

BATTERY HOUSING, BATTERY PACK, AND VEHICLE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority to Chinese Patent Application No. 202122973127. X, filed on November 30, 2021 and entitled "BATTERY HOUSING, BATTERY PACK, AND VEHICLE", which is incorporated herein by reference in its entirety.

FIELD

[0002] The present disclosure relates to the field of battery technologies, and more specifically, to a battery housing, a battery pack, and a vehicle.

BACKGROUND

[0003] Currently, to improve strength of a battery pack, an intermediate beam often needs to be provided in the battery pack. However, the intermediate beam occupies a part of space of the battery pack, resulting in a low overall utilization of the battery pack. In a current new solution, the intermediate beam in the battery pack is utilized and a battery module is arranged in the intermediate beam. However, when the battery module is arranged in the intermediate beam, the following problem exists: when a thermal failure occurs in a battery, generated high-temperature and high-pressure gas cannot be cooled and discharged out of the battery pack in time, and consequently, the high-temperature gas accumulates in short duration and cannot be discharged. As a result, adjacent battery cores or even all battery cores in the entire battery pack easily catch fire due to thermal runaway. Therefore, it is an urgent problem to be resolved to cool and discharge the gas generated by a battery core module in the intermediate beam and improve safety performance of the battery pack.

SUMMARY

[0004] To resolve the foregoing technical problem, an objective of the present disclosure is to provide a battery housing, a battery pack, and a vehicle. The battery housing provided in the present disclosure can cool high-temperature gas generated by a battery core module and quickly and directionally diffuse the gas to a tray, and then discharge the gas out of the battery pack, to protect the battery pack and improve safety of the battery pack.

[0005] According to a first aspect of embodiments of the present disclosure, a battery housing is provided. The battery housing includes:

[0006] a tray, where a first channel is formed in the tray, an explosion-proof valve is arranged on the tray, and the first channel is in communication with the explosion-proof valve;

[0007] at least one module transverse beam, where the module transverse beam is arranged in the tray, the module transverse beam includes an accommodating portion, at least a part of a bottom of the accommodating portion is depressed downward to form a groove that can accommodate gas, and an opening is arranged at at least one end that is of the groove and that is along a length direction of the module transverse beam; and

[0008] a liquid cooling plate, where the liquid cooling plate is hermetically connected to an outside of a bottom of the module transverse beam, at least one connection channel is formed between the liquid cooling plate and the module transverse beam, and the opening is in communication with the first channel through the connection channel.

[0009] Optionally, the module transverse beam includes a first connection portion and a second connection portion. The first connection portion, the accommodating portion, and the second connection portion are secured and connected in sequence. The first connection portion

and the second connection portion are respectively connected to the tray.

[0010] A first opening and a second opening are respectively arranged at two ends that are of the groove and that are along the length direction of the module transverse beam.

[0011] A second channel is formed between the first connection portion and the liquid cooling plate along the length direction of the module transverse beam, and a third channel is formed between the second connection portion and the liquid cooling plate along the length direction of the module transverse beam.

[0012] One end of the second channel is in communication with the first opening, and one end of the third channel is in communication with the second opening.

[0013] Optionally, a first communicating port and a second communicating port are respectively provided at the first connection portion and the second connection portion. The other end of the second channel is in communication with one end of the first communicating port, and the other end of the third channel is in communication with one end of the second communicating port. The other end of the first communicating port and the other end of the second communicating port are respectively in communication with the first channel.

[0014] Optionally, the second channel includes a first connection channel and a second connection channel arranged on two sides along the length direction of the module transverse beam, and the third channel includes a third connection channel and a fourth connection channel arranged on the two sides along the length direction of the module transverse beam.

[0015] One end of the first connection channel and one end of the second connection channel are respectively in communication with the first opening, and one end of the third connection channel and one end of the fourth connection channel are respectively in communication with the second opening. The first communicating port and the second

communicating port are respectively provided at the first connection portion and the second connection portion. The other end of the first connection channel and the other end of the second connection channel are in communication with one end of the first communicating port. The other end of the third connection channel and the other end of the fourth connection channel are in communication with one end of the second communicating port. The other end of the first communicating port and the other end of the second communicating port are respectively in communication with the first channel.

[0016] Optionally, the first connection channel is in communication with the third connection channel to form an integrated channel, and the second connection channel is in communication with the fourth connection channel to form an integrated channel.

[0017] Optionally, a depth of the groove ranges from 3 mm to 5 mm, a difference between a length of an accommodating base and a length of the groove ranges from 15 mm to 35 mm, and a difference between a length of the accommodating base and a width of the groove ranges from 15 mm to 35 mm.

[0018] Optionally, the bottom of the module transverse beam is connected to the liquid cooling plate by using a thermally conductive structural adhesive.

[0019] Optionally, the module transverse beam is a metal component.

[0020] Optionally, the module transverse beam is made of aluminum alloy.

[0021] According to a second aspect of embodiments of the present disclosure, a battery pack is provided. The battery pack includes a battery core module and the battery housing described in the first aspect, where the battery core module is arranged in an accommodating portion.

[0022] Optionally, the battery core module includes a number of battery cores, a pre-

positioning bracket, and a housing. There is an opening at a bottom of the housing, and the pre-positioning bracket stops at and blocks the opening at the bottom of the housing to form an accommodating space for accommodating the battery cores. A number of battery core positioning portions are arranged on one side that is of the pre-positioning bracket and that is located in the accommodating space, and the number of battery cores are respectively arranged in the number of battery core positioning portions.

[0023] Optionally, the battery core module further includes a positive connection sheet and a negative connection sheet. The positive connection sheet and the negative connection sheet are respectively located on two sides of the pre-positioning bracket, and the positive connection sheet and the negative connection sheet are insulated from each other. A through groove is arranged at a bottom wall of the battery core positioning portion, and a positive electrode or a negative electrode of the battery core is connected to the positive connection sheet or the negative connection sheet through the through groove.

[0024] Optionally, a pouring sealant is arranged between the battery core, the housing, the pre-positioning bracket, the positive connection sheet, and the negative connection sheet. The battery core, the housing, the pre-positioning bracket, the positive connection sheet, and the negative connection sheet are hermetically secured and connected by using the pouring sealant.

[0025] Optionally, an outlined-rectangle sealant-resistant foam is arranged between the battery core module and a module transverse beam. A step portion is arranged around the groove in the accommodating portion. A shape of the outlined-rectangle sealant-resistant foam is consistent with a shape of the step portion, and the outlined-rectangle sealant-resistant foam is contacted with the step portion.

[0026] Optionally, an outlined-rectangle opening of the outlined-rectangle sealant-

resistant foam corresponds to an opening of the groove.

[0027] Optionally, the battery core module is at least one of a ternary lithium battery core module and a polymer lithium battery core module.

[0028] Optionally, the battery core is a cylindrical battery or a soft-pack battery.

[0029] Optionally, a pressure relief valve is provided at the battery core module, and the pressure relief valve is arranged toward the groove.

[0030] According to a third aspect of embodiments of the present disclosure, a vehicle is provided. The vehicle includes the battery pack described in the second aspect.

[0031] Optionally, the vehicle is a pure electric vehicle or a hybrid vehicle.

[0032] A technical effect of the present disclosure is that embodiments of the present disclosure provide a battery housing. The groove for accommodating high-temperature and high-pressure gas generated due to thermal runaway of the battery core is arranged at the bottom of the accommodating portion of the module transverse beam. The bottom of the module transverse beam is connected with the liquid cooling plate that can quickly cool the high-temperature and high-pressure gas. The opening for discharging the high-temperature and high-pressure gas is arranged at an end part of the groove. The discharged high-temperature and high-pressure gas is directionally discharged into the first channel in the tray through the connection channel and is discharged out of the battery pack through the explosion-proof valve. Because the gas is discharged directionally, another battery core in the battery pack is not affected by the gas. The battery housing in the present disclosure can cool, in time, the high-temperature and high-pressure gas generated by due to a thermal failure of the battery core, and can quickly and directionally discharge the gas out of the battery pack, to protect the battery pack and improve safety of the battery pack.

[0033] Other features and advantages of the present disclosure are more clear based on

the following detailed descriptions of example embodiments of the present disclosure with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] Accompanying drawings constitute a part of the specification, describe embodiments in the present disclosure, and are used together with the specification to describe the principle of the present disclosure.

[0035] FIG. 1 is a schematic diagram of a structure of a battery pack according to an embodiment of the present disclosure;

[0036] FIG. 2 is a schematic partial diagram of a structure of a battery pack according to an embodiment of the present disclosure;

[0037] FIG. 3 is an exploded view of a structure of a battery pack according to an embodiment of the present disclosure;

[0038] FIG. 4 is a schematic diagram of a structure of a pre-positioning bracket according to an embodiment of the present disclosure;

[0039] FIG. 5 is a schematic diagram of a structure in which a module transverse beam and a battery core module are secured according to an embodiment of the present disclosure;

[0040] FIG. 6 is a cross-sectional view of a plane A-A shown in FIG. 5;

[0041] FIG. 7 is a schematic diagram of a gas flow direction in a groove according to an embodiment of the present disclosure; and

[0042] FIG. 8 is a schematic partial diagram in which gas in a groove flows to a first connection portion according to an embodiment of the present disclosure.

[0043] Description of reference numerals:

[0044] 1. battery core module; 11. battery core; 12. pre-positioning bracket; 121. battery core positioning portion; 122. through groove; 13. housing; 14. positive connection sheet; 15. negative connection sheet; 16. pouring sealant; 17. outlined-rectangle sealant-resistant foam;

[0045] 2. tray; 21. first channel; 22. explosion-proof valve;

[0046] 3. module transverse beam; 31. accommodating portion; 311. step portion; 312. groove; 3121. first opening; 3122. second opening; 32. first connection portion; 321. first connection channel; 322. second connection channel; 323. first communicating port; 33. second connection portion; 331. third connection channel; 332. fourth connection channel; 333. second communicating port; 34. thermally conductive structural adhesive; and

[0047] 4. liquid cooling plate.

DETAILED DESCRIPTION

[0048] Various example embodiments of the present disclosure now are described in detail with reference to the accompanying drawings. It should be noted that, unless otherwise specified, relative arrangement, numerical expressions, and numerical values of components and steps described in the embodiments do not limit the scope of the present disclosure.

[0049] The following descriptions of at least one example embodiment are merely illustrative, and in no way constitute any limitation on the present disclosure and application or use thereof.

[0050] Technologies and devices known to those of ordinary skill in related arts may not be discussed in detail, but in an appropriate case, the technologies and the devices should be considered as a part of the specification.

[0051] In all examples shown and discussed herein, any specific value should be

construed merely as examples but not as limitations. Therefore, another example of example embodiments may have different values.

[0052] It should be noted that, similar reference signs or letters in the following accompanying drawings indicate similar items. Therefore, once an item is defined in one accompanying drawing, the item does not need to be further discussed in the subsequent accompanying drawings.

[0053] According to a first aspect of the present disclosure, a battery housing is provided. Refer to FIG. 1. The battery housing includes a tray 2, at least one module transverse beam 3, and a liquid cooling plate 4. The module transverse beam 3 is arranged in the tray 2.

[0054] As shown in FIG. 2, the module transverse beam 3 includes an accommodating portion 31. At least a part of a bottom of the accommodating portion 31 is depressed downward to form a groove 312 that can accommodate gas. An opening is arranged at at least one end that is of the groove 312 and that is along a length direction of the module transverse beam 3.

[0055] The liquid cooling plate 4 is hermetically connected to an outside of a bottom of the module transverse beam 3. At least one connection channel is formed between the liquid cooling plate 4 and the module transverse beam 3. The opening is in communication with a first channel 21 through the connection channel.

[0056] In the battery housing provided in this embodiment of the present disclosure, when a battery core generates high-temperature and high-pressure gas due to thermal runaway, the high-temperature and high-pressure gas breaks through a battery core module and enters the groove, and is cooled by the liquid cooling plate. Initially cooled gas quickly diffuses to the opening of the groove, and directionally diffuses to the tray through the connection channel. The gas breaks through an explosion-proof valve 22 and is discharged out of a battery pack. The battery

housing in the present disclosure can cool, in time, the high-temperature and high-pressure gas generated by the battery core, and quickly and directionally discharge the gas out of the battery pack through the connection channel and the first channel 21, to avoid a case that an adjacent battery core catches fire because thermal runaway also occurs due to a high-temperature caused by thermal diffusion of the battery core. It is ensured that thermal runaway of a single battery core does not expand and spread to the entire battery pack, and controllability of safety of the entire battery pack and safety of an electric vehicle passenger are ensured. In conclusion, the battery housing in the present disclosure can cool, in time, the high-temperature and high-pressure gas generated by the battery core due to a thermal failure, and quickly and directionally discharge the gas out of the battery pack, to protect the battery pack and improve safety of the battery pack.

[0057] In an embodiment of the present disclosure, as shown in FIG. 2 and FIG. 4, the module transverse beam 3 includes a first connection portion 32 and a second connection portion 33. The first connection portion 32, the accommodating portion 31, and the second connection portion 33 are secured and connected in sequence. The first connection portion 32 and the second connection portion 33 are respectively connected to a tray 2.

[0058] A first opening 3121 and a second opening 3122 are respectively arranged at two ends that are of the groove 312 and that are along the length direction of the module transverse beam 3.

[0059] A second channel is formed between the first connection portion 32 and the liquid cooling plate 4 along the length direction of the module transverse beam 3. A third channel is formed between the second connection portion 33 and the liquid cooling plate 4 along the length direction of the module transverse beam 3.

[0060] One end of the second channel is in communication with the first opening 3121,

and one end of the third channel is in communication with the second opening 3122. A first communicating port 323 and a second communicating port 333 are respectively provided at the first connection portion 32 and the second connection portion 33. The other end of the second channel is in communication with one end of the first communicating port 323, and the other end of the third channel is in communication with one end of the second communicating port 333. The other end of the first communicating port 323 and the other end of the second communicating port 333 are respectively in communication with the first channel 21.

[0061] In an embodiment of the present disclosure, the second channel includes a first connection channel 321 and a second connection channel 322 arranged on two sides along the length direction of the module transverse beam 3. The third channel includes a third connection channel 331 and a fourth connection channel 332 arranged on the two sides along the length direction of the module transverse beam 3. One end of the first connection channel 321 and one end of the second connection channel 322 are respectively in communication with the first opening 3121. One end of the third connection channel 331 and one end of the fourth connection channel 332 are respectively in communication with the second opening 3122. The first communicating port 323 and the second communicating port 333 are respectively provided at the first connection portion 32 and the second connection portion 33. The other end of the first connection channel 321 and the other end of the second connection channel 322 are in communication with one end of the first communicating port 323. The other end of the third connection channel 331 and the other end of the fourth connection channel 332 are in communication with one end of the second communicating port 333. The other end of the first communicating port 323 and the other end of the second communicating port 333 are respectively in communication with the first channel 21. In this embodiment of the present disclosure, the battery core module is located in the middle of

the module transverse beam, and connection channels are arranged at two ends of the battery core module. When a battery core generates high-temperature and high-pressure gas due to thermal runaway, after a liquid cooling plate initially cools the high-temperature and high-pressure gas, the gas may quickly diffuse to the openings at the two ends of the groove, directionally diffuse to a channel on the tray through the connection channel of the connection portion, breaks through the explosion-proof valve 22, and is discharged out of the battery pack. In this embodiment of the present disclosure, after the high-temperature and high-pressure gas generated by the battery core module due to a failure enters the groove, where as shown in FIG. 7, a direction of an arrow in the figure represents a gas flow direction, the gas diffuses from the middle to the two ends of the groove, and is in communication with the connection channel of the connection portion through the first opening and the second opening. As shown in FIG. 8, a direction of an arrow in the figure represents a gas flow direction. The gas diffuses from the groove through the first opening. After diffusing from the first opening, the gas diffuses from a middle of the first opening to the first connection channel and the second connection channel that are on two sides. In this way, the gas is diffused in a short distance and has a specific diffusion direction, so that the gas can be discharged out of the battery pack faster and safety of the battery pack is better ensured.

[0062] In an embodiment of the present disclosure, the first connection channel 321 is in communication with the third connection channel 331 to form an integrated channel, and the second connection channel 322 is in communication with the fourth connection channel 332 to form an integrated channel. In this embodiment of the present disclosure, there is a channel on each of the two sides along the length direction of the module transverse beam, and the channels are respectively in communication with the first connection portion, the accommodating portion, and the second connection portion. In other words, the channel on each side is integrated. In this

way, a formed structure of the module transverse beam is simple. After diffusing from the first opening or the second opening, the gas generated due to thermal runaway may diffuse to left or right through the channel.

[0063] In an embodiment of the present disclosure, a depth of the groove ranges from 3 mm to 5 mm, such as 3 mm, 3.5 mm, 4 mm, 4.5 mm, or 5 mm. A difference between a length of an accommodating base and a length of the groove ranges from 15 mm to 35 mm, such as 15 mm, 16 mm, 17 mm, 18 mm, 19 mm, 20 mm, 21 mm, 22 mm, 23 mm, 24 mm, 25 mm, 26 mm, 27 mm, 28 mm, 29 mm, 30 mm, 31 mm, 32 mm, 33 mm, 34 mm, or 35 mm. In an embodiment of the present disclosure, the length of the accommodating base may be 580 mm, and the length of the groove may be 550 mm. A difference between a width of the accommodating base and a width of the groove ranges from 15 mm to 35 mm, such as 15 mm, 16 mm, 17 mm, 18 mm, 19 mm, 20 mm, 21 mm, 22 mm, 23 mm, 24 mm, 25 mm, 26 mm, 27 mm, 28 mm, 29 mm, 30 mm, 31 mm, 32 mm, 33 mm, 34 mm, or 35 mm. In an embodiment of the present disclosure, the width of the accommodating base may be 80 mm, and the length of the groove may be 50 mm. When the depth, width, and length of the groove are within the foregoing ranges, rapid gas diffusion can be ensured while space of the battery pack is minimized.

[0064] In an embodiment of the present disclosure, the bottom of the module transverse beam 3 is connected to the liquid cooling plate 4 by using a thermally conductive structural adhesive 34. On one hand, the thermally conductive structural adhesive 34 can be used to secure and connect the liquid cooling plate 4 to the module transverse beam. On the other hand, the thermally conductive structural adhesive can be used to transfer a temperature of gas generated due to thermal runaway to the liquid cooling plate for cooling as quickly as possible. In other words, a function of the thermally conductive structural adhesive 34 is to ensure a connection

between the module transverse beam and the liquid cooling plate while transferring the temperature to the liquid cooling plate for cooling as quickly as possible.

[0065] In an embodiment of the present disclosure, the module transverse beam is a metal component. For example, the module transverse beam 3 is made of aluminum alloy, and an entire weight of the battery pack is reduced.

[0066] According to a second aspect of the present disclosure, a battery pack is provided. Refer to FIG. 1. The battery pack includes: a battery core module 1 and the battery housing provided in the first aspect.

[0067] In an embodiment of the present disclosure, as shown in FIG. 3 and FIG. 4, the battery core module 1 includes a number of battery cores 11, a pre-positioning bracket 12, and a housing 13. There is an opening at a bottom of the housing 13, and the pre-positioning bracket 12 stops at and blocks the opening at the bottom of the housing 13 to form an accommodating space for accommodating the battery cores. The battery cores 11 are in the accommodating space. A number of battery core positioning portions 121 are arranged on one side that is of the pre-positioning bracket 12 and that is located in the accommodating space, and the number of battery cores 11 are respectively arranged in the number of battery core positioning portions 121.

[0068] In an embodiment of the present disclosure, as shown in FIG. 3 and FIG. 4, the battery core module 1 further includes a positive connection sheet 14 and a negative connection sheet 15. The positive connection sheet 14 and the negative connection sheet 15 are respectively located on two sides of the pre-positioning bracket 12, and the positive connection sheet 14 and the negative connection sheet 15 are insulated from each other. A through groove 122 is arranged at a bottom wall of the battery core positioning portion 121, and a positive electrode or a negative electrode of the battery core 11 is connected to the positive connection sheet 14 or the negative

connection sheet 15 through the through groove 122.

[0069] In an embodiment of the present disclosure, as shown in FIG. 3 and FIG. 4, a pouring sealant 16 is arranged between the battery core 11, the housing 13, the pre-positioning bracket 12, the positive connection sheet 14, and a negative connection sheet 15. The number of battery cores 11, the housing 13, the pre-positioning bracket 12, the positive connection sheet 14, and the negative connection sheet 15 are hermetically secured and connected by using the pouring sealant 16.

[0070] In the present disclosure, an assembly process of the battery core module 1 is as follows: First, the battery core 11 is initially secured in the pre-positioning bracket 12 by using the battery core positioning portion 121, where a positive electrode or a negative electrode of a battery is connected to the positive connection sheet or the negative connection sheet respectively through the through groove. Then, the pouring sealant is injected into the housing. As shown in FIG. 5 and FIG. 6, the pouring sealant is filled into gaps between the housing, the battery core, the pre-positioning bracket 12, the positive connection sheet 14, and the negative connection sheet 15 and is used to fix the housing, the battery core, the pre-positioning bracket 12, the positive connection sheet 14, and the negative connection sheet 15 together to form the battery core module 1 with an integrated structure.

[0071] In an embodiment of the present disclosure, as shown in FIG. 3, an outlined-rectangle sealant-resistant foam 17 is arranged between the battery core module 1 and the module transverse beam 3. A step portion 311 is arranged around the groove 312 in the accommodating portion. A shape of the outlined-rectangle sealant-resistant foam 17 is consistent with a shape of the step portion 311, and the outlined-rectangle sealant-resistant foam 17 is contacted with the step portion 311. In other words, a shape and size of an outlined-rectangle opening of the outlined-

rectangle sealant-resistant foam 17 is the same as a shape and size of an opening of the groove 312, so that the groove 312 is exposed from the outlined-rectangle sealant-resistant foam 17.

[0072] In an embodiment of the present disclosure, when the battery core module is arranged in the module transverse beam, the battery core module serves as an entirety and is hermetically contacted with the step portion with the outlined-rectangle sealant-resistant foam. An outlined-rectangle opening of the outlined-rectangle sealant-resistant foam corresponds to an opening of the groove. When a pouring sealant is filled into the battery pack later, due to an effect of the outlined-rectangle sealant-resistant foam, the pouring sealant does not enter the groove, to facilitate high-temperature and high-pressure gas to quickly diffuse into the groove when thermal runaway occurs later.

[0073] In an embodiment of the present disclosure, the battery core module is at least one of a ternary lithium battery core module and a polymer lithium battery core module. The battery core module is formed by connecting a number of battery cores, and the battery core is a cylindrical battery or a soft-pack battery.

[0074] In an embodiment of the present disclosure, a pressure relief valve is arranged on the battery core module, and the pressure relief valve is arranged toward the groove. When the battery core module generates high-temperature gas due to thermal runaway, the high-temperature gas flows into the groove through the pressure relief valve.

[0075] According to a third aspect of the present disclosure, a vehicle is provided. The vehicle includes the battery pack in the first aspect. For example, the vehicle may be a pure electric vehicle or a hybrid vehicle such as a car, a bus, or a truck. The present disclosure improves use safety of the vehicle.

[0076] The foregoing embodiments describe emphatically differences between

embodiments. Provided that different optimization features between embodiments are not inconsistent, embodiments can be combined to form a better embodiment. In consideration of simplicity of writing, details are not described herein.

[0077] Although some specific embodiments of the present disclosure have been described in detail by using examples, a person skilled in the art should understand that the foregoing examples are merely for description and are not intended to limit the scope of the present disclosure. A person skilled in the art should understand that modifications may be made to the foregoing embodiments without departing from the scope and spirit of the present disclosure. The scope of the present disclosure is limited by the appended claims.

WHAT IS CLAIMED IS:

1. A battery housing, comprising:

a tray (2), a first channel (21) being formed in the tray (2), an explosion-proof valve (22) being arranged on the tray (2), and the first channel (21) being in communication with the explosion-proof valve (22);

at least one module transverse beam (3), the module transverse beam (3) being arranged in the tray (2), the module transverse beam (3) comprising an accommodating portion (31), at least a part of a bottom of the accommodating portion (31) being depressed downward to form a groove (312) that can accommodate gas, and an opening being arranged at at least one end that is of the groove (312) and that is along a length direction of the module transverse beam (3); and

a liquid cooling plate (4), the liquid cooling plate (4) being hermetically connected to an outside of a bottom of the module transverse beam (3), at least one connection channel being formed between the liquid cooling plate (4) and the module transverse beam (3), and the opening being in communication with the first channel (21) through the connection channel.

2. The battery housing according to claim 1, wherein the module transverse beam (3) comprises a first connection portion (32) and a second connection portion (33), the first connection portion (32), the accommodating portion (31), and the second connection portion (33) are secured and connected in sequence, and the first connection portion (32) and the second connection portion (33) are respectively connected to the tray (2);

a first opening (3121) and a second opening (3122) are respectively arranged at two ends that are of the groove (312) and that are along the length direction of the module transverse beam (3);

a second channel is formed between the first connection portion (32) and the liquid cooling

plate (4) along the length direction of the module transverse beam (3), and a third channel is formed between the second connection portion (33) and the liquid cooling plate (4) along the length direction of the module transverse beam (3); and

one end of the second channel is in communication with the first opening (3121), and one end of the third channel is in communication with the second opening (3122).

3. The battery housing according to claim 2, wherein a first communicating port (323) and a second communicating port (333) are respectively provided at the first connection portion (32) and the second connection portion (33), the other end of the second channel is in communication with one end of the first communicating port (323), the other end of the third channel is in communication with one end of the second communicating port (333), and the other end of the first communicating port (323) and the other end of the second communicating port (333) are respectively in communication with the first channel (21).

4. The battery housing according to any one of claims 1 to 3, wherein the second channel comprises a first connection channel (321) and a second connection channel (322) arranged on two sides along the length direction of the module transverse beam (3), and the third channel comprises a third connection channel (331) and a fourth connection channel (332) arranged on the two sides along the length direction of the module transverse beam (3);

one end of the first connection channel (321) and one end of the second connection channel (322) are respectively in communication with the first opening (3121), one end of the third connection channel (331) and one end of the fourth connection channel (332) are respectively in communication with the second opening (3122); and the first communicating port (323) and the

second communicating port (333) are respectively provided at the first connection portion (32) and the second connection portion (33), the other end of the first connection channel (321) and the other end of the second connection channel (322) are in communication with one end of the first communicating port (323), the other end of the third connection channel (331) and the other end of the fourth connection channel (332) are in communication with one end of the second communicating port (333), and the other end of the first communicating port (323) and the other end of the second communicating port (333) are respectively in communication with the first channel (21).

5. The battery housing according to claim 4, wherein the first connection channel (321) is in communication with the third connection channel (331) to form an integrated channel, and the second connection channel (322) is in communication with the fourth connection channel (332) to form an integrated channel.

6. The battery housing according to any one of claims 1 to 5, wherein a depth of the groove (312) ranges from 3 mm to 5 mm, a difference between a length of an accommodating base and a length of the groove (312) ranges from 15 mm to 35 mm, and a difference between a length of the accommodating base and a width of the groove (312) ranges from 15 mm to 35 mm.

7. The battery housing according to any one of claims 1 to 6, wherein the bottom of the module transverse beam (3) is connected to the liquid cooling plate (4) by using a thermally conductive structural adhesive (34).

8. The battery housing according to any one of claims 1 to 7, wherein the module transverse beam (3) is a metal component.

9. The battery housing according to claim 8, wherein the module transverse beam (3) is made of aluminum alloy.

10. A battery pack, comprising a battery core module (1) and the battery housing according to any one of claims 1 to 9, the battery core module (1) being arranged in an accommodating portion (31).

11. The battery pack according to claim 10, wherein the battery core module (1) comprises a plurality of battery cores (11), a pre-positioning bracket (12), and a housing (13); there is an opening at a bottom of the housing (13), and the pre-positioning bracket (12) stops at and blocks the opening at the bottom of the housing (13) to form an accommodating space for accommodating the battery cores (11); and a plurality of battery core positioning portions (121) are arranged on one side that is of the pre-positioning bracket (12) and that is located in the accommodating space, and the plurality of battery cores (11) are respectively arranged in the plurality of battery core positioning portions (121).

12. The battery pack according to claim 11, wherein the battery core module (1) further comprises a positive connection sheet (14) and a negative connection sheet (15), the positive connection sheet (14) and the negative connection sheet (15) are respectively located on two sides of the pre-positioning bracket (12), and the positive connection sheet (14) and the negative connection sheet (15) are insulated from each other; and a through groove (122) is arranged at a bottom wall of the

battery core positioning portion (121), and a positive electrode or a negative electrode of the battery core (11) is connected to the positive connection sheet (14) or the negative connection sheet (15) through the through groove (122).

13. The battery pack according to claim 12, wherein a pouring sealant (16) is arranged between the battery core (11), the housing (13), the pre-positioning bracket (12), the positive connection sheet, and the negative connection sheet (15), and the battery core (11), the housing (13), the pre-positioning bracket (12), the positive connection sheet, and the negative connection sheet (15) are hermetically secured and connected by using the pouring sealant (16).

14. The battery pack according to claim 13, wherein an outlined-rectangle sealant-resistant foam (17) is arranged between the battery core module (1) and a module transverse beam (3), a step portion (311) is arranged around the groove (312) in the accommodating portion (31), a shape of the outlined-rectangle sealant-resistant foam (17) is consistent with a shape of the step portion (311), and the outlined-rectangle sealant-resistant foam (17) is contacted with the step portion (311).

15. The battery pack according to claim 14, wherein an outlined-rectangle opening of the outlined-rectangle sealant-resistant foam (17) corresponds to an opening of the groove (312).

16. The battery pack according to any one of claims 10 to 15, wherein the battery core module (1) is at least one of a ternary lithium battery core module and a polymer lithium battery core module.

17. The battery pack according to any one of claims 10 to 16, wherein the battery core (11) is a cylindrical battery or a soft-pack battery.

18. The battery pack according to any one of claims 11 to 17, wherein a pressure relief valve is provided at the battery core module (1), and the pressure relief valve is arranged toward the groove (312).

19. A vehicle, comprising the battery pack according to any one of claims 10 to 18.

20. The vehicle according to claim 19, wherein the vehicle is a pure electric vehicle or a hybrid vehicle.