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(54) **FREIGHT TRAIN CHASSIS AND FREIGHT TRAIN**

(57) The present invention provides a freight train chassis and a freight train, the freight train chassis includes: a first chassis module, a plurality of connecting module and at least one second chassis module, the first chassis module and the second chassis module are disposed along a length direction of a freight train, the second chassis module is connected to the first chassis module by one or more connecting modules of the plurality of connecting modules, and the second chassis modules are connected by one or more connecting modules of

the plurality of connecting modules. The freight train chassis and the freight train provided by the present invention can adaptively adjust the number of the second chassis module as required for different sizes of goods or containers, thereby adjusting the length of the freight train chassis, which improves the adaptability of the freight train to different sizes of goods and the space utilization rate of the freight train, and improves the transportation efficiency and transportation volume of railway transportation.

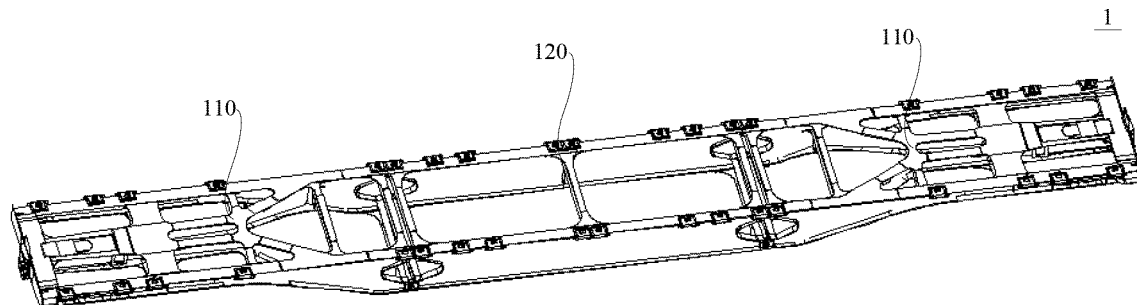


FIG. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to a technical field of freight train, in particular, to a freight train chassis and a freight train.

BACKGROUND

[0002] Railway transportation has the characteristics of fast transportation speed and large transportation volume. Therefore, a freight train has become the main means of land transportation.

[0003] In the related art, the vehicle chassis of the freight train mainly adopts the welded overall structure, and the size of the vehicle chassis is mainly manufactured according to relevant standard rules. The size of the vehicle chassis of the freight train is fixed after the production of the vehicle chassis is completed.

[0004] However, with the development of the railway transportation industry, the types and sizes of goods transported are increasing. For different sizes of containers, when the transportation is performed using the freight train with the fixed chassis, there may be a situation where the chassis transport space is narrow and the containers cannot be loaded, or there may be a situation where the transportation space of the chassis is too large and the transportation space is wasted, which seriously affects the transportation efficiency and transportation volume of railway transportation.

SUMMARY

[0005] The invention provides a freight train chassis and a freight train to solve the problem in the prior art that, when the transportation is performed using the freight train with the fixed size chassis for different sizes of containers, the space thereof cannot be effectively utilized and the railway transportation efficiency and the transportation volume thereof are affected. The freight train chassis and the freight train provided by the invention improve the adaptability of the freight train to different sizes of goods and the space utilization rate of the freight train, and improve the transportation efficiency and transportation volume of railway transportation.

[0006] In a first aspect, the present invention provides a freight train chassis, including: a first chassis module, a plurality of connecting modules and at least one second chassis module, where the first chassis module and the second chassis module are disposed along a length direction of a freight train, the second chassis module is connected to the first chassis module by one or more connecting modules of the plurality of connecting modules, and the second chassis modules are connected by one or more connecting modules of the plurality of connecting modules.

[0007] As an alternative embodiment, the present in-

vention provides a freight train chassis, the second chassis module is connected to the first chassis module by at least two of the plurality of connecting modules, and the second chassis modules are connected by at least two of the plurality of connecting modules.

[0008] As an alternative embodiment, the present invention provides a freight train chassis, the connecting module includes a first connecting member, a second connecting member, a connecting shaft and a tensioner, where a profile hole matching the tensioner is disposed on the first connecting member and a circular hole is disposed on the second connecting member, the connecting shaft passes through the profile hole and the circular hole to connect the first connecting member and the second connecting member, the tensioner is used to be inserted into the profile hole and abutted against the connecting shaft, so that the first connecting member is rigidly connected with the second connecting member; and the first connecting member and/or the second connecting member are connected to the first chassis module; and the first connecting member and/or the second connecting member are connected to the second chassis module.

[0009] As an alternative embodiment, the present invention provides a freight train chassis, the tensioner is a wedge block, the connecting shaft has a slope matching the wedge block, and when the tensioner is inserted into the profile hole, the wedge block is abutted against the slope; and both of the number of the slope and the number of the wedge block are at least two, and the two slopes are respectively located on two ends of the connecting shaft or are respectively located on opposite sides of a same end of the connecting shaft.

[0010] As an alternative embodiment, the present invention provides a freight train chassis, the connecting module further includes an adjusting plate, and the adjusting plate has an adjustable thickness, the adjusting plate is used to be abutted against the second connecting member when the tensioner is inserted into the profile hole.

[0011] As an alternative embodiment, the present invention provides a freight train chassis, the number of the adjusting plate is plural, and the plurality of adjusting plates have different thicknesses, and one of the adjusting plates is selected to be detachably connected to the first connecting member.

[0012] As an alternative embodiment, the present invention provides a freight train chassis, the first connecting member has a U-shaped groove, the U-shaped groove is disposed along the length direction of the freight train, an opening direction of the U-shaped groove is perpendicular to an axis of the profile hole, the U-shaped groove is in communication with the profile hole, the second connecting member is inserted into the U-shaped groove, and the connecting shaft sequentially passes through the profile hole on one side of the U-shaped groove, the circular hole and the profile hole on the other

side of the U-shaped groove to connect the first connecting member and the second connecting member.

[0013] As an alternative embodiment, the present invention provides a freight train chassis, and the adjusting plate is located at a bottom of the U-shaped groove.

[0014] As an alternative embodiment, the present invention provides a freight train chassis, the first chassis module includes two side beams, a sleeper beam, an end beam and at least one first crossbeam, and the two side beams are oppositely disposed parallel to the length direction of the freight train; and

the sleeper beam, the end beam and the at least one first crossbeam are located between the two side beams, and two ends of the sleeper beam are respectively connected to the two side beams, two ends of the end beam are respectively connected to the two side beams, and two ends of the at least one first crossbeam are respectively connected to the two side beams.

[0015] As an alternative embodiment, the present invention provides a freight train chassis, the first connecting member and/or the second connecting member are located on end surfaces of the two side beams perpendicular to the length direction of the freight train, and is connected to one end of the two side beams which is connected to the second chassis module.

[0016] As an alternative embodiment, the present invention provides a freight train chassis, a thickness of one end of each side beam of the side beams which is not connected to the second chassis module in a vertical direction is smaller than a thickness of one end of the side beam which is connected to the second chassis module in the vertical direction.

[0017] As an alternative embodiment, the present invention provides a freight train chassis, the second chassis module includes two boundary beams and a plurality of second crossbeams; the two boundary beams are disposed opposite to each other in a direction parallel to the length direction of the freight train, and the plurality of second crossbeams are disposed between the two boundary beams and are connected to sides, opposite to each other, of the two boundary beams.

[0018] As an alternative embodiment, the present invention provides a freight train chassis, and the first connecting member and/or the second connecting member are located on end surfaces of the two boundary beams perpendicular to the length direction of the freight train.

[0019] As an alternative embodiment, the present invention provides a freight train chassis, a thickness of each boundary beam of the boundary beams in a vertical direction is equal to the thickness of one end of the crossbeam which is connected to the second chassis module in the vertical direction.

[0020] As an alternative embodiment, the present invention provides a freight train chassis, and both the side beams and the boundary beams are -shaped steel or H-shaped steel.

[0021] As an alternative embodiment, the present in-

vention provides a freight train chassis. The freight train chassis further includes a locking member, the number of the locking member is plural, and both the first chassis module and the second chassis module are provided with the locking members, and the locking members are used to fix goods.

[0022] In the second aspect, the present invention provides a freight train. The freight train includes the freight train chassis of the first aspect of the present invention.

[0023] As an alternative embodiment, the present invention provides a freight train. The freight train further includes a coupler buffer device, where the coupler buffer device is disposed on the first chassis module.

[0024] As an alternative embodiment, the present invention provides a freight train. The freight train further includes a bogie, where the bogie is connected to a bottom of the first chassis module.

[0025] As an alternative embodiment, the present invention provides a freight train. The freight train further includes an upper center plate, disposed at the bottom of the first chassis module, where the upper center plate is used to connect to the bogie and the first chassis module.

[0026] The freight train chassis and the freight train provided by the present invention provide a first chassis module, a plurality of connecting modules and at least one second chassis module, where the first chassis module and the second chassis module are disposed along a length direction of a freight train, the second chassis module is connected to the first chassis module by the connecting module, and the second chassis modules are connected by the connecting module. In this way, the number of the second chassis module can be adjusted as required for different sizes of goods or containers, thereby adjusting the length of the freight train chassis, which improves the adaptability of the freight train to different sizes of goods and the space utilization rate of the freight train, and improves the transportation efficiency and transportation volume of railway transportation.

BRIEF DESCRIPTION OF DRAWINGS

[0027] In order to more clearly illustrate embodiments of the present invention or the technical solutions in the prior art, a brief description of the drawings used in the embodiments or the prior art description will be briefly described below. Obviously, the drawings in the following description are some embodiments of the present invention, and those skilled in the art can obtain other drawings based on these drawings without any creative efforts.

FIG. 1 is a schematic view showing an overall structure of a freight train chassis provided by the present invention;

FIG. 2a is a schematic view of a structure of a freight train chassis connected with a plurality of second chassis modules provided by the present invention; FIG. 2b is a schematic view of a structure of a freight

train chassis connected with a single second chassis module provided by the present invention;
 FIG. 2c is a schematic view of a structure of a freight train chassis not connected with a second chassis module provided by the present invention;
 FIG. 3 is a schematic view showing an overall structure of a connecting module of the freight train chassis provided by the present invention;
 FIG. 4 is a cross-sectional view of a connecting module of a freight train chassis provided by the present invention;
 FIG. 5 is a schematic view of a structure of a first chassis module of a freight train chassis provided by the present invention;
 FIG. 6 is a partial enlarged view of one end of a first chassis module of a freight train chassis connected to a second chassis module provided by the present invention;
 FIG. 7 is a schematic view showing an overall structure of a second chassis module of a freight train chassis provided by the present invention;
 FIG. 8 is a schematic view showing an overall structure of a freight train provided by the present invention; and
 FIG. 9 is a schematic view of a structure of another perspective view of a first chassis module of a freight train chassis provided by the present invention.

[0028] The reference numerals in the figures indicate:

1-Freight train chassis;
 110-First chassis module;
 111-Side beam; 112-Sleeper beam; 113-End beam;
 114-First crossbeam; 115-Center beam;
 1151-Front coupler seat; 1152-Rear coupler seat;
 1153-Upper center plate;
 120-Second chassis module;
 121-Boundary beam; 122-Second crossbeam;
 130-Connecting module;
 131-First connecting member;
 1311-Profile hole;
 132-Second connecting member;
 1321-Circular hole;
 133-Connecting shaft; 134-Tensioner; 135-Adjusting plate;
 140-Locking member;
 2-Coupler buffer device; and
 3-Bogie.

DETAILED DESCRIPTION OF EMBODIMENTS

[0029] In order to make the objects, technical solutions and advantages of the embodiments of the present invention more clear, the technical solutions in the embodiments of the present invention will be clearly and completely described in the following with reference to the accompanying drawings in the embodiments of the present invention. It is apparent that the described em-

bodiments are a part of the embodiments of the invention, and not all of the embodiments. All other embodiments obtained by those skilled in the art based on the embodiments of the present invention without creative efforts are within the protection scope of the present invention.

[0030] Exemplary embodiments will be described in detail herein, examples of which are illustrated in the accompanying drawings. The same numbers refer to the same or similar elements in the different figures unless otherwise indicated when the following description refers to the drawings.

[0031] In the related art, the vehicle chassis of the freight train mainly adopts the welded overall structure, and the size of the vehicle chassis is mainly manufactured according to relevant standard rules. The size of the vehicle chassis of the freight train is fixed after the production of the vehicle chassis is completed.

[0032] However, with the development of the railway transportation industry, the types and sizes of goods transported are increasing. For different sizes of containers, when the transportation is performed using the freight train with the fixed chassis, there may be a situation where the chassis transport space is narrow and the containers cannot be loaded, or there may be a situation where the transportation space of the chassis is too large and the transportation space is wasted, which seriously affects the transportation efficiency and transportation volume of railway transportation.

[0033] FIG. 1 is a schematic view showing an overall structure of a freight train chassis provided by the present invention. FIG. 2a is a schematic view of a structure of a freight train chassis connected with a plurality of second chassis modules provided by the present invention. FIG. 2b is a schematic view of a structure of a freight train chassis connected with a single second chassis module provided by the present invention. FIG. 2c is a schematic view of a structure of a freight train chassis not connected with a second chassis module provided by the present invention. FIG. 3 is a schematic view showing an overall structure of a connecting module of the freight train chassis provided by the present invention. FIG. 4 is a cross-sectional view of a connecting module of a freight train chassis provided by the present invention. FIG. 5 is a schematic view of a structure of a first chassis module of a freight train chassis provided by the present invention. FIG. 6 is a partial enlarged view of one end of a first chassis module of a freight train chassis connected to a second chassis module provided by the present invention. FIG. 7 is a schematic view showing an overall structure of a second chassis module of a freight train chassis provided by the present invention.

[0034] An embodiment of the present invention according to a first aspect provides a freight train chassis 1, referring to FIG. 1 to FIG. 7, the freight train chassis 1 includes a first chassis module 110, a plurality of connecting modules 130 and at least one second chassis module 120. The first chassis module 110 and the second chassis module 120 are disposed along a length direction

of a freight train, the second chassis module 120 is connected to the first chassis module 110 by the connecting module 130, and the second chassis modules 120 are connected by the connecting module 130.

[0035] In the freight train chassis and the freight train provided by the present invention, a first chassis module, a plurality of connecting modules and at least one second chassis module are provided, where the first chassis module and the second chassis module are disposed along a length direction of the freight train, the second chassis module is connected to the first chassis module by the connecting modules, and the second chassis modules are connected by the connecting modules. In this way, the number of the second chassis module can be adjusted according to the needs of different sizes of goods or containers, thereby adjusting the length of the freight train chassis, which improves the adaptability of the freight train to different sizes of goods and the space utilization rate of the freight train, and improves the transportation efficiency and transportation volume of railway transportation.

[0036] Specifically, referring to FIG. 2a to FIG. 2c, FIG. 2a is a schematic view of a structure of a freight train chassis connected with a plurality of second chassis modules provided by the present invention, FIG. 2b is a schematic view of a structure of a freight train chassis connected with a single second chassis module provided by the present invention, and FIG. 2c is a schematic view of a structure of a freight train chassis not connected with a second chassis module provided by the present invention. In the freight train chassis 1 provided by the present embodiment, in order to accommodate different sizes and lengths of goods or containers, the plurality of second chassis modules 120 are connected to each other through the connection module 130, then, they are connected to the first chassis module 110 through the connection module 130. In this way, the length of the freight train chassis 1 can be adjusted to accommodate different sizes and lengths of goods. Optionally, referring to FIG. 2c, when the size of the goods is short, the freight train chassis 1 provided in the present embodiment may comprise only two first chassis modules 110 connected through the connecting module 130. In this way, in the case that the length of the train chassis is fixed, for the small-sized goods, the space of the train chassis is too large, space waste is avoided, and the space utilization rate of the freight train and the transportation volume of the freight train are improved.

[0037] Optionally, in the freight train chassis provided in the present embodiment, the second chassis module 120 is connected to the first chassis module 110 by at least two connecting modules 130, and the second chassis modules 120 are connected by the at least two connecting modules 130.

[0038] Specifically, referring to FIG. 5 to FIG. 7, in the present embodiment, the at least two connecting modules 130 may be disposed on an end surface of the second chassis module 120 perpendicular to the length di-

rection of the freight train, and the at least two connecting modules 130 may be disposed in parallel with each other on the end surface of the second chassis module 120, and the at least two connecting modules 130 may also be disposed at opposite corners of the end surface of the second chassis module 120. The connecting module 130 is connected to the first chassis module 110. Optionally, in the present embodiment, the connecting module 130 may also be disposed on the end surface of the first chassis module 110 perpendicular to the length direction of the freight train, and the connecting module 130 is connected to the second chassis module 120. Optionally, in the present embodiment, four connecting modules 130 may be set, and the four connecting modules 130 are disposed on four corners of the end surface of the second connecting module 120 perpendicular to the length direction of the freight train; or, the four connecting modules 130 are disposed on four corners of the end surface of the first connecting module 110 perpendicular to the length direction of the freight train. In the present embodiment, the number of the connecting module is set to four, which increases the rigidity and stability of the connection surface, improves the rigidity of the overall vertical direction of the frame, and further increases the bearing capacity of the freight train chassis.

[0039] Optionally, referring to FIG. 3 and FIG. 4, the present embodiment provides a freight train chassis. The connecting module 130 includes a first connecting member 131, a second connecting member 132, a connecting shaft 133 and a tensioner 134, where a profile hole 1311 matching the tensioner 134 is disposed on the first connecting member 131, a circular hole 1321 is disposed on the second connecting member 132, the connecting shaft 133 passes through the profile hole 1311 and the circular hole 1321 to connect the first connecting member 131 and the second connecting member 132, and the tensioner 134 is used to be inserted into the profile hole 1311 and abutted against the connecting shaft 133 so that the first connecting member 131 is rigidly connected with the second connecting member 132; and

[0040] The first connecting member 131 and/or the second connecting member 132 are connected to the first chassis module 110; and the first connecting member 131 and/or the second connecting member 132 are connected to the second chassis module 120.

[0041] Specifically, referring to FIG. 5, in the present embodiment, the tensioner 134 is a wedge block, the connecting shaft 133 has a slope matching the wedge block, and when the tensioner 134 is inserted into the profile hole 1311, the wedge block is abutted against the slope; and

both of the number of the slope and the number of the wedge block are at least two, and the two slopes are respectively located on two ends of the connecting shaft 133 or are respectively located on opposite sides of a same end of the connecting shaft 133.

[0042] Specifically, referring to FIG. 5, in the present embodiment, the slope of the connecting shaft 133 is

disposed on the slope side of the connecting shaft 133 is disposed perpendicular to the diametrical direction along the length of the freight train and away from one side of the first connecting member 131, and the spacing between the slope of the connecting shaft 133 and the inner wall of the profile hole 1311 gradually decreases from the both ends to the center of the connecting shaft 133. In this way, after the tensioner 134 is inserted into the profile hole 1311, the tensioner 134 and the slope of the connecting shaft 133 are abutted against each other, thereby pushing the connecting shaft 133 to move in the direction indicated by the arrow in FIG. 5, thereby abutting the end of the second connecting member 132 against the first connecting member 131, which achieves a rigid connection between the first connecting member 131 and the second connecting member 132. Optionally, in the present embodiment, the connecting shaft 133 may be a pin.

[0043] In further, referring to FIG. 3 and FIG. 4, the present embodiment provides a freight train chassis. The connecting module 130 further includes an adjusting plate 135, the adjusting plate 135 has an adjustable thickness, and the adjusting plate 135 is used to be abutted against the second connecting member 132 when the tensioner 134 is inserted into the profile hole 1311.

[0044] Specifically, referring to FIG. 4, in the present embodiment, after the tensioner 134 is inserted into the profile hole 1311, the connecting shaft 133 drives the second connecting member 132 to move and abuts on the adjusting plate 135, and a pre-tightening force is generated between the adjusting plate 135 and the second connecting member 132, so that the first connecting member 131 and the second connecting member 132 are rigidly connected. In the present embodiment, by providing the adjusting plate, the accurate alignment between the profile hole on the first connecting member and the circular hole on the second connecting member can be guaranteed, which improves the efficiency of connection installation between the first chassis module and the second chassis module, and increases the rigidity of the connection of the first connecting member and the second connecting member.

[0045] In further, in the present implementation, the number of the adjusting plate 135 is plural, the plurality of adjusting plates 135 have different thicknesses, and one of the adjusting plates 135 is selected to be detachably connected to the first connecting member 130.

[0046] Specifically, referring to FIG. 3, in the present embodiment, the adjusting plate 135 may be fixed to the first connecting member 131 by bolts. In the present embodiment, the thickness of the adjusting plate 135 can be adjusted by replacing the adjusting plates 135 with different thicknesses after disassembly. Optionally, in the present embodiment, in order to increase the rigidity of the first connecting member 131 and the second connecting member 132, the materials of the first connecting member 131 and the second connecting member 132 may be forged steel, or the materials of the first connect-

ing member 131 and the second connecting member 132 may be rolled steel; of course, the material of one of the first connecting member 131 and the second connecting member 132 may be forged steel and the material of the other one is rolled steel.

[0047] Optionally, referring to FIG. 3 and FIG. 4, the present embodiment provides a freight train chassis. The first connecting member 131 has a U-shaped groove, the U-shaped groove is disposed along the length direction of the freight train, an opening direction of the U-shaped groove is perpendicular to an axis of the profile hole 1311, and the U-shaped groove is in communication with the profile hole 1311. The second connecting member 132 is inserted into the U-shaped groove, and the connecting shaft 133 sequentially passes through the profile hole 1311 on one side of the U-shaped groove, the circular hole 1321 and the profile hole 1311 on the other side of the U-shaped groove to connect the first connecting member 131 and the second connecting member 132.

[0048] Specifically, referring to FIG. 3 and FIG. 4, in the present embodiment, the end portion of the T-shaped structure of the second connecting member 132 along the length direction of the freight train is inserted into the U-shaped groove of the first connecting member 131, and is abutted against the U-shaped groove. The end portion of the T-shaped structure of the second connecting member 132 perpendicular to the length direction of the freight train is connected to the first chassis module 110 or the second chassis module 120.

[0049] In further, in the freight train chassis provided by the present embodiment, the adjusting plate 135 is located at a bottom of the U-shaped groove.

[0050] Specifically, the adjusting plate 135 and the inner wall of the U-shaped groove perpendicular to the length direction of the freight train are detachably connected by bolts, screws, or the like.

[0051] Optionally, referring to FIG. 5, the present embodiment provides a freight train chassis. The first chassis module 110 includes two side beams 111, a sleeper beam 112, an end beam 113 and at least one first crossbeam 114, and the two side beams 111 are oppositely disposed parallel to the length direction of the freight train; and the sleeper beam 112, the end beam 113 and the at least one first crossbeam 114 are located between the two side beams 111, two ends of the sleeper beam 112 are respectively connected to the two side beams 111, two ends of the end beam 113 are respectively connected to the two side beams 111, and two ends of the at least one first crossbeam 114 are respectively connected to the two side beams 111.

[0052] Optionally, in the present embodiment, in order to improve the rigidity and the bearing capacity of the first chassis module 110, the plurality of the first crossbeams 114 may be disposed, referring to FIG. 5, for example, three first crossbeam 114s are disposed, of course, other numbers may be set for the crossbeam 114, which is not specifically limited in the present embodiment.

[0053] Optionally, referring to FIG. 5 and FIG. 6, the present embodiment provides a freight train chassis. The first connecting member 131 and/or the second connecting member 132 are located on end surfaces of the two side beams 111 perpendicular to the length direction of the freight train, and are connected to one end of the two side beams 111 which is connected to the second chassis module 120.

[0054] Specifically, referring to FIG. 5 and FIG. 6, in the present embodiment, one end of the two side beams 111 connected to the second chassis module 120 is formed with four corners, and each of two of the four corners is provided with the first connecting member 131 diagonally, and each of the other two corners is provided with the second connecting member 132 diagonally. In other words, in the present embodiment, the number of the first connecting members 131 and the number of the second connecting members 132 are both set as four, where, for the first chassis module 110, two first connecting members 131 are disposed on the first chassis module 110, and two second connecting members 132 are also disposed on the first chassis module 110. Of course, it can be understood that only one exemplary embodiment is shown in FIG. 5 and FIG. 6, four first connecting members 131 in the present embodiment may also be all disposed on the first chassis module 110, at the same time, four second connecting members 132 may also be all disposed on the second chassis module 120; in another alternative implementation, the position of the first connecting members 131 and the position of the second connecting members 132 are also interchangeable. Here, the interchange of the position of the first connecting members 131 and the position of the second connecting members 132 may be not only an interchange between on the first chassis module 110 and on the second chassis module 120, but also may also be an interchange of positions on the four corners provided on the first chassis module 110 or the second chassis module 120; for example, in an alternative implementation, the first connecting member 131 may be disposed on two corners of the four corners of the first chassis module 110 as shown in FIG. 5 and FIG. 6 at the top of the first chassis module 110.

[0055] In the present implementation, one end of the first chassis module 110 connected to the second chassis module 120 is disposed as four corners, and the number of the first connecting member 131 and the number of the second connecting member 132 are both set as four, the four connecting modules 130 are separated on four corners. The vertical rigidity of the first chassis module and the second chassis module is improved, and the stability of the connection surface is increased.

[0056] In further, referring to FIG. 5, the present embodiment provides a freight train chassis. The thickness of one end of each side beam of the side beams 111 which is not connected to the second chassis module 120 in the vertical direction is smaller than the thickness of one end of the side beams 111 which is connected to

the second chassis module 120 in the vertical direction.

[0057] Specifically, referring to FIG. 5, the thickness D2 of the side beams 111 is greater than the thickness D1. In this way, setting the thickness D2 greater than the thickness D1 for the side beams 111 improves the rigidity and load bearing capacity of the joint between the first chassis module 110 and the second chassis module 120.

[0058] Optionally, referring to FIG. 7, the present embodiment provides a freight train chassis. The second chassis module 120 includes two boundary beams 121 and a plurality of second crossbeams 122; the two boundary beams 121 are disposed opposite to each other in the direction parallel to the length direction of the freight train, and the plurality of second crossbeams 122 are disposed between the two boundary beams 121 and are connected to sides, opposite to each other, of the two boundary beams 121.

[0059] Specifically, referring to FIG. 7, in the present embodiment, the second crossbeams 122 may be a plurality of second crossbeams uniformly disposed along the length direction of the freight train. Optionally, in order to improve the rigidity and the bearing capacity of the second chassis modules 120, at least three second crossbeams 122 can be disposed. Optionally, the case where five second crossbeams 122 are disposed is shown in FIG. 7, where three second crossbeams 122 are disposed at the top of the boundary beam 121, and the other two second crossbeams 122 are disposed at the bottom of the boundary beam 121 and located at both ends of the boundary beam 121 along the length direction of the freight train. In this way, the number of the second crossbeams to be used can be saved while increasing the rigidity of the second chassis module.

[0060] Optionally, referring to FIG. 7, the first connecting member 131 and/or the second connecting member 132 are located on end surfaces of the two boundary beams 121 perpendicular to the length direction of the freight train.

[0061] Optionally, referring to FIG. 7, the thickness of the boundary beam 121 in the vertical direction is equal to the thickness of the end of the crossbeam 111 connected to the second chassis module 120 in the vertical direction.

[0062] Specifically, referring to FIG. 5 and FIG. 7, the thickness D3 of the boundary beams 121 is equal to the thickness D2 of the crossbeam 111. In this way, the rigidity and load bearing capacity after the boundary beams 121 being connected to the crossbeam 111 are improved.

[0063] Optionally, the present invention provides a freight train chassis. Both the side beams 111 and the boundary beams 121 are -shaped steel or H-shaped steel.

[0064] Specifically, both the side beams 111 and the boundary beams 121 can be the -shaped steel or the H-shaped steel, of course, the side beams 111 may be the -shaped steel and the boundary beams 121 may

be the H-shaped steel, and vice versa. In the present embodiment, the side beams 111 and the boundary beams 121 are arranged as the -shaped steel or the H-shaped steel, which increases the cross-sectional dimension of the steel section and improves the overall rigidity of the freight train chassis.

[0065] In further, referring to FIG. 5 and FIG. 7, the present invention provides a freight train chassis. The freight train chassis further includes a locking member 140, the number of the locking member 140 is plural, both the first chassis module 110 and the second chassis module 120 are provided with the locking members 140, and the locking members 140 are used to fix goods.

[0066] Specifically, in the present embodiment, the locking members 140 may be disposed on the side beams 111 and the boundary beams 121, the locking member 140 may be uniformly disposed on the side beams 111 and may be uniformly disposed on the boundary beams 121, and fixedly connected to the side beams 111 and the boundary beams 121. Of course, in the present embodiment, the locking members 140 may also be slidably connected to the side beams 111 and the boundary beams 121. In the present embodiment, by providing a plurality of locking members, the plurality of locking member can use different cargo sizes to fix the goods in a targeted manner.

[0067] In the freight train chassis provided by the present invention, a first chassis module, a plurality of connecting modules and at least one second chassis module are provided, the first chassis module and the second chassis module are disposed along a length direction of a freight train, the second chassis module is connected to the first chassis module by the connecting modules, and the second chassis modules are connected by the connecting modules. In this way, the number of the second chassis module can be adjusted as required for different sizes of goods or containers, thereby adjusting the length of the freight train chassis, which improves the adaptability of the freight train to different sizes of goods and the space utilization rate thereof, and improves the transportation efficiency and transportation volume of railway transportation.

[0068] FIG. 8 is a schematic view showing an overall structure of a freight train provided by the present invention. FIG. 9 is a schematic view of a structure of another perspective view of a first chassis module of a freight train chassis provided by the present invention.

[0069] Referring to FIG. 8 and FIG. 9, an embodiment of the second aspect of the present invention provides a freight train. The freight train includes the freight train chassis 1 of the first aspect of the present invention.

[0070] Optionally, referring to FIG. 8, the present embodiment provides a freight train. The freight train further includes a coupler buffer device 2, and the coupler buffer device 2 is disposed on the first chassis module 110.

[0071] Specifically, in the present embodiment, the coupler buffer device 2 may be disposed at one end of

the first chassis module 110 which is not connected to the second chassis module 120. The coupler buffer device 2 is used to connect to the coupler buffer device 2 provided on other freight train chassis 1 of the freight train.

[0072] Optionally, referring to FIG. 8, the present embodiment provides a freight train. The freight train further includes a bogie 3, and the bogie 3 is connected to a bottom of the first chassis module 110.

[0073] Specifically, the bogie 3 can be disposed at the bottom of the one end frame of the first chassis module 110 having the thickness D1, so that the bogie can support the first chassis module 110 and improve the bearing capacity of the first chassis module.

[0074] In further, referring to FIG. 9, the present embodiment provides a freight train. The freight train further includes an upper center plate 1153, the upper center plate 1153 is disposed at a bottom of the first chassis module 110, and the upper center plate 1153 is used to connect to the bogie 3 and the first chassis module 110.

[0075] Specifically, referring to FIG. 9, the present embodiment provides a freight train. The first chassis module 110 further includes a center beam 115. Optionally, the center beam 115 is a box-shaped structure welded by a plate, and a front coupler seat 1151 and a rear coupler seat 1152 are disposed inside the center beam 115 of the box structure. Specifically, the front coupler seat 1151 is located at one end of the box structure facing away from the second chassis module 120, and the rear coupler seat 1152 is located at one end of the box structure adjacent to the second chassis module 120. The coupler buffer device 2 is disposed between the front coupler seat 1151 and the rear coupler seat 1152, and a portion of the coupler buffer device 2 protrudes from an end of the first chassis module 110 that is not connected to the second chassis module 120. Specifically, in the present embodiment, the upper center plate 1152 may be disposed at the bottom of the center beam 115, and connected to the bogie 3. In the present embodiment, the specific structures, of the coupler buffer device 2 and the bogie 3 in the present embodiment can be referred to the structural arrangements of the coupler buffer device and the bogie in the art, which will not be described in detail in the present embodiment.

[0076] The freight train provided by the present invention provides a first chassis module, a plurality of connecting modules and at least one second chassis module, the first chassis module and the second chassis module are disposed along the length direction of the freight train, the second chassis module is connected to the first chassis module by the connecting modules, and the second chassis modules are connected by the connecting modules. In this way, the number of the second chassis module can be adjusted as required for different sizes of goods or containers, thereby adjusting the length of the freight train chassis, which improves the adaptability of the freight train to different sizes of goods and the space utilization rate thereof, and improves the transportation

efficiency and transportation volume of railway transportation.

[0077] Finally, it should be noted that the above embodiments are only used to illustrate the technical solutions of the present invention, and are not limited thereto; although the present invention has been described in detail with reference to the foregoing embodiments, it will be understood by those of ordinary skill in the art that the technical solutions described in the foregoing embodiments may be modified or equivalently substituted for some or all of the technical features, and the modifications or substitutions do not depart from the scope of the technical solutions of the embodiments of the present invention.

Claims

1. A freight train chassis, comprising: a first chassis module, a plurality of connecting modules and at least one second chassis module, wherein the first chassis module and the second chassis module are disposed along a length direction of a freight train, the second chassis module is connected to the first chassis module by one or more connecting modules of the plurality of connecting modules, and the second chassis modules are connected by one or more connecting modules of the plurality of connecting modules.
2. The freight train chassis according to claim 1, wherein the second chassis module is connected to the first chassis module by at least two of the plurality of connecting modules, and the second chassis modules are connected by at least two of the plurality of connecting modules.
3. The freight train chassis according to claim 1, wherein the connecting module comprises a first connecting member, a second connecting member, a connecting shaft and a tensioner, wherein a profile hole matching the tensioner is disposed on the first connecting member and a circular hole is disposed on the second connecting member, the connecting shaft passes through the profile hole and the circular hole to connect the first connecting member and the second connecting member, and the tensioner is used to be inserted into the profile hole and abutted against the connecting shaft so that the first connecting member is rigidly connected with the second connecting member; and the first connecting member and/or the second connecting member are connected to the first chassis module; and the first connecting member and/or the second connecting member are connected to the second chassis module.
4. The freight train chassis according to claim 3, where-

in the tensioner is a wedge block, the connecting shaft has a slope matching the wedge block, and when the tensioner is inserted into the profile hole, the wedge block is abutted against the slope; and both of the number of the slope and the number of the wedge block are at least two, and the two slopes are respectively located on two ends of the connecting shaft or are respectively located on opposite sides of a same end of the connecting shaft.

5. The freight train chassis according to claim 3, wherein the connecting module further comprises an adjusting plate, the adjusting plate has an adjustable thickness, and the adjusting plate is used to be abutted against the second connecting member when the tensioner is inserted into the profile hole.
6. The freight train chassis according to claim 5, wherein the number of the adjusting plate is plural, and the plurality of adjusting plates have different thicknesses, and one of the adjusting plates is selected to be detachably connected to the first connecting member.
7. The freight train chassis according to claim 5, wherein the first connecting member has a U-shaped groove, the U-shaped groove is disposed along the length direction of the freight train, an opening direction of the U-shaped groove is perpendicular to an axis of the profile hole, the U-shaped groove is in communication with the profile hole, the second connecting member is inserted into the U-shaped groove, and the connecting shaft sequentially passes through the profile hole on one side of the U-shaped groove, the circular hole and the profile hole on the other side of the U-shaped groove to connect the first connecting member and the second connecting member.
8. The freight train chassis according to claim 7, wherein the adjusting plate is located at a bottom of the U-shaped groove.
9. The freight train chassis according to claim 3, wherein the first chassis module comprises two side beams, a sleeper beam, an end beam and at least one first crossbeam, and the two side beams are oppositely disposed parallel to the length direction of the freight train; and the sleeper beam, the end beam and the at least one first crossbeam are located between the two side beams, and two ends of the sleeper beam are respectively connected to the two side beams, two ends of the end beam are respectively connected to the two side beams, and two ends of the at least one first crossbeam are respectively connected to the two side beams.

10. The freight train chassis according to claim 9, wherein the first connecting member and/or the second connecting member are located on end surfaces of the two side beams perpendicular to the length direction of the freight train, and are connected to one end of the two side beams which is connected to the second chassis module.
11. The freight train chassis according to claim 9, wherein a thickness of one end of each side beam of the side beams which is not connected to the second chassis module in a vertical direction is smaller than a thickness of one end of the side beam which is connected to the second chassis module in the vertical direction.
12. The freight train chassis according to claim 11, wherein the second chassis module comprises two boundary beams and a plurality of second crossbeams; the two boundary beams are disposed opposite to each other in a direction parallel to the length direction of the freight train, and the plurality of second crossbeams are disposed between the two boundary beams and are connected to sides, opposite to each other, of the two boundary beams.
13. The freight train chassis according to claim 12, wherein the first connecting member and/or the second connecting member are located on end surfaces of the two boundary beams perpendicular to the length direction of the freight train.
14. The freight train chassis according to claim 12, wherein a thickness of each boundary beam of the boundary beams in a vertical direction is equal to the thickness of one end of the crossbeam which is connected to the second chassis module in the vertical direction.
15. The freight train chassis according to claim 12, wherein both the side beams and the boundary beams are -shaped steel or H-shaped steel.
16. The freight train chassis according to any one of claims 1-15, further comprising a locking member, the number of the locking member is plural, both the first chassis module and the second chassis module are provided with the locking members, and the locking members are used to fix goods.
17. A freight train, comprising: the freight train chassis according to any one of claims 1-16.
18. The freight train according to claim 17, further comprising a coupler buffer device, wherein the coupler buffer device is disposed on the first chassis module.
19. The freight train according to claim 17, further comprising a bogie, wherein the bogie is connected to a bottom of the first chassis module.
20. The freight train according to claim 19, further comprising an upper center plate, disposed at the bottom of the first chassis module, wherein the upper center plate is used to connect the bogie and the first chassis module.

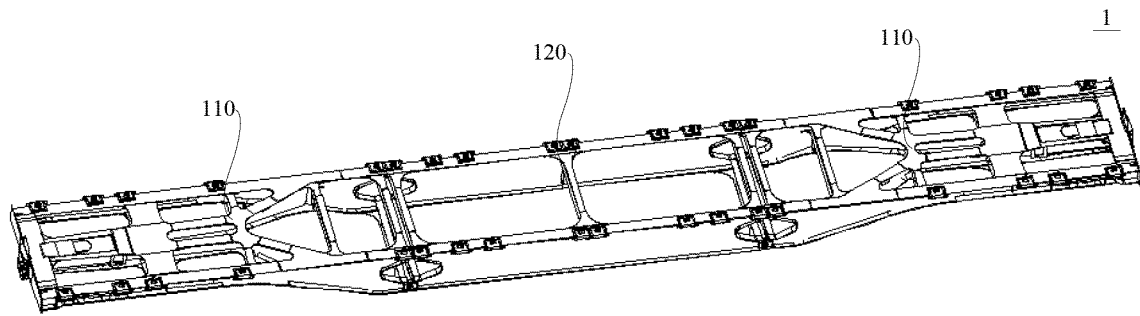


FIG. 1

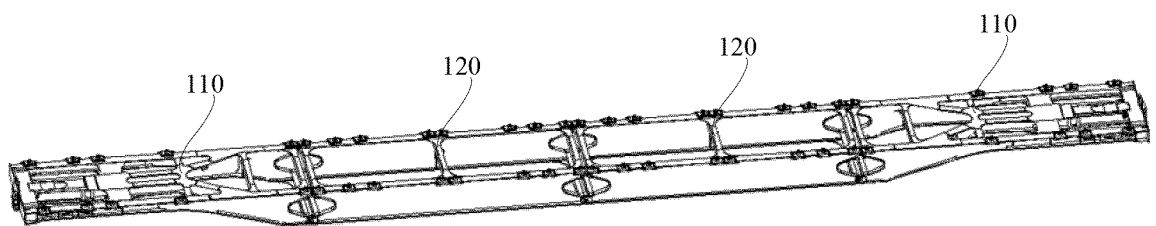


FIG. 2a

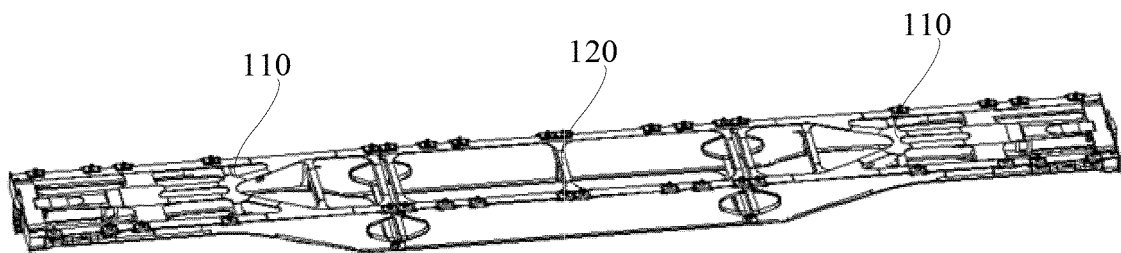


FIG. 2b

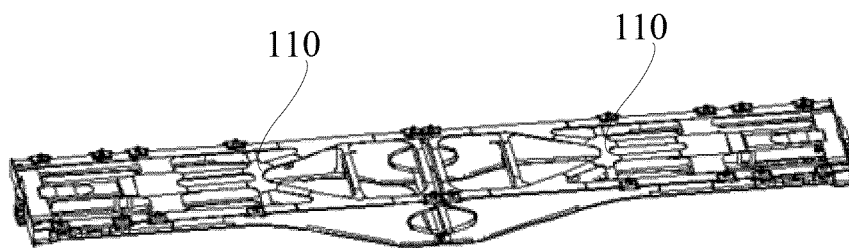


FIG. 2c

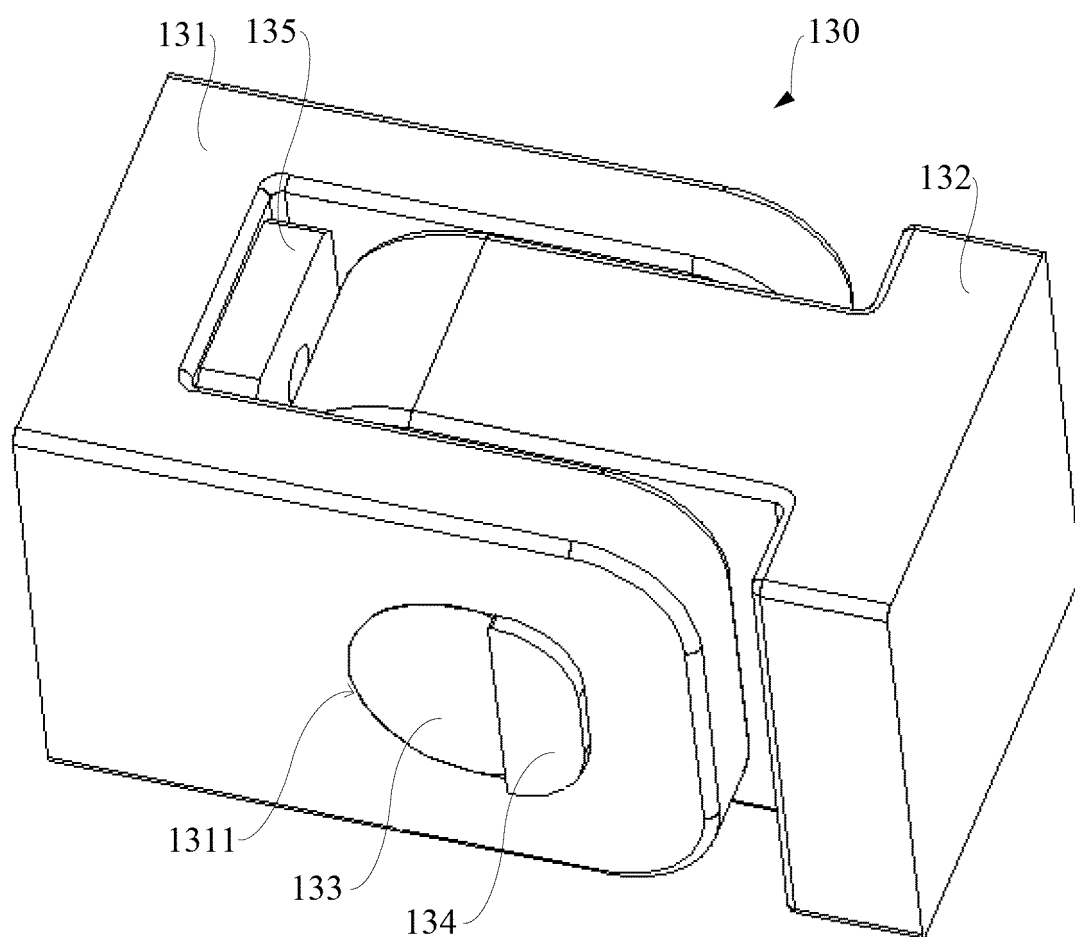


FIG. 3

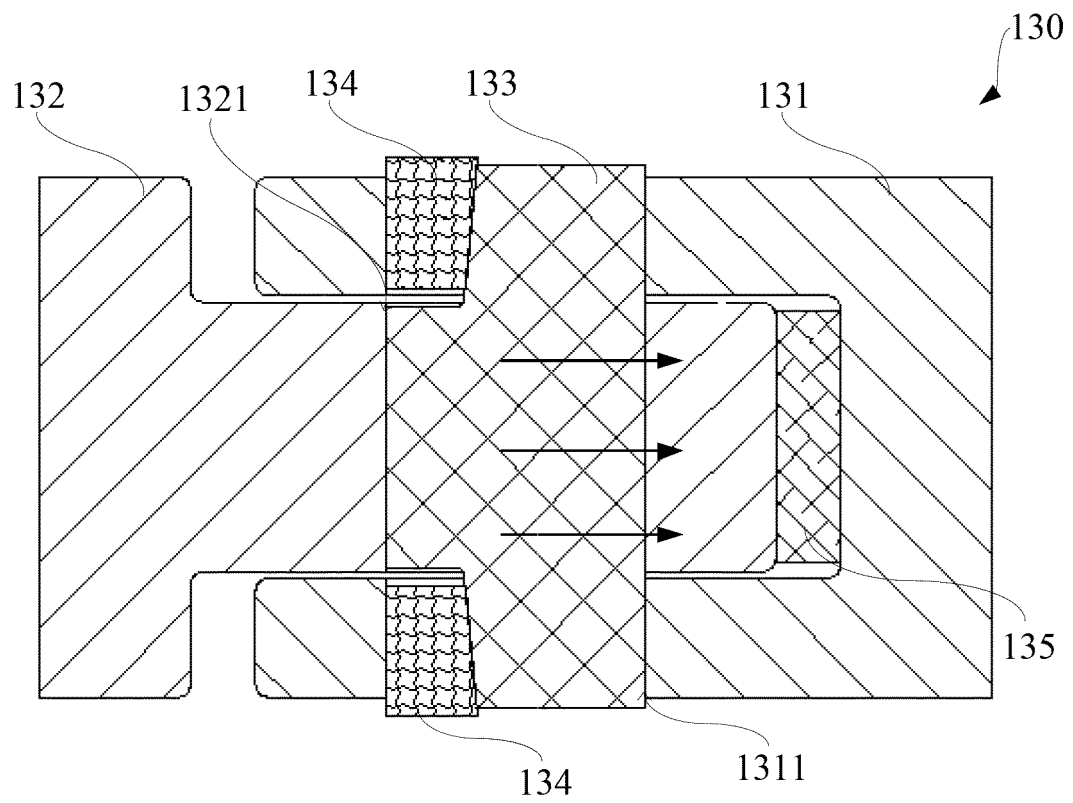


FIG. 4

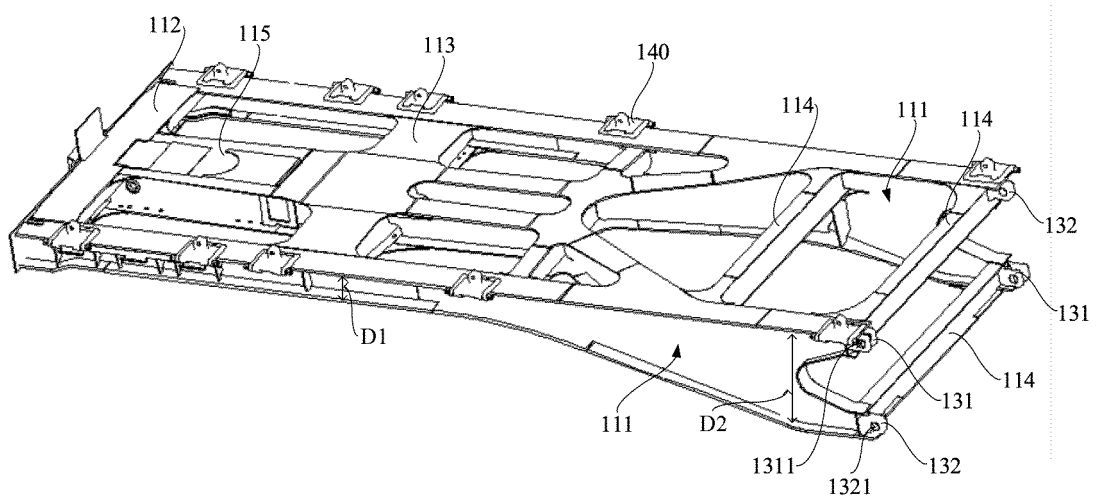


FIG. 5

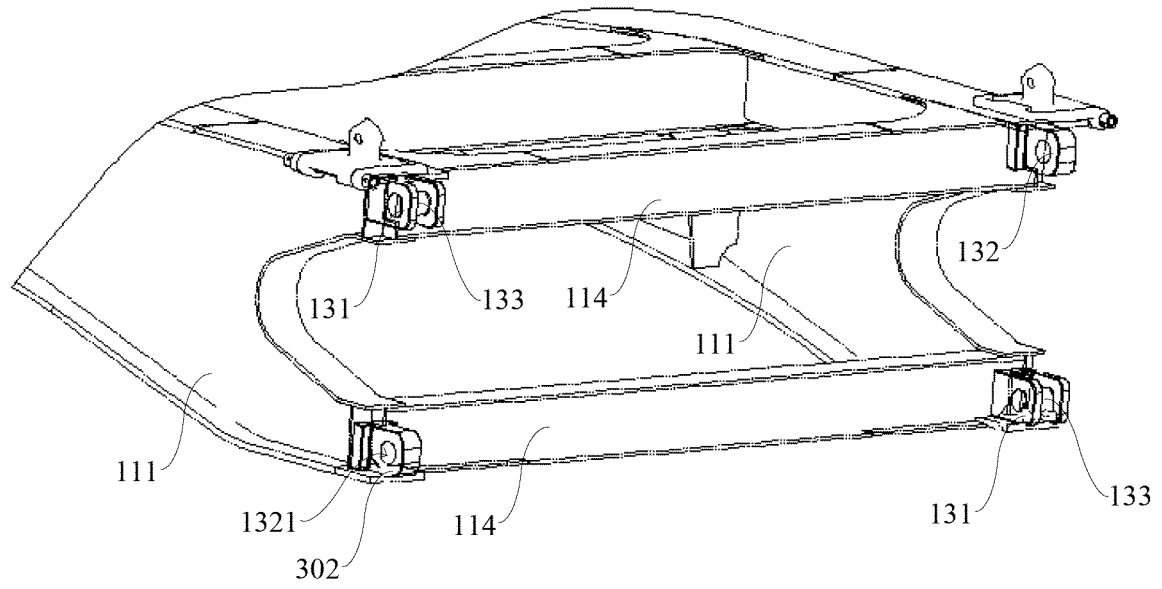


FIG. 6

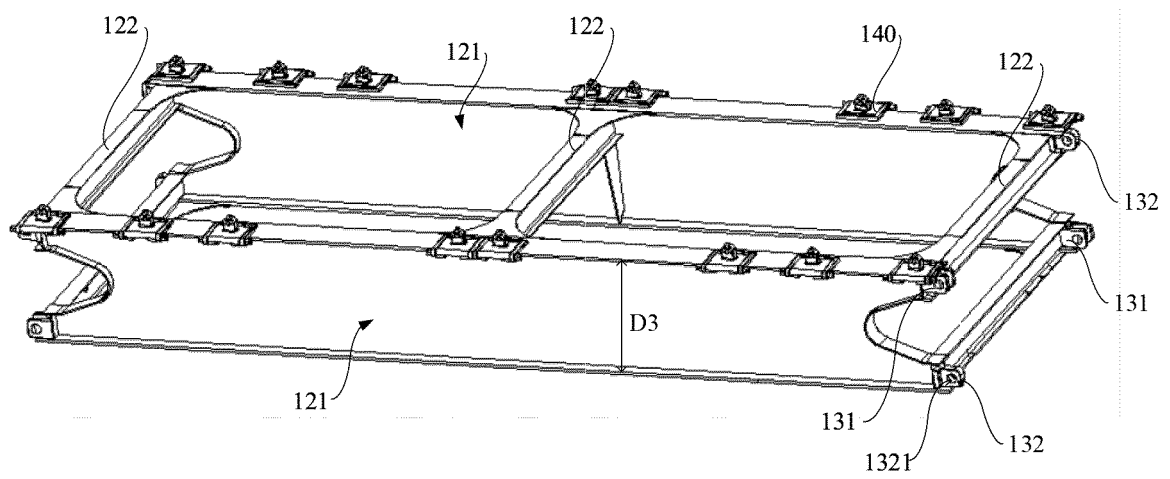


FIG. 7

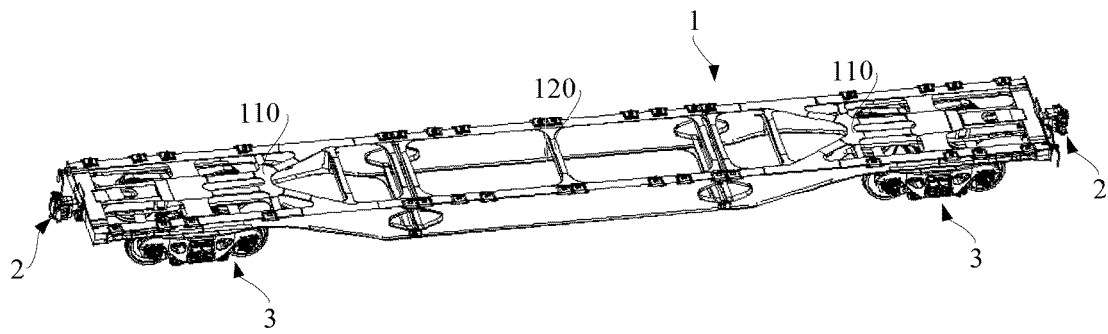


FIG. 8

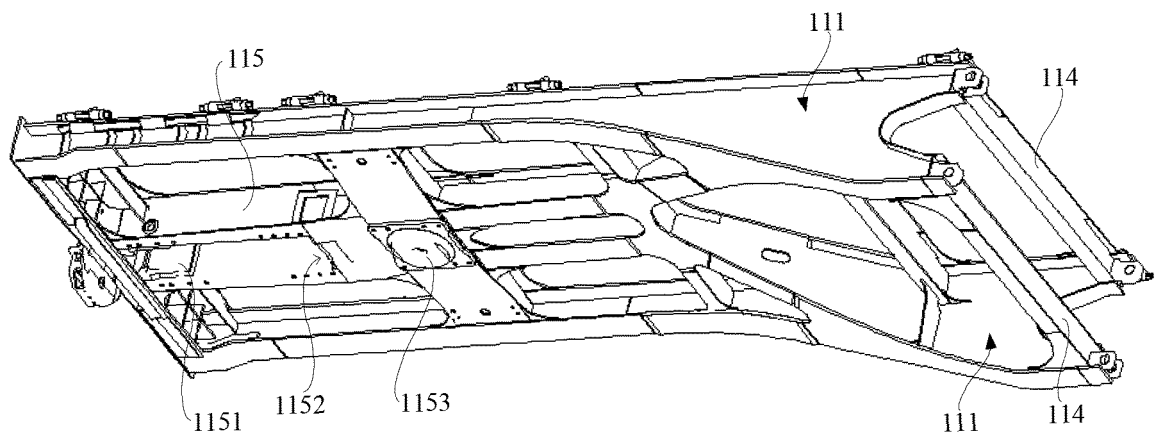


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2018/113165

A. CLASSIFICATION OF SUBJECT MATTER B61F 1/00(2006.01)i; B61D 3/20(2006.01)i According to International Patent Classification (IPC) or to both national classification and IPC																					
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) B61F1/-; B61D3/- Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																					
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) CNPAT, CNKI, WPI, EPODOC; 底架; 模块, 组合, 长度, 尺寸; 集装箱; 轴, 销; 楔, 斜面, 锥; 涨紧, 胀紧, 锁紧; 孔; underframe?, undercarriage?, module?, modular+, multifunction; size?, length?, combin+; container?, shaft?, axle?, pin?, hole?, aperture?, wedge+, slop, slant+, inclin+, bevel, conic+, taper+, cone?; lock+, swell+, bulg+, expand+, expansion.																					
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>CN 102602413 A (CSR ERQI CO., LTD.) 25 July 2012 (2012-07-25) description, paragraphs [0003] and [0020]-[0024], and figures 1-7</td> <td>1, 2, 16-20</td> </tr> <tr> <td>A</td> <td>CN 201372992 Y (KONKA GROUP CO., LTD.) 30 December 2009 (2009-12-30) entire document</td> <td>1-20</td> </tr> <tr> <td>A</td> <td>CN 102079313 A (CSR ERQI CO., LTD.) 01 June 2011 (2011-06-01) entire document</td> <td>1-20</td> </tr> <tr> <td>A</td> <td>CN 202251494 U (SHANGHAI GLOBE SCREW TECHNOLOGY CO., LTD.) 30 May 2012 (2012-05-30) entire document</td> <td>1-20</td> </tr> <tr> <td>A</td> <td>CN 201745581 U (JINAN RAILWAY VEHICLES EQUIPMENT CO., LTD.) 16 February 2011 (2011-02-16) entire document</td> <td>1-20</td> </tr> <tr> <td>A</td> <td>CN 205632506 U (CRRC MEISHAN CO., LTD.) 12 October 2016 (2016-10-12) entire document</td> <td>1-20</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	CN 102602413 A (CSR ERQI CO., LTD.) 25 July 2012 (2012-07-25) description, paragraphs [0003] and [0020]-[0024], and figures 1-7	1, 2, 16-20	A	CN 201372992 Y (KONKA GROUP CO., LTD.) 30 December 2009 (2009-12-30) entire document	1-20	A	CN 102079313 A (CSR ERQI CO., LTD.) 01 June 2011 (2011-06-01) entire document	1-20	A	CN 202251494 U (SHANGHAI GLOBE SCREW TECHNOLOGY CO., LTD.) 30 May 2012 (2012-05-30) entire document	1-20	A	CN 201745581 U (JINAN RAILWAY VEHICLES EQUIPMENT CO., LTD.) 16 February 2011 (2011-02-16) entire document	1-20	A	CN 205632506 U (CRRC MEISHAN CO., LTD.) 12 October 2016 (2016-10-12) entire document	1-20
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Date of the actual completion of the international search 10 July 2019	Date of mailing of the international search report 26 July 2019																				
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2018/113165

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 104149799 A (CSR MEISHAN ROLLING STOCK CO., LTD.) 19 November 2014 (2014-11-19) entire document	1-20
A	US 4905608 A (TRAILER TRAIN CO.) 06 March 1990 (1990-03-06) entire document	1-20

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2018/113165

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 102602413 A	25 July 2012	CN 102602413 B	16 April 2014
CN 201372992 Y	30 December 2009	None	
CN 102079313 A	01 June 2011	CN 102079313 B	20 June 2012
CN 202251494 U	30 May 2012	None	
CN 201745581 U	16 February 2011	None	
CN 205632506 U	12 October 2016	None	
CN 104149799 A	19 November 2014	CN 104149799 B	05 October 2016
US 4905608 A	06 March 1990	None	

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