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(54) **FRAME AND FREIGHT TRAIN**

(57) Disclosed are a vehicle frame and a freight train. The vehicle frame includes a first longitudinal beam (10), a second longitudinal beam (20), a first traction beam (30), and a second traction beam (40), wherein an extension direction of the first longitudinal beam (10) and an extension direction of the second longitudinal beam (20) are both parallel to a running direction of the train, and the first longitudinal beam (10) and the second longitudinal beam (20) are arranged at an interval in a direction parallel to a horizontal plane; and a front end of the first longitudinal beam (10) and a front end of the second longitudinal beam (20) are connected by the first traction beam (30), and a rear end of the first longitudinal beam (10) and a rear end of the second longitudinal beam (20) are connected by the second traction beam (40). By

the above arrangement, when the train runs, a bogie drives the first traction beam (30) and the second traction beam (40) to move in an extension direction of a rail, and the first longitudinal beam (10) and the second longitudinal beam (20) run along with the train. Due to the fact that the extension direction of the first longitudinal beam (10) and the extension direction of the second longitudinal beam (20) are both parallel to the running direction of the train, compared with a way where side beams are arranged on a center beam and the extension direction of the side beams is perpendicular to the running direction of the train, resistance between the first longitudinal beam (10) and air and resistance between the second longitudinal beam (20) and the air are small, and air resistance during running of the train is reduced.

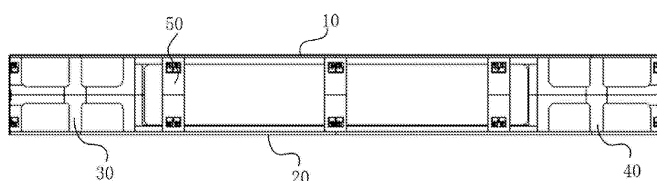


Fig. 1

Description

Cross-Reference to Related Application

[0001] The present disclosure claims the priority of Chinese Patent Application No. 201910801353.4, to the Chinese Patent Office on August 28, 2019 and entitled "Vehicle Frame and Freight Train", the entire contents of which are incorporated herein by reference.

Technical Field

[0002] The present disclosure relates to a rail train technology, and particularly relates to a vehicle frame and a freight train.

Background

[0003] As the railway network develops gradually, railway transportation has become one of the main transportation ways. Specifically, a freight train includes a vehicle frame, goods are placed in a container, and then the container is placed on the vehicle frame, so as to transport the goods through the freight train.

[0004] In the prior art, the vehicle frame usually includes a center beam and a plurality of side beams, the center beam is arranged in the direction parallel to the running direction of the train, and couplers used for connecting adjacent vehicle frames are arranged at the front end and the rear end of the center beam; the plurality of side beams are arranged at intervals along the running direction of the train and arranged on the two sides, perpendicular to the running direction of the train, of the center beam; and the container is fixed on the center sill and the side beams, and in the transportation process, the container is fixed to the side beams, so as to prevent the container from being separated from the vehicle frame in the transportation process.

[0005] However, when the freight train runs, as the extension direction of each of the side beams is perpendicular to the running direction of the train, the resistance between the side beams and the air is large.

Summary

[0006] A first aspect of the present invention is to provide a vehicle frame, including: a first longitudinal beam, a second longitudinal beam, a first traction beam, and a second traction beam, wherein an extension direction of the first longitudinal beam and an extension direction of the second longitudinal beam are both parallel to a running direction of a train, and the first longitudinal beam and the second longitudinal beam are arranged at an interval in a direction parallel to a horizontal plane; and a front end of the first longitudinal beam and a front end of the second longitudinal beam are connected by the first traction beam, and a rear end of the first longitudinal beam and a rear end of the second longitudinal beam

are connected by the second traction beam.

[0007] The other aspect of the present invention is to provide a freight train, including the above vehicle frame.

[0008] The first aspect of the present invention has the technical effects that when the train runs, a bogie drives the first traction beam and the second traction beam to move in an extension direction of a rail, and the first longitudinal beam and the second longitudinal beam run along with the train. Due to the fact that the extension direction of the first longitudinal beam and the extension direction of the second longitudinal beam are both parallel to the running direction of the train, compared with the situation where side beams are arranged on a center beam and the extension direction of the side beams is perpendicular to the running direction of the train, resistance between the first longitudinal beam and air and resistance between the second longitudinal beam and the air are small, and air resistance during running of the train is reduced, thereby improving the aerodynamic performance of the train.

Brief Description of the Drawings

[0009]

Fig. 1 is a schematic structural diagram of a vehicle frame provided in an embodiment of the present invention;

Fig. 2 is a perspective structural schematic diagram of the vehicle frame provided in the embodiment of the present invention;

Fig. 3 is a front view of a first longitudinal beam in Fig. 1;

Fig. 4 is a rear view of the first longitudinal beam in Fig. 1;

Fig. 5 is a cutaway diagram of an A-A direction in Fig. 3;

Fig. 6 is a schematic diagram I of cooperation between the vehicle frame and a container provided in an embodiment of the present invention;

Fig. 7 is a schematic diagram II of cooperation between the vehicle frame and the container provided in an embodiment of the present invention;

Fig. 8 is a schematic diagram III of cooperation between the vehicle frame and the container provided in an embodiment of the present invention;

Fig. 9 is a schematic diagram IV of cooperation between the vehicle frame and the container provided in an embodiment of the present invention.

Brief description of the reference numbers:

[0010]

10: First longitudinal beam;
 101: Upper side beam;
 1011: First flange slab;
 1012: Second flange slab;
 1013: Web;
 102: Lower side beam;
 1021: First support plate;
 1022: Second support plate;
 103: Outer covering plate;
 1031: Upper covering plate;
 1032: Lower covering plate;
 104: Support member;
 20: Second longitudinal beam;
 30: First traction beam;
 40: Second traction beam;
 50: Cross beam.

Detailed Description of the Embodiments

[0011] For making the objectives, technical solutions and advantages of embodiments of the present invention more obvious, the technical solutions of the present invention will be clearly and completely described below in conjunction with the accompanying drawings in the embodiments of the present invention, and obviously, the described embodiments are some, rather than all of the embodiments of the present invention. Based on the embodiments of the present invention, all other embodiments acquired by those of ordinary skill in the art without making creative efforts fall within the scope of protection of the present invention. The following embodiments and the features of the embodiments may be combined with each other without conflict.

[0012] Fig. 1 is a schematic structural diagram of a vehicle frame provided in an embodiment of the present invention; Fig. 2 is a perspective structural schematic diagram of the vehicle frame provided in the embodiment of the present invention; Fig. 3 is a front view of a first longitudinal beam in Fig. 1; Fig. 4 is a rear view of the

first longitudinal beam in Fig. 1; Fig. 5 is a cutaway diagram of an A-A direction in Fig. 3; Fig. 6 is a schematic diagram I of cooperation between the vehicle frame and a container provided in an embodiment of the present invention; Fig. 7 is a schematic diagram II of cooperation between the vehicle frame and the container provided in an embodiment of the present invention; Fig. 8 is a schematic diagram III of cooperation between the vehicle frame and the container provided in an embodiment of the present invention; and Fig. 9 is a schematic diagram IV of cooperation between the vehicle frame and the container provided in an embodiment of the present invention.

[0013] With reference to Figs. 1-2, the vehicle frame provided in the embodiment includes: a first longitudinal beam 10, a second longitudinal beam 20, a first traction beam 30, and a second traction beam 40, wherein an extension direction of the first longitudinal beam 10 and an extension direction of the second longitudinal beam 20 are both parallel to a running direction of the train, and the first longitudinal beam 10 and the second longitudinal beam 20 are arranged at an interval in a direction parallel to a horizontal plane; and a front end of the first longitudinal beam 10 and a front end of the second longitudinal beam 20 are connected by the first traction beam 30, and a rear end of the first longitudinal beam 10 and a rear end of the second longitudinal beam 20 are connected by the second traction beam 40.

[0014] Specifically, the running direction of the train is the moving direction of the vehicle frame, and as the train runs along the rail, the running direction of the train is the extension direction of the rail on which the train runs.

[0015] Specifically, bogies are arranged at a front end and a rear end of the vehicle frame, the bogies are traveling components of the train and generally include wheel sets and frameworks erected on the wheel sets, the framework of the bogie at the front end is connected to the first traction beam 30, and the vehicle framework of the bogie at the rear end is connected to the second traction beam 40. Some bogies are further provided with a driving system, the driving system generally consists of an electric motor and a gear box, the electric motor is in transmission connection with the gear box, and an output shaft of the gear box is in transmission connection with the wheel set; and when the freight train runs, the electric motor drives the wheel set to rotate via the gear box, so as to drive the whole vehicle frame to run.

[0016] It should be understood that couplers are arranged at a front end of the first traction beam 30 and a rear end of the second traction beam 40, the couplers are used for connecting adjacent vehicle frames, that is, a rear end of one vehicle frame is connected to a front end of the next vehicle frame via the coupler, and therefore traction force is transmitted to all vehicle frames via the couplers between the adjacent vehicle frames, so as to drive all vehicle frames to move, thereby achieving transportation of the goods.

[0017] In this embodiment, the extension direction of

the first longitudinal beam 10 is parallel to the running direction of the train, and the first longitudinal beam 10 extends for a length that accommodates an 80-foot container. An interval between the first longitudinal beam 10 and the second longitudinal beam 20 in the direction parallel to the horizontal plane is a width of the container, such that the container is borne by the first longitudinal beam 10 and the second longitudinal beam 20, and the first longitudinal beam 10 and the second longitudinal beam 20 provide support force for the container.

[0018] It is worthy of explanation that the first longitudinal beam 10 is a bearing component of the train and is used for bearing the container, the first longitudinal beam 10 is generally a steel beam, and this embodiment does not limit a material of the first longitudinal beam 10; and optionally, this embodiment also does not limit a width of the first longitudinal beam 10, for example, the first longitudinal beam 10 has the width of 10 mm, and the first longitudinal beam 10 has the width as small as possible to reduce manufacturing costs under the condition that the first longitudinal beam 10 has enough strength to be capable of bearing the container.

[0019] In this embodiment, the first traction beam 30 includes a traction beam body on which the container is placed and a coupler mounting base; and the coupler mounting base is arranged at a front end of the traction beam and used for connecting the coupler. A locking device used for fixing the container is arranged on a connection face of the traction beam body and the container, and prevents the container from being separated from the first traction beam 30 in the transportation process of the train.

[0020] Illustratively, as shown in Fig. 2, the traction beam body includes a main beam and two support beams, wherein the main beam is arranged in a direction perpendicular to the running direction of the train, and two ends of the main beam are connected with the first longitudinal beam 10 and the second longitudinal beam 20 separately; and the support beams are T-shaped beams, bottom ends of the T-shaped beams are connected with the main beam, compared with a plate-shaped traction beam body, through holes are formed between the two T-shaped beams and the main beam, the dead weight of the first traction beam 30 is reduced, and therefore vertical bearing capacity of the vehicle frame is improved. For enhancing the bearing performance of the first traction beam 30, reinforcing ribs are further arranged on lower portions of the main beam and the support beams, and the reinforcing ribs are connected to the main beam and the support beams in a welding or bolting mode; or protrusion portions are arranged on the lower portions of the main beam and the support beams and are arc-shaped, such that the middle portions of the main beam and the support beams have larger thickness than that of end portions, and the strength of the first traction beam 30 is improved, thereby increasing the bearing capacity of the first traction beam 30.

[0021] In this embodiment, the first traction beam 30

is connected with a front end of the first longitudinal beam 10 and a front end of the second longitudinal beam 20, and this embodiment does not limit a connection mode between the first traction beam 30 and the second longitudinal beam 20 and between the first traction beam 30 and the first longitudinal beam 10 as long as it is guaranteed that the first longitudinal beam 10 and the second longitudinal beam 20 may not be separated from the first traction beam 30 during running of the train. For example, the first traction beam 30 may be fixedly connected with the first longitudinal beam 10 and the second longitudinal beam 20 in a welding manner, or the first traction beam 30 is detachably connected with the first longitudinal beam 10 and the second longitudinal beam 20 in a clamping or bolting manner.

[0022] The first traction beam 30 is a bearing component of the train and is used for bearing the container, the first traction beam 30 is generally made of an aluminum alloy plate or a steel plate, and this embodiment does not limit the material of the first traction beam 30. The structure, function, and material of the second traction beam 40 are similar to those of the first traction beam 30 and are not described in detail herein. It is worthy of explanation that the first traction beam 30 is arranged at the front end of the first longitudinal beam 10 and the front end of the second longitudinal beam 20, and the second traction beam 40 is arranged at a rear end of the first longitudinal beam 10 and a rear end of the second longitudinal beam 20; and meanwhile, the second traction beam 40 is connected with the first longitudinal beam 10 and the second longitudinal beam 20 in a manner similar to that of the first traction beam 30, which will not be described in detail herein.

[0023] In addition, the structure, function, and material of the second longitudinal beam 20 are similar to those of the first longitudinal beam 10 and are not described in detail in this embodiment. It is worthy of explanation that the second longitudinal beam 20 and the first longitudinal beam 10 are arranged at intervals in a direction parallel to the horizontal plane; and meanwhile, the second longitudinal beam 20 is connected with the first traction beam 30 and the second traction beam 40 in a manner similar to that of the first longitudinal beam 10, which will not be described in detail herein.

[0024] A mounting process of the vehicle frame provided by this embodiment includes: connecting the front end of the first longitudinal beam 10 to the first traction beam 30, and meanwhile connecting the rear end of the first longitudinal beam 10 to the second traction beam 40; then connecting the front end of the second longitudinal beam 20 to the first traction beam 30, and meanwhile connecting the rear end of the second longitudinal beam 20 to the second traction beam 40; and then mounting the bogies on the first traction beam 30 and the second traction beam 40. During running of the train, air flows along surfaces of the first longitudinal beam 10 and the second longitudinal beam 20, and the resistance is small, and since the resistance is reduced during running of the

train, the vehicle frame may run at a high speed. Illustratively, the vehicle frame provided in this embodiment is adapted to high speed running of 160 km/h while carries an 80-foot railway container.

[0025] The vehicle frame provided in the embodiment includes a first longitudinal beam 10, a second longitudinal beam 20, a first traction beam 30, and a second traction beam 40, wherein an extension direction of the first longitudinal beam 10 and an extension direction of the second longitudinal beam 20 are both parallel to a running direction of the train, and the first longitudinal beam 10 and the second longitudinal beam 20 are arranged at an interval in a direction parallel to a horizontal plane; and a front end of the first longitudinal beam 10 and a front end of the second longitudinal beam 20 are connected by the first traction beam 30, and a rear end of the first longitudinal beam 10 and a rear end of the second longitudinal beam 20 are connected by the second traction beam 40. By the above arrangement, a bogie is connected with the first traction beam 30 and the second traction beam 40, so as to drive the first traction beam 30 and the second traction beam 40 to move in an extension direction of a rail, and the first longitudinal beam 10 and the second longitudinal beam 20 which are connected with the first traction beam 30 and the second traction beam 40 run along with the train. Due to the fact that the extension direction of the first longitudinal beam 10 and the extension direction of the second longitudinal beam 20 are both parallel to the running direction of the train, compared with the situation where side beams are arranged on a center beam and the extension direction of the side beams is perpendicular to the running direction of the train, resistance between the first longitudinal beam 10 and air and resistance between the second longitudinal beam 20 and the air are small, and air resistance during running of the train is reduced, thereby improving the aerodynamic performance of the train.

[0026] Meanwhile, the container is mounted on the vehicle frame and borne by the first longitudinal beam 10 and the second longitudinal beam 20 on two sides of the container, and compared with the condition that the weight of the container is concentrated on the center beam in the prior art, the container is not prone to torsion. In addition, the vehicle frame includes the first longitudinal beam 10, the second longitudinal beam 20, the first traction beam 30 and the second traction beam 40, the above components are assembled to form the vehicle frame, and compared with an integral vehicle frame, the vehicle frame provided in the embodiment is simple in machining process and the components may be independently replaced, which saves the maintenance cost.

[0027] With reference to Figs. 3-5, in this embodiment, the first longitudinal beam 10 includes an upper side beam 101, a lower side beam 102 and an outer covering plate 103, an extension direction of the upper side beam 101 and an extension direction of the lower side beam 102 are both parallel to the running direction of the train, the upper side beam 101 and the lower side beam 102

are arranged at intervals in a direction perpendicular to the horizontal plane, and the outer covering plate 103 covers sides, away from the second longitudinal beam 20, of the upper side beam 101 and the lower side beam 102.

[0028] The outer side of the upper side beam 101 and the outer side of the lower side beam 102 are covered with the outer covering plate 103, such that no structure of the vehicle frame is exposed outside the vehicle frame, no structure is perpendicular to the running direction of the train in the running process of the train, resistance between the vehicle frame and air is small, and the train may adapt to 160 km/h high-speed running.

[0029] Specifically, the upper side beam 101 is made of channel steel, a manufacturing process is simple, and the weight is small, accordingly, the dead weight of the first longitudinal beam 10 is reduced, and load of the vehicle frame is large. With continued reference to Fig. 5, the channel steel includes a web 1013, a first flange slab 1011, and a second flange slab 1012, extension directions of the web 1013, the first flange slab 1011, and the second flange slab 1012 being parallel to the running direction of the train. Wherein, the web 1013 is arranged perpendicular to the horizontal plane, and the first flange slab 1011 and the second flange slab 1012 are arranged parallel to the horizontal plane; and one end of the first flange slab 1011 is connected with a top end of the web 1013, one end of the second flange slab 1012 is connected with a bottom end of the web 1013, and the web 1013, the first flange slab 1011 and the second flange slab 1012 together define a groove.

[0030] The web 1013, the first flange slab 1011 and the second flange slab 1012 are integrally formed in a casting mode; and alternatively, the other ends of the first flange slab 1011 and the second flange slab 1012 are connected with the outer covering plate 103, and the other ends of the first flange slab 1011 and the second flange slab 1012 may be connected with the outer covering plate 103 in a welding manner and may also be integrally formed together with the outer covering plate 103 in a casting manner, which is not limited in this embodiment. Alternatively, the channel steel may be 10# or 12#, or may be set by the skilled people according to an actual operating condition of the first longitudinal beam 10, which is not limited in this embodiment.

[0031] Specifically, the lower side beam 102 includes a first support plate 1021 and a second support plate 1022, one end of the first support plate 1021 being perpendicularly connected with one end of the second support plate 1022. Alternatively, the other end of the first support plate 1021 and the other end of the second support plate 1022 are connected with the outer covering plate 103, and the other end of the first support plate 1021 and the other end of the second support plate 1022 may be connected with the outer covering plate 103 in a welding manner or integrally formed together with the outer covering plate 103 in a casting manner, which is not limited in this embodiment.

[0032] It is worthy of explanation that the first flange slab 1011 and the second flange slab 1012 of the first longitudinal beam 10 support the container, the lower side beam 102 does not support the container, and the first support plate 1021 and the second support plate 1022 have smaller thickness, thereby reducing the dead weight of the first longitudinal beam 10, and increasing the load of the vehicle frame.

[0033] Specifically, the outer covering plate 103 includes an upper covering plate 1031 and a lower covering plate 1032, the upper covering plate 1031 covering the upper side beam 101, and the lower covering plate 1032 covering the lower side beam 102. The upper side beam 101 is connected with the upper covering plate 1031, and the lower side beam 102 is connected with the lower covering plate 1032. The upper side beam 101 and the lower side beam 102 are covered with the outer covering plate 103, the upper side beam 101 and the lower side beam 102 are not exposed outside the vehicle frame, and accordingly, it is avoided that in the running process of the train, resistance between the train and the air is large; wherein one side, away from the upper side beam 101 and the lower side beam 102, of the outer covering plate 103 is a plane.

[0034] Alternatively, the upper covering plate 1031 is connected with the lower covering plate 1032, and the upper covering plate 1031 and the lower covering plate 1032 may be connected in a welding, screwing or riveting manner, which is not limited in this embodiment. According to the preferred implementation mode of this embodiment, the upper covering plate 1031 and the lower covering plate 1032 are integrally formed in a casting manner, compared with a welding manner, welding seam fatigue cracks caused by welding are effectively avoided, meanwhile, the welding amount is reduced, and welding deformation is reduced.

[0035] Alternatively, for reducing the weight of the first longitudinal beam 10 and increasing the load of the vehicle frame, the upper covering plate 1031 and the lower covering plate 1032 may be made of aluminum alloy plates, steel plates, or lightweight materials.

[0036] In this embodiment, the first longitudinal beam 10 further includes a support member 104, the support member 104 being arranged between the upper side beam 101 and the lower side beam 102 and being connected with the upper side beam 101 and the lower side beam 102.

[0037] By arranging the support member 104 between the upper side beam 101 and the lower side beam 102, the connection strength between the upper side beam 101 and the lower side beam 102 is enhanced, thereby improving the strength of the first longitudinal beam 10. Specifically, this embodiment does not limit the support member 104 as long as the upper side beam 101 and the lower side beam 102 are connected to enhance the connection strength between the upper side beam 101 and the lower side beam 102. For example, the support member 104 may be of cylindrical shaped, a bottom end

of the support member 104 is connected with a top end of the lower side beam 102, the top end of the lower side beam 102 provides support force for the support member 104, a top end of the support member 104 is connected with a bottom end of the upper side beam 101, and the support member 104 provides support force for the bottom end of the upper side beam 101. Alternatively, the support member 104 may also be of prismatic shaped, or be of irregular shaped. Further, the top end of the support member 104 is provided with a groove, and the bottom end of the upper side beam 101 is accommodated in the groove, a bottom face of the groove providing support force for a side wall and the bottom end of the upper side beam 101, thereby improving the support strength of the upper side beam 101. In addition, the support member 104 may be arranged vertically between the upper side beam 101 and the lower side beam 102, may be inclined to form an included angle with the horizontal plane, or may use the both ways in combination.

[0038] The support member 104 may be solid or hollow. The preferred implementation mode of this embodiment is a hollow support member 104, the hollow support member 104 is lighter than a solid one, which reduces the dead weight of the first longitudinal beam 10 and increases the load of the vehicle frame. Preferably, plurality of support members 104 are provided, the plurality of support members 104 are arranged between the upper side beam 101 and the lower side beam 102 at intervals to further enhance the connection strength between the upper side beam 101 and the lower side beam 102, thereby improving the strength of the first longitudinal beam 10.

[0039] With continued reference to Figs. 1-2, based on the embodiment described above, the vehicle frame further includes a cross beam 50, wherein the cross beam 50 is arranged between the first traction beam 30 and the second traction beam 40, and two ends of the cross beam 50 are connected with the first longitudinal beam 10 and the second longitudinal beam 20 separately. Therefore, the cross beam 50 may further improve the connection strength between the first longitudinal beam 10 and the second longitudinal beam 20, thereby improving the bearing capacity of the vehicle frame.

[0040] Specifically, the cross beam 50 is connected with the upper side beam 101 to increase the strength of the upper side beam 101; and alternatively, the cross beam 50 and the upper side beam 101 may be connected in a welding or bonding manner, or in a screwing or clamping manner, which is not limited in this embodiment.

[0041] Specifically, the cross beam 50 includes a first transverse plate, a second transverse plate and a longitudinal plate, wherein the first transverse plate and the second transverse plate are arranged in parallel at an interval, the longitudinal plate is arranged between the first transverse plate and the second transverse plate, and the longitudinal plate is perpendicular to the first transverse plate and the second transverse plate; wherein a plurality of longitudinal plates are provided, the plurality of longitudinal plates are arranged at intervals,

through holes are provided in the longitudinal plates, the weight of the cross beam 50 is reduced, the weight of the vehicle frame is reduced, and the load of the vehicle frame is increased. In addition, a locking device used for mounting the container is arranged on the cross beam 50 and, which prevents the container from being separated from the cross beam 50 in the transportation process of the train.

[0042] Preferably, a plurality of cross beams 50 are provided, the plurality of cross beams 50 are provided between the first traction beam 30 and the second traction beam 40 to further enhance the connection strength between the first longitudinal beam 10 and the second longitudinal beam 20 so as to improve the load of the vehicle frame, and at the same time, by increasing the number of cross beams 50, a plurality of containers may be fixedly mounted via the locking device on each cross beam 50. The plurality of cross beams 50 may be arranged between the first traction beam 30 and the second traction beam 40 at intervals, may also be arranged at the rear end of the first traction beam 30 and the front end of the second traction beam 40, or may be freely set by the skilled person according to the size and number of containers actually borne by the vehicle frame.

[0043] For example, referring to Fig. 6, the vehicle frame may bear two containers, the two containers may be 20 feet or 40 feet, and the sum of the lengths of the two containers is not larger than the extension length of the first longitudinal beam 10. One cross beam 50 is arranged on the vehicle frame, the front container is borne by the cross beam 50 and the first traction beam 30, and the rear container is borne by the cross beam 50 and the second traction beam 40.

[0044] As a second example, referring to Fig. 7, the vehicle frame may also bear four containers, the four containers may be 20 feet, and the sum of the lengths of the four containers is not larger than the extension length of the first longitudinal beam 10. Three cross beams 50 are arranged on the vehicle frame, the front container is borne by a cross beam 50 and the first traction beam 30, the rear container is borne by a cross beam 50 and the second traction beam 40, and the two containers in the middle are borne by two cross beams 50 separately.

[0045] For a third example, referring to Fig. 8, the vehicle frame may also bear only one container, the container may be 40 feet or 53 feet, as long as the length of the container is not larger than the extension length of the first longitudinal beam 10. Two cross beams 50 are arranged on the vehicle frame, the container is borne by the two cross beams 50.

[0046] For a fourth example, referring to Fig. 9, the vehicle frame may also bear three containers, the sum of the dimensions of the three containers is not larger than the extension length of the first longitudinal beam 10, two cross beams 50 are arranged on the vehicle frame, the front container is borne by a cross beam 50 and the first traction beam 30, the rear container is borne by a cross beams 50 and the second traction beam 40,

and the middle container is borne by the two cross beams 50. Based on the above content, by adjusting the number and positions of the cross beams 50 and the locking devices, the vehicle frame may be used for bearing containers of different sizes and numbers, and the vehicle frame is various in bearing form and high in flexibility.

[0047] For example, according to the orientation shown in Fig. 2, a braking system is further arranged on the vehicle frame, the braking system is arranged in a space enclosed by the first longitudinal beam 10, the second longitudinal beam 20 and two adjacent cross beams 50 and is connected with the first longitudinal beam 10 and the second longitudinal beam 20, and the braking system mainly includes an energy supply device, a control device, a transmission device and a brake, and is used for controlling the train to reduce speed and even stop running in the running process. Compared with the prior art that a vehicle frame includes a center beam arranged in a direction parallel to the running direction of the train, no longitudinal beam is arranged between two adjacent cross beams 50, an assembly space of the braking system is large, and assembling and disassembling are convenient.

[0048] The embodiment of the present invention also provides a freight train, including a vehicle frame, wherein the structure and function of the vehicle frame have been described in detail in the above embodiments and will not be described in detail herein.

[0049] The freight train provided in the embodiment of the present invention includes the vehicle frame. The vehicle frame includes a first longitudinal beam 10, a second longitudinal beam 20, a first traction beam 30, and a second traction beam 40, wherein an extension direction of the first longitudinal beam 10 and an extension direction of the second longitudinal beam 20 are both parallel to a running direction of the train, and the first longitudinal beam 10 and the second longitudinal beam 20 are arranged at an interval in a direction parallel to a horizontal plane; and a front end of the first longitudinal beam 10 and a front end of the second longitudinal beam 20 are connected by the first traction beam 30, and a rear end of the first longitudinal beam 10 and a rear end of the second longitudinal beam 20 are connected by the second traction beam 40.

[0050] By means of the above arrangement, when the freight train runs, a bogie is connected with the first traction beam 30 and the second traction beam 40, so as to drive the first traction beam 30 and the second traction beam 40 to move in an extension direction of a rail, and accordingly, the first longitudinal beam and the second longitudinal beam run along with the train. Due to the fact that the extension direction of the first longitudinal beam 10 and the extension direction of the second longitudinal beam 20 are both parallel to the running direction of the train, compared with the situation where a side beam is arranged on a center beam and the extension direction of the side beam is perpendicular to the running direction of the train, resistance between the first longitudinal

beam 10 and air and resistance between the second longitudinal beam 20 and the air are small, and air resistance during running of the train is reduced, thereby improving the aerodynamic performance of the train.

[0051] In the description of the present invention, it is to be understood that the terms "central", "longitudinal", "transverse", "length", "width", "thickness", "upper", "lower", "front", "back", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "counterclockwise", "axial", "radial", "circumferential", etc. indicate azimuthal or positional relations based on those shown in the drawings only for ease of description of the present invention and for simplicity of description, and are not intended to indicate or imply that the referenced device or element must have a particular orientation and be constructed and operative in a particular orientation, and thus may not be construed as a limitation on the present invention.

[0052] In the present invention, unless expressly specified otherwise, the terms "mount", "connect", "connected", "fix", etc. are to be construed broadly and, for example, may be fixedly connected, or detachably connected, or integrally formed, may be mechanically connected, or electrically connected, or communicable with each other, may be direct connected or indirect connected via an intermediary medium, or may be a communication between two elements or an interworking relation between two elements, unless expressly defined otherwise. The specific meanings of the above terms in the present invention may be understood on a case-by-case basis for those of ordinary skill in the art.

[0053] Finally, it should be noted that the above embodiments are merely intended to illustrate the technical solution of the present invention and not to limit the same; although the present invention has been described in detail with reference to the foregoing embodiments, it should be understood by those of ordinary skill in the art that the technical solutions described in the foregoing embodiments may be modified or equivalents may be substituted for some or all of the technical features thereof; and the modification or substitution does not make the essence of the corresponding technical solution deviate from the scope of the technical solution of each embodiment of the present invention.

Claims

1. A vehicle frame, comprising a first longitudinal beam, a second longitudinal beam, a first traction beam, and a second traction beam, wherein an extension direction of the first longitudinal beam and an extension direction of the second longitudinal beam are both parallel to a running direction of a train, and the first longitudinal beam and the second longitudinal beam are arranged at an interval in a direction parallel to a horizontal plane; and a front end of the first longitudinal beam and a front end of the second longitudinal

beam are connected by the first traction beam, and a rear end of the first longitudinal beam and a rear end of the second longitudinal beam are connected by the second traction beam.

2. The vehicle frame as claimed in claim 1, wherein the first longitudinal beam comprises an upper side beam, a lower side beam and an outer covering plate, an extension direction of the upper side beam and an extension direction of the lower side beam being both parallel to the running direction of the train, the upper side beam and the lower side beam being arranged at an interval in a direction perpendicular to the horizontal plane, and the outer covering plate covers sides, away from the second longitudinal beam, of the upper side beam and the lower side beam.
3. The vehicle frame as claimed in claim 2, wherein the outer covering plate comprises an upper covering plate and a lower covering plate, the upper covering plate covering the upper side beam, and the lower covering plate covering the lower side beam.
4. The vehicle frame as claimed in claim 2 or 3, wherein the upper side beam is made of channel steel.
5. The vehicle frame as claimed in any one of claims 2 to 4, wherein the first longitudinal beam further comprises a support member, the support member being provided between the upper side beam and the lower side beam and connecting with the upper side beam and the lower side beam.
6. The vehicle frame as claimed in claim 5, wherein a top end of the support member is provided with a groove, and a bottom end of the upper side beam is accommodated in the groove.
7. The vehicle frame as claimed in claim 5 or 6, wherein a plurality of support members are provided, and the plurality of support members are arranged between the upper side beam and the lower side beam at intervals.
8. The vehicle frame as claimed in any one of claims 1 to 7, wherein the vehicle frame further comprises a cross beam, the cross beam being provided between the first traction beam and the second traction beam, and the cross beam being connected to the first longitudinal beam and the second longitudinal beam.
9. The vehicle frame as claimed in claim 8, wherein a plurality of cross beams are provided, and the plurality of cross beams are arranged between the first traction beam and the second traction beam at intervals.

10. A freight train, comprising the vehicle frame as claimed in any one of claims 1-9.

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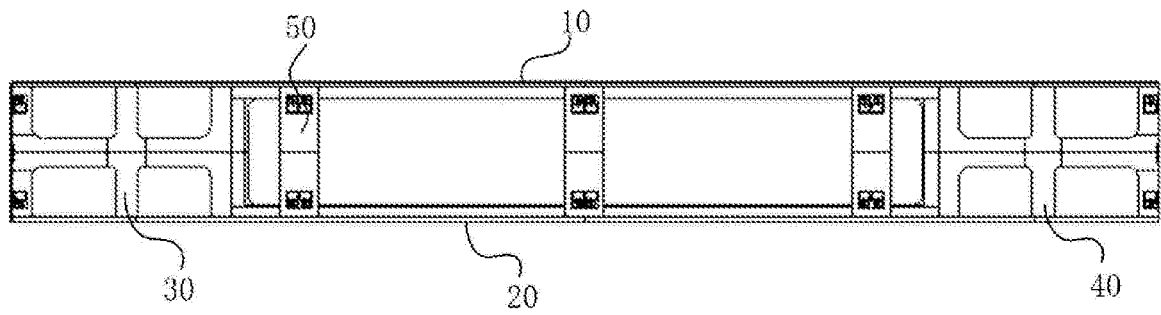


Fig. 1

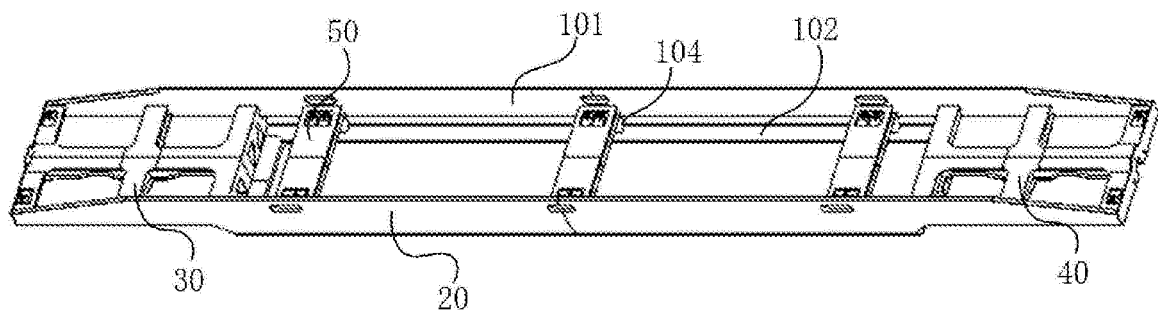


Fig. 2

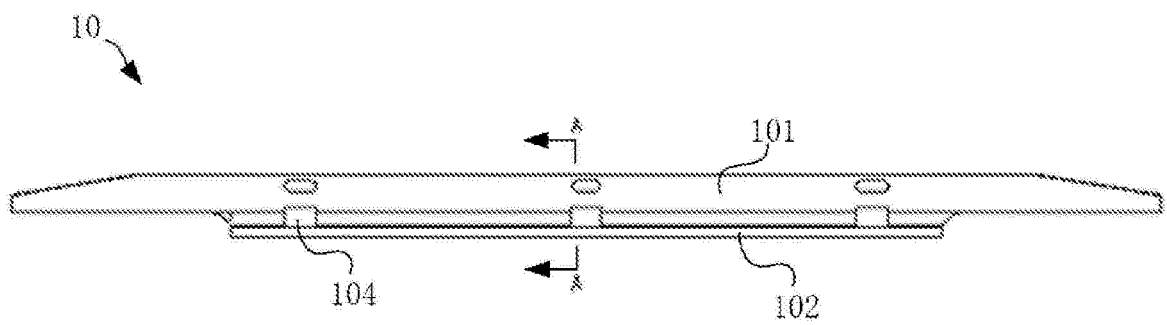


Fig. 3

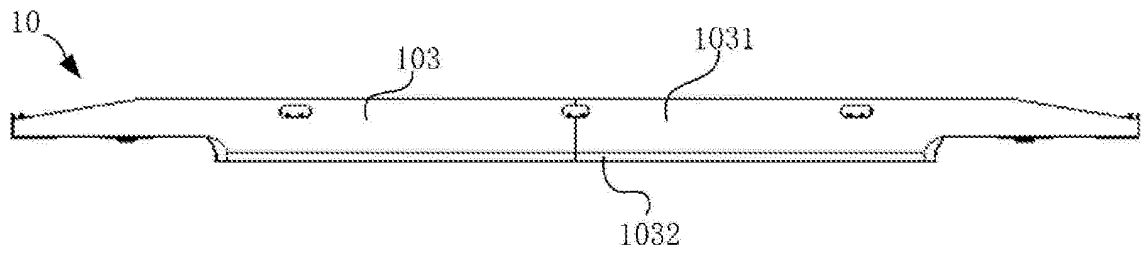


Fig. 4

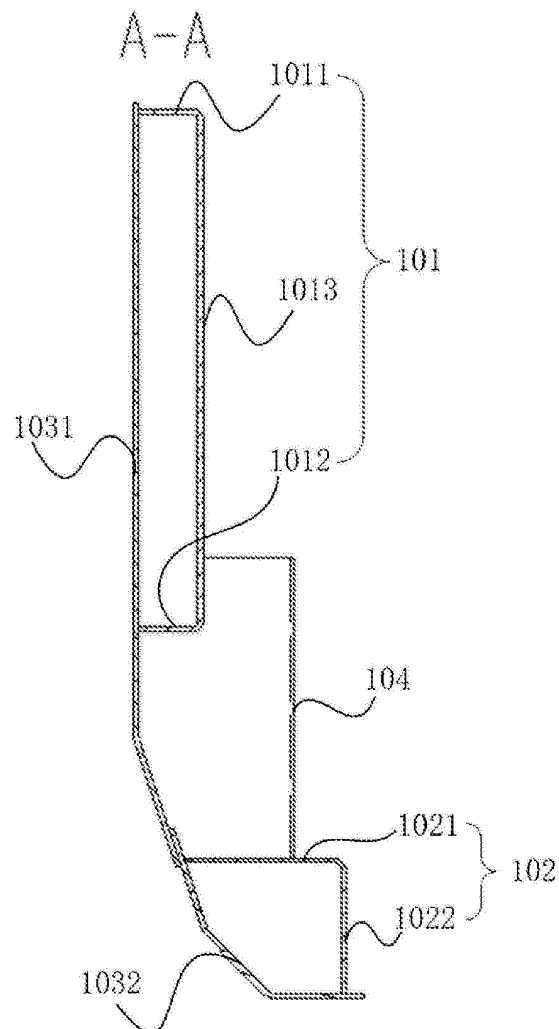


Fig. 5

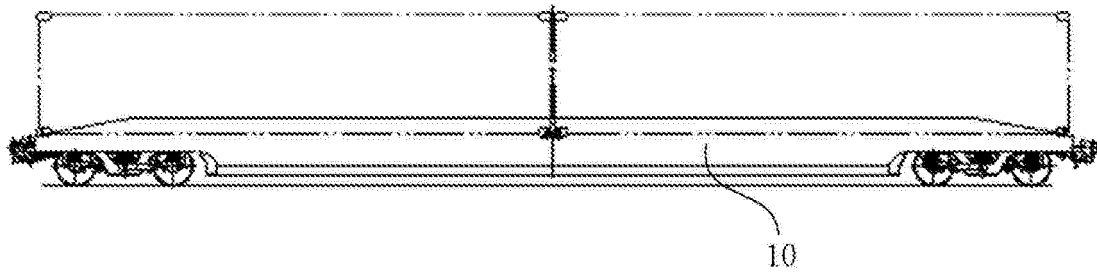


Fig. 6

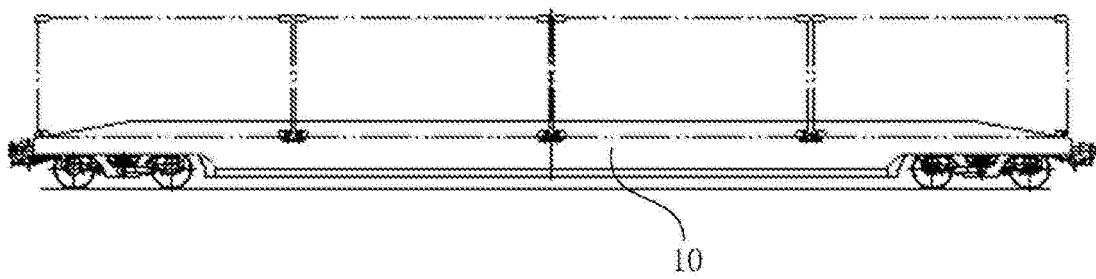


Fig. 7

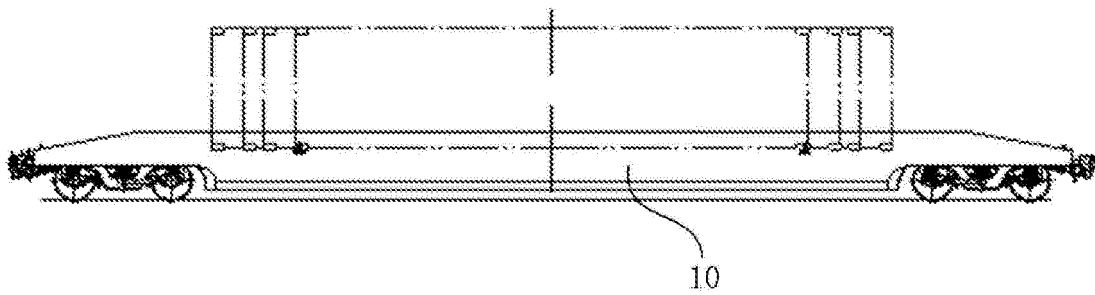


Fig. 8

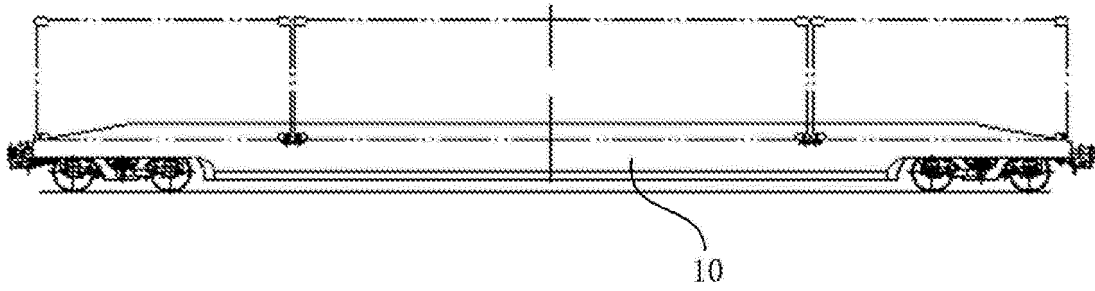


Fig. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/107643

5	A. CLASSIFICATION OF SUBJECT MATTER		
	B61F 1/08(2006.01)i		
	According to International Patent Classification (IPC) or to both national classification and IPC		
10	B. FIELDS SEARCHED		
	Minimum documentation searched (classification system followed by classification symbols)		
	B61F, B61D		
	Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
15	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
	CNPAT, WPL, EPODOC, CNKI: 中车, 齐齐哈尔, 车架, 列车, 货运, 纵梁, 边梁, 横梁, 牵引, 封板, 支撑, train+, rail+, wagon, freight, vehicle, car, frame, beam, longitudinal, transverse, intermediate, draft+, sill, clos+, plate, support+.		
	C. DOCUMENTS CONSIDERED TO BE RELEVANT		
20	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	PX	CN 110356426 A (CRRC QIQIHAR CO., LTD.) 22 October 2019 (2019-10-22) claims 1-10, description paragraphs 0046-0077, figures 1-9	1-10
	X	CN 104973084 A (CSR ZIYANG LOCOMOTIVE CO., LTD.) 14 October 2015 (2015-10-14) description paragraphs 0018-0025, figures 1-9	1, 8-10
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	X	CN 202686377 U (CSR ZIYANG LOCOMOTIVE CO., LTD.) 23 January 2013 (2013-01-23) description paragraphs 0021-0023, figures 1-4	1, 8-10
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	A	CN 202115523 U (CSR QISHUYAN CO., LTD.) 18 January 2012 (2012-01-18) entire document	1-10
35	A	US 2005066852 A1 (NATIONAL STEEL CAR LTD.) 31 March 2005 (2005-03-31) entire document	1-10
	☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
40	* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
45			
	Date of the actual completion of the international search		Date of mailing of the international search report
	15 October 2020		28 October 2020
50	Name and mailing address of the ISA/CN		Authorized officer
	China National Intellectual Property Administration (ISA/ CN) No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088 China		
55	Facsimile No. (86-10)62019451		Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2020/107643

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CN 202686377 U	23 January 2013	None	
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REFERENCES CITED IN THE DESCRIPTION

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