COMPOSITE CONTAINER

BACKGROUND

[0001] The present application relates to the technical field of containers, and in particular to a composite container.

[0002] The side panels, top panel and front panel of containers are less stressed and mainly play the role of shielding and sealing. Currently, the side panels, top panel and front panel of ordinary containers are all made of thin corrugated steel plates, which account for 40% to 50% of the total weight of the entire container. There are two main problems in the process of manufacturing the container: first, the processes of sandblasting and anti-corrosion coating of the thin corrugated steel plates involve not only a large workload but also sandblasting dust and noise, coating pollution, and poor working conditions; second, the welding between the thin corrugated steel plates as well as between the thin corrugated steel plates and the main components of the container is adopted, which involves a large amount of welding, and the welding smoke, harmful gases, noise, and radiation during the welding process, which will also have an adverse effect on both the environment and the health of personnel. When the thin corrugated steel plates are replaced with other materials, there may be a problem that the strength of the container body is not enough or the sealing performance is poor.

[0003] Therefore, there is a need for a composite container to at least partially solve the above problems.

SUMMARY

[0004] A series of simplified concepts is introduced into the portion of Summary, which would be further illustrated in the portion of the detailed description. The Summary of the present invention does not mean attempting to define the key feature and essential technical feature of the claimed technical solution, let alone determining the protection scope thereof.

[0005] To at least partially solve the problem, the present application provides a composite container, comprising a side panel, a top panel, a front panel, a container body frame and at least one reinforcing rib, the container body frame is made of steel material; wherein at least a portion of the side panel, the top panel and the front panel is constituted by at least one composite material board, and the composite material board is connected to the container body frame; the reinforcing rib comprises at least one connecting portion and a protruding portion, wherein the connecting portion is connected to the composite material board; and the protruding portion extends from the connecting portion in a direction away from the composite material board.

[0006] According to another aspect of the present application, another composite container is provided, which includes a container body frame, a side panel, a top panel, a front panel and at least one reinforcing rib, the container body frame is made of steel material; the side panel is disposed on both sides of the container body frame; the top panel is disposed at the

top end of the container body frame; the front panel is disposed at the front end of the container body frame; at least a portion of the side panel, the top panel and/or the front panel is constituted by at least one composite material board; the reinforcing rib is connected to the composite material board to reinforce the strength of the side panel, the top panel and/or the front panel constituted by the composite material board; wherein at least one of the composite material boards is directly connected to the container body frame.

[0007] According to the present application, at least a portion of the thin corrugated steel plates of the side panels, top panel and/or front panel of the container is replaced with lower-density composite material boards, so that the container has light weight, low manufacturing cost. The use of non-metallic material boards can avoid rust and holes caused by rust, greatly extending the service life. Moreover, no paint is used for corrosion protection, and no welding is used, making it green and environmentally friendly. The inner surfaces of the panels are paint-free, preventing contamination such as staining of goods caused by paint peeling. Additionally, compared with steel plates, the composite material boards have better thermal insulation, which can avoid problems such as moisture damage to goods caused by condensation inside the container body, thereby facilitating cross-regional transportation and use of the container in tropical regions such as Southeast Asia around the world. By the use of the reinforcing ribs, the protruding portion of the reinforcing ribs can improve the structural strength, and the connecting portion is connected to the composite material board so that the reinforcing ribs and the composite material board form an integral body, which can ensure physical performance such as the structural strength and the rigidity of the container body on all panel surfaces.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The following drawings of the present application are hereby incorporated as part of the present application for the understanding of the present application. The embodiments of the present application are illustrated and described in the drawings in order to explain the principles of the present application.

[0009] Fig.1 is a perspective view of a composite container according to a first embodiment of the present application;

[0010] Fig. 2 is another perspective view of the container shown in Fig. 1, wherein composite material boards are removed;

[0011] Fig. 3 is a longitudinal cross-sectional perspective view of the container shown in Fig. 1;

[0012] Fig. 4 is a schematic structural view of a top panel including a composite material board and a metal plate;

[0013] Fig. 5 is a longitudinal cross-sectional view of a side panel and its connected structure shown in Fig. 1, wherein an area A is a non-joint area of the composite material board, and an area B is a joint area of the composite material board;

[0014] Fig. 6a is a partial enlarged view of the area A in Fig. 5;

[0015] Fig. 6b is a partial enlarged view of the area B in Fig. 5;

[0016] Fig. 7a is a longitudinal cross-sectional view of a top panel and its connected structure shown in Fig. 1, wherein an area C is the non-joint area of the composite material board, and area D is the joint area of the composite material board;

crossbeam 115 by a single row of fasteners 60, while two adjacent bottom panel units 133 are respectively connected to the same wide bottom crossbeam 134 through a single row of fasteners 60. The bottom panel unit 133 is fixed at the joint with a wider wide bottom crossbeam 134, such that the bottom panel 110 is more firmly and reliably fixed at the joint. Optionally, both the wide bottom crossbeam 134 and the bottom crossbeam 115 are made of angle steel.

[00168] Returning back to Figs. 3 and 9, the portion of the side panel 10 close to the bottom side is provided with a clearance hole 11. At least one fixing member 132 for auxiliary fixation is disposed in the inner side of the reinforcing rib 50 (specifically in a recessed structure). The fixing member 132 may pass through external components, such as binding ropes, steel wires or other rope-like elements, or other connectors such as hooks or buckles, to assist in securing the goods inside the container body. The clearance hole 11 is used to fix the end of a rope-like elements such as ropes to the fixing member 132 at the bottom of the side panel 10, so as to secure the goods with the rope-like elements. Optionally, the fixing member 132 has a shape such as cylindrical or annular. The fixing member 132 may be welded to the reinforcing rib 50 and/or the bottom side rail 112. The protruding portion 50B of the reinforcing rib 50 forms a recessed structure 54, and the fixing member 132 is located within the recessed structure 54. The fixing member 132 is disposed at the bottom of the reinforcing rib 50. Optionally, the container 100 further includes a fixing assembly 137 corresponding to each fixing member 132. The fixing assembly 137 includes a cover plate 138 and two sealing plates 139 disposed on both sides of the fixing member 132. One end of the fixing member 132 is fixedly connected to the bottom side rail 112 and the other end is fixedly connected to the cover plate 138. The cover plate 138, the two sealing plates 139 and the inner wall of the protruding portion 50B form a space for guiding external components through the fixing member 132.

[00169] Referring back to Fig. 5, the inner side of the front end corner post 42 is provided with a reinforcing member 135 vertically extending. The reinforcing member 135 is located on the inner side of the front end corner post 42 and is connected to the front end corner post 42. Both ends of the reinforcing member 135 are respectively connected to the top corner piece 111a and the bottom corner piece 111b to increase the structural strength of the front end corner post 42. The thickness of the plate material used to make the reinforcing member 135 is 2.5 mm to 4 mm, for example, may be 2.5 mm, 2.6 mm, 2.8 mm, 3 mm, 3.2 mm, 3.4 mm, 3.6 mm, 3.8 mm, 4 mm, or other suitable values. to ensure that the container 100 has sufficient stacking capacity.

[00170] Optionally, the fastener 60 used to secure the composite material board 70 is a rivet. When conventional rivets are used, the tail of the rivets will protrude from the composite material board after installation, which will cause damage to the goods and personnel in the container. The present application improves the rivet such that its tail does not protrude from the composite material board as much as possible. Specifically, the composite material board 70 is connected to other container body member 151 with rivets 200. The container body member 151 may be the top side rail 108, the front end header 106, the rear end header 107 or the corner post 40 of the container body frame 101, or may be other structures

such as reinforcing ribs connected and secured to the composite material board 70. The rivet 200 of the present application is described below in conjunction with Figs. 31 to 35.

[00171] As shown in Figs. 31 and 32, the rivet 200 may include a rivet sleeve 231. The rivet sleeve 231 may be configured to be cylindrical and have a tip structure 231a disposed on the outer peripheral surface. The rivet sleeve 231 is configured such that when the inner peripheral surface of the rivet sleeve 231 is subjected to an external force in its own radial direction, the rivet sleeve 231 can at least partially expand and deform in its own radial direction, so that the tip structure 231a is at least partially embedded in the interior of the composite material board 70. After installation, the outer peripheral surface of the portion where the rivet sleeve 231 overlaps with the container body member 151 and the composite material board 70 can expand and deform in its own radial direction. After the rivet sleeve 231 undergoes the expansion and deformation, the tip structure 231a is embedded in the interior of the composite material board 70, thereby achieving a riveted connection. The embedding of the tip structure 231a into the interior of the composite material board 70 can ensure the connection strength and improve the pull-out force of the rivet 200, such that the rivet 200 does not need to protrude above the composite material board after riveting is completed, and its tail may be roughly flush with the composite material board to avoid damage to the goods and personnel in the container.

[00172] In actual selection, the length of the rivet sleeve 231 is not less than the sum of the thicknesses of the container body member 151 and the composite material board 70. For example, the length of the rivet sleeve 231 is equal to the sum of the thicknesses of the container body member 151 and the composite material board 70, or the length of the rivet sleeve 231 is slightly greater than the sum of the thicknesses of the container body member 151 and the composite material board 70. In this way, after riveting is completed, the tail of the rivet 200 (i.e., the end of the rivet sleeve 231) may be configured to be roughly flush with the composite material board 70, preventing the user from being injured by the protruding portion of the rivet 200.

[00173] Optionally, the tip structure 231a is configured as a triangular thread to facilitate the embedding of the tip structure 231a, making the riveting operation more labor-saving. In this case, the tip structure 231a may extend along the circumferential direction of the rivet sleeve 231 and form a helical shape along the axial direction. The cross-sectional shape of the triangular thread is triangular. Alternatively, a plurality of tip structures 231a are evenly disposed on the outer peripheral surface of the rivet sleeve 231, with the tip structure 231a formed in a conical shape. In other words, the rivet sleeve 231 resembles the shape of a mace, making it easier to embed.

[00174] The rivet 200 may further include a cap body 233. The cap body 233 is connected to the first end of the rivet sleeve 231. The outer circumference of the cap body 233 is greater than that of the rivet sleeve 231. Furthermore, the outer peripheral portion of the cap body 233 radially protrudes outward from the rivet sleeve 231. In the installed state, the cap body 233 is

the present application adopts a concealed design for the fastener 60.

[00182] The concealed design is applied to the fastener 60 at the reinforcing rib 50.

[00183] As described above, the connecting portion 50A includes a first connecting portion 50A1 disposed in the recessed structure 54 and/or a second connecting portion 50A2 disposed outside the recessed structure 54. As shown in Figs. 15a and 15b, the connecting portion 50A includes the first connecting portion 50A1, but does not include the second connecting portion 50A2; the first connecting portion 50A1 is connected to the two ends of the protruding portion 50B in the width direction of the reinforcing rib 50. The fastener 60 connects the first connecting portion 50A1 to the composite material board 70. The cross-sectional shape of the reinforcing rib 50 is, for example, rectangular.

[00184] As shown in Fig. 36a, the connecting portion 50A includes a first connecting portion 50A1 and two second connecting portions 50A2 connected to the first connecting portion 50A1. The two second connecting portions 50A2 are respectively connected to the two ends of the protruding portion 50B in the width direction of the reinforcing rib 50. The first connecting portion 50A1 is connected to the composite material board 70 through the fastener 60, and the two second connecting portions 50A2 are bonded to the composite material board 70 through structural adhesive. Both parts of the connecting portions are connected to the composite material board, so that the reliability of the connection between the reinforcing rib and the composite material board is better.

[00185] As shown in Figs. 36b and 36c, the connecting portion 50A includes two first connecting portions 50A1, but does not include the second connecting portion 50A2, and the two first connecting portions 50A1 are respectively connected to the two ends of the protruding portion 50B in the width direction of the reinforcing rib 50. The fastener 60 connects the two first connecting portions 50A1 to the composite material board 70. The difference is that the first protruding portion 50B1 in Fig. 36b is perpendicular to the first connecting portion 50A1, and the first protruding portion 50B1 in Fig. 36b is inclined to the first connecting portion 50A1.

[00186] The fastener 60 is disposed at the first connecting portion 50A1, so that the outer end of the fastener 60 can be hidden in the recessed structure 54 and shielded by the protruding portion 50B. Thus, water outside the container body can be further prevented from entering the container body through the fastener 60 at the reinforcing rib 50, effectively reducing the risk of water entering the container body and improving the sealing and waterproof performance of the container body. Moreover, the fastener 60 at the reinforcing rib 50 cannot be observed from the outside of the container 100, which can improve the overall aesthetics of the product.

[00187] A concealed design is applied to the fastener 60 at the container body frame 101.

[00188] The member constituting the container body frame 101 includes an inner side panel 141, an outer side panel 142, and a transition panel 143 connected between the inner side panel 141 and the outer side panel 142. The outer side panel 142 is located on the outer side of the inner side panel 141 facing away from the center of the container body frame 101, and shields the inner side panel 141. The outer side panel 142, the inner side panel 141, and the

vertically disposed and installed on the door panel reinforcing rib 355, which improves the anti-deformation ability of the middle position of the door panel 331 in the horizontal and vertical directions.

[00203] The thickness t14 of the plate material used to make the door panel reinforcing rib 355 is 2.5 mm to 4 mm, for example, the thickness t14 may be 2.5 mm, 2.6 mm, 2.8 mm, 3 mm, 3.2 mm, 3.4 mm, 3.6 mm, 3.8 mm, 4 mm, or other suitable values. The plate material of the door panel reinforcing rib 355 is preferably a high-strength steel with a yield strength of 345 MPa or more.

[00204] As shown in Fig. 51, the fastener 60 further includes a third fastener 63 and a fourth fastener 64. It should be noted that, as described above, the fasteners 60 on the door frame 132 and the door panel reinforcing rib 355 are shielded by the protruding portion 50B. Fig. 51 schematically shows the outer transmission position of the third fastener 63 and the fourth fastener 64. The door frame 132 is connected to the composite material board 70 through the third fastener 63, and the door panel reinforcing rib 355 is connected to the composite material board 70 through the fourth fastener 64. Two adjacent third fasteners 63 have a spacing D33, and two adjacent fourth fasteners 64 have a spacing D34. The connection between the composite material board 70 and the door frame 132 needs to be firmer and more reliable, so the third fastener 63 is more densely disposed relative to the fourth fastener 64, whereupon D34 > D33. If necessary and/or desired, it may also be set to D34 ≤ D33. Optionally, the spacing D33 is 50 mm to 120 mm, for example, the spacing D33 may be 0 mm, 55 mm, 60 mm, 65 mm, 70 mm, 75 mm, 80 mm, 85 mm, 90 mm, 100 mm, 110 mm, 120 mm, or other suitable values. The spacing D34 is 80 mm to 170 mm, for example, the spacing D34 may be 80 mm, 100 mm, 110 mm, 120 mm, 130 mm, 140 mm, 150 mm, 160 mm, 170 mm, or other suitable values. The spacing of the fasteners 60 are set within the above range, which can ensure reliable connection between the composite material board 70 and the door frame 132 and the door panel reinforcing rib 355, and resist deformation of the composite material board 70.

[00205] The present application can achieve at least the following beneficial effects:

[00206] The present application uses composite material boards instead of thin corrugated steel plates to constitute the side panels, top panel, front panel and/or door panels. The composite material boards are non-metallic material boards, which can avoid rust and holes caused by rust, greatly extending the service life. Moreover, no paint is used for corrosion protection, and no welding is used. Composite material boards are characterized by being welding-free and painting-free, which can significantly reduce the welding and painting workload during the production of the container, lower VOCs and solid waste emissions, and have notable environmental benefits.

[00207] Since the density of composite materials is much lower than that of steel, the composite material container of the present invention can theoretically reduce the container weight by more than 6% and carbon emissions by more than 13% compared with steel containers of the same type. At the same time, due to the excellent wear resistance, corrosion

resistance and impact resistance of composite materials, the maintenance costs throughout the container's life cycle can be effectively reduced.

[00208] The inner surface of the container in the present application is flat, which is conducive to cargo loading and enhances the biosafety level of the container. The inner surfaces of the panels are paint-free, preventing contamination such as staining of goods caused by paint peeling. Additionally, compared with steel plates, the composite material boards have better thermal insulation, which can avoid problems such as moisture damage to goods caused by condensation inside the container body, thereby facilitating cross-regional transportation and use of the container in tropical regions such as Southeast Asia around the world.

[00209] Unless otherwise defined, the technical and scientific terms used herein have the same meanings as commonly understood by those skilled in the technical field of the present application. The terms used herein are only for describing specific implementation purposes, and are not intended to limit the present application. A feature described in one embodiment herein can be applied to another embodiment alone or in combination with other features, unless the feature is not applicable in the other embodiment or otherwise stated.

[00210] The present application has been described through the above-mentioned embodiments, but it should be understood that the above-mentioned embodiments are only for the purpose of illustration and description, and are not intended to limit the present application to the described embodiments. Furthermore, more variations and modifications can be made according to the teachings of the present application, and these variations and modifications fall within the scope claimed by the present application.

WHAT IS CLAIMED IS:

1. A composite container, comprising:

a side panel;

a top panel;

a front panel;

a container body frame made of steel material; and

at least one reinforcing rib;

wherein at least a portion of the side panel, the top panel, and the front panel is constituted by at least one composite material board connected to the container body frame; and

the reinforcing rib comprises:

at least one connecting portion connected to the composite material board; and

a protruding portion extending from the connecting portion in a direction away from the composite material board.

2. The composite container of claim 1, wherein the protruding portion comprises a first protruding portion and a second protruding portion, the first protruding portion is connected to the connecting portion, and the second protruding portion is connected to the first protruding portion and is spaced apart from the connecting portion in a thickness direction of the reinforcing rib.

3. The composite container of claim 2, wherein the first protruding portion is inclined or perpendicular to the connecting portion, the cross-sectional shape of the reinforcing rib is rectangular, U-shaped, H-shaped or Z-shaped.

4. The composite container of claim 1, wherein the reinforcing rib comprises two of the connecting portions spaced apart in a width direction of the reinforcing rib, and the cross-sectional shape of the reinforcing rib is Ω-shaped, wherein two legs of the Ω-shaped reinforcing rib serve as the two connecting portions.

5. The composite container of claim 1, wherein at least one of the side panel, the top panel and the front panel comprises at least two jointed composite material boards, and the connecting portion is connected to two adjacent composite material boards and at least partially covers a seam between the two adjacent composite material boards.

6. The composite container of any one of claims 1 to 5, wherein the container body frame

comprises:

a corner post comprising a pair of front end corner posts located at the front end of the container body frame and a pair of rear end corner posts located at the rear end of the container body frame;

a front end header connected to upper ends of the pair of front end corner posts respectively;

a pair of top side rails respectively connected to upper ends of the front end corner posts and the rear end corner posts located on the same side;

an underframe connected to lower ends of the pair of front end corner posts and the pair of rear end corner posts respectively;

wherein the reinforcing rib comprises a top panel reinforcing rib extending in a transverse direction between the pair of top side rails, a side panel reinforcing rib extending in a vertical direction between the top side rails and the underframe, and a front panel reinforcing rib extending in a vertical direction between the front end header and the underframe.

7. The composite container of claim 6, wherein:

the composite material board constituting at least one of the front panel and the side panel is located on the inner side of the container body frame; and/or

the composite material board constituting the top panel is located on the outer side of the container body frame; and/or

at least one of the front panel reinforcing rib and the side panel reinforcing rib is located on the outer side of the composite material board constituting the front panel; and/or

the top panel reinforcing rib is located on the inner side of the composite material board constituting the top panel.

8. A composite container, comprising:

a container body frame made of steel material;

a side panel disposed on both sides of the container body frame;

a top panel disposed at the top end of the container body frame;

a front panel disposed at the front end of the container body frame; and

at least one reinforcing rib;

wherein at least a portion of the side panel, the top panel and/or the front panel is constituted by at least one composite material board;

the reinforcing rib is connected to the composite material board to reinforce the strength of the side panel, the top panel and/or the front panel constituted by the composite material board;

wherein at least one of the composite material boards is directly connected to the container

body frame.

9. The composite container of claim 8, wherein at least one of the side panel, the top panel and the front panel comprises at least two jointed composite material boards, the container comprises a fastener, two adjacent composite material boards are connected by the reinforcing ribs, and the two adjacent composite material boards are lapped with each other and lapping potions are connected by the fastener or structural adhesives, or

wherein at least one of the side panel, the top panel and the front panel comprises at least two jointed composite material boards, two adjacent composite material boards are coplanar with each other and the reinforcing ribs have a connecting portion attached in surface contact with the two adjacent composite material boards, and the connecting portion is connected to the two adjacent composite material boards and covers a seam between the two adjacent composite material boards.

10. The composite container of claim 8, wherein the reinforcing rib comprises at least one of a side panel reinforcing rib extending in a vertical direction, a top panel reinforcing rib extending in a transverse direction and a front panel reinforcing rib extending in a vertical direction,

wherein a spacing between two adjacent side panel reinforcing ribs is 300 mm to 600 mm; and/or

a spacing between two adjacent top panel reinforcing ribs is 500 mm to 800 mm; and/or

a spacing between two adjacent front panel reinforcing ribs is 300 mm to 600 mm.

11. The composite container of claim 8, wherein the container body frame comprises a top side rail and a bottom side rail, the top side rail and the bottom side rail each comprise a side rail body and a recessed platform bent outward from the side rail body in multiple sections, the recessed platform comprises a first section disposed horizontally, a second section disposed vertically, and a third section disposed horizontally, wherein the second section is connected to the side panel, the first section and the third section are respectively disposed at the upper and lower ends and the inner and outer sides of the second section, a space for installing the reinforcing rib is formed between the third section of the top side rail and the third section of the bottom side rail, and the overall thickness of the reinforcing rib is less than the width of the third section.

12. The composite container of claim 8, wherein the side panel and/or the front panel are all constituted by the composite material boards,

wherein the top panel is all constituted by the composite material boards, or

the top panel comprises the composite material board and a metal plate connected to the composite material board through the reinforcing rib or bonded to the composite material board.

13. The composite container of claim 8, wherein a seal is provided between the composite material board and the container body frame and/or between the composite material board and the reinforcing rib,

wherein the container comprises a fastener, the composite material board is connected to the container body frame and/or the reinforcing rib via the fastener, and the seal is disposed around the fastener; and/or

the seal is disposed between mating surfaces of the composite material board and the container body frame; and/or

the seal is disposed between mating surfaces of the composite material board and the reinforcing rib; and/or

when adjacent composite material boards are provided and the two adjacent composite material boards lap, the seal is disposed between mating surfaces of the two adjacent composite material boards at the lap.

14. The composite container of claim 8, wherein the container comprises a fastener, the composite material board constituting the top panel is connected to the top end of the container body frame through the fastener, the top end of the container body frame has a top upper surface, a top side surface and a top lower surface, the top side surface is located on the inner side of both the top upper surface and the top lower surface toward the center of the top panel, and the fastener is disposed on the top upper surface.

15. The composite container of claim 8, wherein the container comprises a fastener, the composite material board is connected to the container body frame and/or the reinforcing rib through the fastener, the fastener is a rivet, comprising:

a rivet sleeve provided with a tip structure at an outer peripheral surface;

the rivet sleeve configured such that when an inner peripheral surface of the rivet sleeve is subjected to a force acting outward in a radial direction of the rivet, the rivet sleeve can at least partially expand and deform in the radial direction to allow the tip structure to be at least partially embedded in the composite material board.

16. The composite container of claim 15, wherein the rivet comprises a cap body connected to a first end of the rivet sleeve, an outer peripheral portion of the cap body protrudes radially outward from the rivet sleeve, and the outer peripheral portion of the cap body abuts against the container body frame and/or the reinforcing rib.

17. The composite container of claim 15, wherein the rivet comprises a mandrel and an expansion head, the mandrel is inserted into the rivet sleeve, the expansion head is connected to one end of the mandrel, and the radial dimension of the expansion head is greater than an inner diameter of the rivet sleeve when it is not deformed,

wherein the rivet is configured such that the mandrel can slide relative to the rivet sleeve along an axial direction of the rivet when the rivet is not riveted, and the expansion head protrudes from a second end of the rivet sleeve when the rivet is not riveted and is embedded in the interior of the rivet sleeve along with the sliding of the mandrel when the rivet is riveted,

wherein the mandrel comprises an embedded portion and a detachment portion, one end of the embedded portion is connected to the expansion head, and the detachment portion is connected to the other end of the embedded portion,

wherein the rivet is configured such that the embedded portion is hidden inside the rivet sleeve when the rivet is riveted, and the detachment portion protrudes from the first end of the rivet sleeve when the rivet is not riveted and is detached from the embedded portion by external force when the rivet is riveted.

18. The composite container of claim 15, wherein the tip structure is configured as a triangular thread.

19. The composite container of claim 8, wherein the reinforcing rib comprises a connecting portion and a protruding portion, the connecting portion is attached in surface contact with and connected to the composite material board, and the protruding portion is connected to the connecting portion and extends in a direction away from the composite material board.

20. The composite container of claim 19, wherein the composite container comprises a fastener, the inner side of the protruding portion forms a recessed structure, the connecting portion comprises a first connecting portion disposed in the recessed structure, and the fastener connects the composite material board and the first connecting portion so that the outer end of the fastener is hidden in the recessed structure.

21. The composite container of claim 20, wherein the connecting portion further comprises a second connecting portion disposed outside the recessed structure, connected to the first connecting portion and bonded to the composite material board by structural adhesive or sealant.

22. The composite container of claim 19, wherein the protruding portion comprises a first protruding portion connected to the connecting portion and a second protruding portion parallel

to and spaced apart from the connecting portion, and at least one end of the second protruding portion in a width direction of the reinforcing rib is connected to the connecting portion via the first protruding portion.

23. The composite container of claim 8, wherein the side panel is located on the inner side of the container body frame, the top panel is located on the outer side of the container body frame, and the front panel is located on the inner side of the container body frame,

wherein the reinforcing rib comprises at least one of a side panel reinforcing rib extending in a vertical direction, a top panel reinforcing rib extending in a transverse direction and a front panel reinforcing rib extending in a vertical direction,

wherein the side panel reinforcing rib is disposed on the outer side of the composite material board constituting the side panel; and/or

the top panel reinforcing rib is disposed on the inner side of the composite material board constituting the top panel; and/or

the front panel reinforcing rib is disposed on the outer side of the composite material board constituting the front panel.

24. The composite container of claim 8, wherein the reinforcing rib comprises at least one of a side panel reinforcing rib extending in a vertical direction, a top panel reinforcing rib extending in a transverse direction and a front panel reinforcing rib extending in a vertical direction,

wherein the thickness of the plate material used to make the side panel reinforcing rib is 2.5 mm to 4 mm; and/or

the thickness of the plate material used to make the top panel reinforcing rib is 2 mm to 3 mm; and/or

the thickness of the plate material used to make the front panel reinforcing ribs is 2.5 mm to 4 mm.

25. The composite container of any one of claims 8 to 24, wherein the container comprises a first fastener, the composite material board is connected to the container body frame through the first fastener, and the spacing between two adjacent first fasteners is 80 mm to 180 mm; and/or

wherein the container comprises a second fastener, the composite material board constituting the front panel and/or the side panel is connected to the reinforcing rib through the second fastener, and the spacing between two adjacent second fasteners is 120 mm to 300 mm; and/or

wherein the thickness of the composite material board is 2.5 mm to 4 mm.

26. The composite container of any one of claims 8 to 24, wherein the container further comprises a bottom panel and an underframe, the underframe comprises two bottom side rails disposed opposite to each other, the bottom panel comprises a plurality of bottom panel units, both ends of the bottom panel unit in a width direction of the container are lapped on the two bottom side rails, and the plurality of bottom panel units are laid in a length direction of the container.

27. The composite container of claim 26, wherein the underframe comprises a bottom crossbeam and a wide bottom crossbeam, each connected to the two bottom side rails, the width of the wide bottom crossbeam is greater than that of the bottom crossbeam, the bottom panel unit is independently connected to the bottom crossbeam, and two adjacent bottom panel units are connected to the same wide bottom crossbeam.

28. The composite container of any one of claims 8 to 24, wherein the container body frame comprises a front end corner post, a top corner piece and a bottom corner piece, a reinforcing member extending in a vertical direction is provided on the inner side of the front end corner post, and both ends of the reinforcing member are respectively connected to the top corner piece and the bottom corner piece.

29. The composite container of any one of claims 8 to 24, wherein composite material of the composite material board mainly comprises glass fiber and resin, the mass percentage of the glass fiber is 60% to 70%, and the mass percentage of the resin is 30% to 35%.

30. The composite container of claim 19, wherein the composite container further comprises at least one fixing member for auxiliary fixation, a recessed structure is formed on the inner side of the protruding portion, the fixing member is disposed in the recessed structure, and a clearance hole is disposed on the side panel at a position corresponding to the fixing member, and the clearance hole is used for an external component to pass through and connect with the fixing member.

31. The composite container of claim 30, wherein the composite container comprises a fixing assembly disposed corresponding to each of the fixing members, the fixing member is disposed at the bottom of the reinforcing rib, the container body frame comprises a bottom side rail, the fixing assembly comprises a cover plate and two sealing plates disposed on both sides of the fixing member, one end of the fixing member is fixedly connected to the bottom side rail and the other end is fixedly connected to the cover plate, and the cover plate, the two sealing plates and the inner wall of the protruding portion form a space for guiding the external

component to pass through the fixing member.

32. The composite container of any one of claims 8 to 24, wherein the member constituting the container body frame comprises an inner side panel, an outer side panel, and a transition panel connected between the inner side panel and the outer side panel, the outer side panel is located on the outer side of the inner side panel facing away from the center of the container body frame and shields the inner side panel, a concave cavity is formed on the inner sides of the outer side panel, the inner side panel and the transition panel, and the inner side panel is connected to the composite material board by a fastener so that the outer end of the fastener is hidden in the concave cavity.

33. The composite container of claim 32, wherein the container body frame comprises a front end header, a rear end header, four corner posts and two top side rails, and at least one of the front end header, the rear end header, the corner posts and the top side rails is the member constituting the container body frame.

34. The composite container of any one of claims 8 to 24, wherein the container comprises a door panel assembly disposed on the rear end of the container or the side panel in an openable and closable manner, the door panel assembly comprises a door panel and a door frame, the door panel is connected to the door frame, at least a portion of the door panel is constituted by at least one composite material board, the reinforcing rib comprises a door panel reinforcing rib, and the door panel reinforcing rib is connected to an outer surface of the composite material board constituting the door panel.

35. The composite container of claim 34, wherein the door frame is connected to an outer surface of the composite material board constituting the door panel.

36. The composite container of claim 34, wherein the door panel reinforcing rib is disposed in the width direction of the door panel assembly, and/or two ends of the door panel reinforcing rib are connected to or abutted against the door frame.

37. The composite container of claim 34, wherein the composite material board constituting the door panel is connected to the door frame and/or the door panel reinforcing rib through a fastener, and a seal is provided around the fastener; and/or

wherein a seal is provided between mating surfaces of the composite material board and the door frame; and/or

a seal is provided between mating surfaces of the composite material board and the door

panel reinforcing rib.

38. The composite container of claim 34, wherein the door panel assembly further comprises a door lock mechanism comprising a lock rod and a lock rod bracket, the lock rod is vertically disposed, a mounting position for mounting and fixing the lock rod bracket is provided on the door panel reinforcing rib and/or the door frame, and the lock rod is installed to the door frame and/or the door panel reinforcing rib through the lock rod bracket.

39. The composite container of any one of claims 8 to 22 and 24, wherein the reinforcing rib comprises a top panel reinforcing rib extending in a transverse direction and disposed on the outer side of the composite material board constituting the top panel.

40. The composite container of claim 39, wherein the cross-section of the top panel reinforcing rib has a closed annular shape to form a cavity, and a closing member is provided at both ends of the top panel reinforcing rib.

41. The composite container of claim 40, wherein the top panel reinforcing rib is connected to the composite material board constituting the top panel through a fastener, and the fastener is hidden in the cavity of the top panel reinforcing rib.

42. The composite container of claim 39, wherein the container body frame comprises a front end header, a rear end header and a top side rail, the top panel reinforcing rib is provided at an end of the front end header and/or the rear end header,

wherein the top panel reinforcing rib is connected to both the composite material board constituting the top panel and the end of the front end header through a fastener; and/or

the top panel reinforcing rib is connected to both the composite material board constituting the top panel and the end of the rear end header through a fastener; and/or

the top panel reinforcing rib is connected to the composite material board constituting the top panel and the top side rail through a fastener.