the connecting piece **140** may alternatively abut against a middle portion of the first wall **1222** in the second direction Y, so that the battery cell **121** is more evenly stressed, and the connecting piece **140** has a better limiting effect on the battery cell **121**.
[0149] In some other embodiments, the connecting piece **140** is provided in plurality, where at least one connecting piece **140** may abut against the end portion of the first wall **1222** in the second direction Y, and at least one connecting piece **140** may abut against a middle portion of the first wall **1222** in the second direction Y.
[0150] In some embodiments, the connecting piece **140** is bonded to the first wall **1222**.
[0151] The connecting piece **140** is bonded to the first wall **1222**, so that locations of the connecting piece **140** and the battery cell **121** can be more stable, the connecting piece **140** can play a better role in limiting the battery cell **121** in a plurality of directions (the first direction X, the second direction Y, and the third direction Z), and the connecting piece **140** can better limit the expansion of the battery cell **121**. This can further improve the internal cycle performance of the battery cell **121**, prolong the service life of the battery cell **121**, and improve the stability of the overall structure of the battery **100**. In addition, an adhesive used for bonding the connecting piece **140** and the first wall **1222** can also play a buffering role, to reduce a possibility that an external force applied to the connecting piece **140** acts on the first wall **1222** to cause damage to the battery cell **121**.
[0152] In some embodiments, the adhesive connecting the connecting piece **140** and the first wall **1222** may be an insulating adhesive, and a possibility of a short circuit between the plurality of battery cells **121** can be reduced.
[0153] In some other embodiments, the connecting piece **140** may alternatively be connected to the first wall **1222** through a fitting structure, such as a protrusion and a groove, or a buckle and a groove, so that locations of the connecting piece **140** and the battery cell **121** can be more stable, and the connecting piece **140** can play a better role in limiting the battery cell **121**.
[0154] In some other embodiments, a part in which the connecting piece **140** is connected to the first wall **1222** may be provided with a buffer layer, so that a buffering role can be played when the battery **100** is stressed, to reduce a possibility that an external force applied to the connecting piece **140** acts on the first wall **1222** to cause damage to the battery cell **121**.
[0155] In some embodiments, the battery **100** includes a plurality of battery cell groups **120** arranged in the second direction Y, a projection of each reinforcing piece **130** overlaps with a projection of a battery cell **121** in each battery cell group **120** in the first direction X, and the second direction Y intersects with the first direction X.
[0156] The battery **100** includes the plurality of battery cell groups **120** arranged in the second direction Y, so that the energy density of the battery **100** can be increased. The projection of each reinforcing piece **130** overlaps with the projection of the battery cell **121** in each battery cell group **120** in the first direction X, so that each reinforcing piece **130** can support and structurally strengthen a plurality of battery cells **121**, and the stability of the overall structure of the battery **100** is further improved. In some embodiments, the connecting piece **140** abuts against first walls **1222** of two battery cells **121** adjacent to each other in the second direction Y in two adjacent battery cell groups **120**. In this way, two adjacent battery cell groups **120** may share the same connecting piece **140**, so that a quantity of connecting pieces **140** can be decreased, and costs can be reduced.
[0157] In some embodiments, a gap is present between two adjacent battery cell groups **120** in the second direction Y, and the connecting piece **140** covers the gap.
[0158] A gap is present between two adjacent battery cell groups **120** in the second direction Y, so that locations of battery cells **121** can be conveniently adjusted, and a possibility that the battery cells **121** expand to squeeze adjacent battery cells **121** can be reduced. The connecting piece **140** covers the gap, so that a possibility that metal particles fall into the gap and cause damage or a

short circuit to the battery cells **121** can be reduced.
[0159] Refer to FIG. **3** and FIG. **7**. FIG. **7** is a schematic front view of a part of a structure of a battery according to some embodiments of this application. In some embodiments, a part of the connecting piece **140** extends into the gap.
[0160] A part of the connecting piece **140** extends into the gap, so that the connecting piece **140** can further play a role in limiting the battery cells **121** in the second direction Y, the locations of the battery cells **121** are more stable, and the stability of the overall structure of the battery **100** is improved.
[0161] In some embodiments, one end of the connecting piece **140** is threadedly connected or riveted to the first limiting portion **113**, and the other end of the connecting piece **140** is threadedly connected or riveted to the second limiting portion **114**.
[0162] The threaded connection means to connect various components and parts tightly by using threaded connecting pieces (such as screws, bolts, and nuts) and various washers.
[0163] Riveting, namely, a rivet connection, is a method of connecting a plurality of parts by thickening a rivet shank located in a rivet hole of a part by using an axial force to form a rivet head.
[0164] One end of the connecting piece **140** is threadedly connected or riveted to the first limiting portion **113**, and the other end is threadedly connected or riveted to the second limiting portion **114**, so that a connection structure between the connecting piece **140** and each of the first limiting portion **113** and the second limiting portion **114** is simple, mounting is convenient, and costs are saved. In addition, the connecting piece **140** can be stably connected to each of the first limiting portion **113** and the second limiting portion **114**.
[0165] In some other embodiments, the connecting piece **140** may alternatively be connected to the first limiting portion **113** and the second limiting portion **114** through bonding, buckling, and the like.
[0166] In some embodiments, the connecting piece **140** is provided in plurality, the plurality of connecting pieces **140** are spaced apart in the second direction Y, and the second direction Y intersects with the first direction X.
[0167] The connecting piece **140** is provided in plurality, and the plurality of connecting pieces **140** are spaced apart in the second direction Y, so that the rigidity of the box **110** can be further strengthened, thereby better limiting the expansion of the plurality of battery cells **121** in the first direction X. This improves the internal cycle performance of the battery cells **121**, prolong the service life of the battery cells **121**, and improve the stability of the overall structure of the battery **100**.
[0168] Two adjacent connecting pieces **140** in the plurality of connecting pieces **140** respectively abut against two end portions of the first wall **1222** of the battery cell **121** in the second direction, so that both end portions of the first wall **1222** in the second direction can be limited, the battery cell **121** is uniformly stressed, and the limiting effect is better.
[0169] In some embodiments, a chamber for accommodating a heat exchange medium is formed inside the reinforcing piece **130**, and the chambers of the plurality of reinforcing pieces **130** communicate with each other.
[0170] In some embodiments, the plurality of reinforcing pieces **130** may communicate with each other through pipes **131**.
[0171] The chamber for accommodating the heat exchange medium is formed inside the reinforcing piece **130**, and the chambers of the plurality of reinforcing pieces **130** communicate with each other, so that fluidity of the heat exchange medium in the chambers can be effectively improved, thereby further improving heat exchange efficiency of the reinforcing pieces **130**. In addition, the chambers of the plurality of reinforcing pieces **130** communicate with each other, so that quantities of liquid inlet pipes and liquid outlet pipes can be reduced, and space occupied by a liquid inlet structure and a liquid outlet structure can be further reduced. This helps further improve the energy density of the battery **100**.

[0172] Some embodiments of this application provide an electric apparatus, including the battery **100** described in any one of the foregoing solutions, and the battery **100** is configured to provide electric energy.
[0173] The electric apparatus may be any of the foregoing systems or devices using the battery **100**.
[0174] Refer to FIG. **3** and FIG. **5**. Some embodiments of this application provide a battery **100**. The battery includes a box **110**, a plurality of battery cell groups **120**, a plurality of reinforcing pieces **130**, and a plurality of connecting pieces **140**. The box **110** includes a first limiting portion **113** and a second limiting portion **114** disposed opposite each other in a first direction X. The plurality of battery cell groups **120** are disposed in the box **110** and located between the first limiting portion **113** and the second limiting portion **114**. The plurality of battery cell groups **120** are arranged in a second direction Y. Each battery cell group **120** includes a plurality of battery cells **121** arranged in the first direction X. The plurality of reinforcing pieces **130** are disposed in the box **110** and located between the first limiting portion **113** and the second limiting portion **114**, the plurality of reinforcing pieces **130** are spaced apart in the first direction X, and a plurality of battery cells **121** are disposed between two adjacent reinforcing pieces **130**. One end of the connecting piece **140** is connected to the first limiting portion **113**, the other end of the connecting piece **140** is connected to the second limiting portion **114**, and the plurality of connecting pieces **140** are spaced apart in the second direction Y.
[0175] The first direction X, the second direction Y, and the third direction Z are perpendicular to each other.
[0176] A length direction of the connecting piece **140** is parallel to the first direction X, and a length direction of the reinforcing piece **130** is the second direction Y.
[0177] The box **110** further includes a mounting wall **1112**, the first limiting portion **113** and the second limiting portion **114** are connected to the mounting wall **1112**, and the connecting piece **140** is located at an end that is of the battery cell **121** and that faces away from the mounting wall **1112**.
[0178] The first direction X is perpendicular to a surface with a largest area of the battery cell **121**.
[0179] The battery cell **121** includes a housing **122**, electrode terminals **123** and a pressure relief mechanism **124**. The housing **122** has a first wall **1222** facing away from the mounting wall **1112**. The electrode terminals **123** and the pressure relief mechanism **124** are separately disposed on the first wall **1222**. The connecting piece **140** is bonded to an end portion of the first wall **1222** in the second direction Y.
[0180] In a third direction Z, a projection of the connecting piece **140** does not overlap with a projection of the electrode terminal **123**, and the projection of the connecting piece **140** does not overlap with a projection of the pressure relief mechanism **124**.
[0181] One end of the connecting piece **140** is threadedly connected to the first limiting portion **113**, and the other end is threadedly connected to the second limiting portion **114**.
[0182] A chamber for accommodating a heat exchange medium is formed inside the reinforcing piece **130**, and the chambers of the plurality of reinforcing pieces **130** communicate with each other.
[0183] It should be noted that embodiments in this application and features in embodiments may be combined with each other in the case of no conflict.
[0184] The foregoing descriptions are merely some embodiments of this application, and are not intended to limit this application. For a person skilled in the art, this application may have various modifications and variations. Any modifications, equivalent replacements, improvement, or the like made without departing from the spirit and principle of this application shall fall within the protection scope of this application.

Claims

1. A battery, comprising: a box comprising a first limiting portion and a second limiting portion disposed opposite each other in a first direction; at least one battery cell group that is disposed in the box and located between the first limiting portion and the second limiting portion, wherein the battery cell group comprises a plurality of battery cells arranged in the first direction; a plurality of reinforcing pieces that are disposed in the box and located between the first limiting portion and the second limiting portion, wherein the plurality of reinforcing pieces are spaced apart in the first direction, and at least one of the battery cells is disposed between two adjacent ones of the reinforcing pieces; and a connecting piece, wherein one end of the connecting piece is connected to the first limiting portion, and the other end of the connecting piece is connected to the second limiting portion.

2. The battery according to claim 1, wherein the connecting piece is located at an end of the battery cell in a third direction, a projection of the reinforcing piece intersects with a projection of the connecting piece in the third direction, and the third direction is perpendicular to the first direction.

3. The battery according to claim 1, wherein the first direction is perpendicular to a surface with a largest area of the battery cell.

4. The battery according to claim 1, wherein a length direction of the connecting piece is parallel to the first direction.

5. The battery according to claim 1, wherein a length direction of the reinforcing piece is a second direction, and the second direction intersects with the first direction.

6. The battery according to claim 5, wherein the second direction is perpendicular to the first direction.

7. The battery according to claim 1, wherein the box further comprises a mounting wall, both the first limiting portion and the second limiting portion are connected to the mounting wall, and the connecting piece is located at an end of the battery cell facing away from the mounting wall.

8. The battery according to claim 7, wherein the battery cell comprises a housing and an electrode terminal, wherein the housing has a first wall facing away from the mounting wall, the electrode terminal is disposed on the first wall, and the connecting piece abuts against the first wall.

9. The battery according to claim 8, wherein the projection of the connecting piece does not overlap with a projection of the electrode terminal in the third direction, and the third direction is parallel to a thickness direction of the mounting wall.

10. The battery according to claim 8, wherein the battery cell further comprises a pressure relief mechanism, the pressure relief mechanism is disposed on the first wall, the projection of the connecting piece does not overlap with a projection of the pressure relief mechanism in the third direction, and the third direction is parallel to a thickness direction of the mounting wall.

11. The battery according to claim 8, wherein the battery cell further comprises a pressure relief mechanism, and the pressure relief mechanism and the electrode terminal are disposed on different walls of the battery cell.

12. The battery according to claim 8, wherein the connecting piece abuts against an end portion of the first wall in the second direction, and the second direction intersects with the first direction.

13. The battery according to claim 8, wherein the connecting piece is bonded to the first wall.

14. The battery according to claim 1, wherein the battery comprises a plurality of battery cell groups arranged in the second direction, a projection of each reinforcing piece overlaps with a projection of a battery cell in each battery cell group in the first direction, and the second direction intersects with the first direction.

15. The battery according to claim 14, wherein a gap is present between two adjacent battery cell groups in the second direction, and the connecting piece covers the gap.

16. The battery according to claim 15, wherein a part of the connecting piece extends into the gap.

17. The battery according to claim 1, wherein one end of the connecting piece is threadedly connected or riveted to the first limiting portion, and the other end of the connecting piece is

threadedly connected or riveted to the second limiting portion.

18. The battery according to claim 1, wherein the connecting piece is provided in plurality, the plurality of connecting pieces are spaced apart in the second direction, and the second direction intersects with the first direction.

19. The battery according to claim 1, wherein a chamber for accommodating a heat exchange medium is formed inside the reinforcing piece, and the chambers of the plurality of reinforcing pieces communicate with each other.

20. An electric apparatus, comprising the battery according to claim 1, wherein the battery is configured to provide electric energy.