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(54) RAILWAY VEHICLE AND END WALL THEREOF

(57) A railway vehicle and an end wall thereof, the end wall comprising an external frame (11) and an end wall main body (12), wherein the external frame (11) is fixedly connected to a vehicle body of the railway vehicle, and the end wall main body (12) is detachably connected to the external frame (11) by means of a tightening part, and the end wall main body (12) is a honeycomb board, and the honeycomb board comprises two panels (121), a honeycomb structure (122) provided between the two panels (121) and edge sealing profiles used for sealing peripheral parts of the two panels (121). As the end wall is a separated design having the external frame (11) and the end wall main body (12), large-sized modules in the vehicle are convenient to mount and transfer; meanwhile, the structure of the main body is an aluminum honeycomb board structure so that the design requirement of the vehicle body being lightweight can be satisfied.

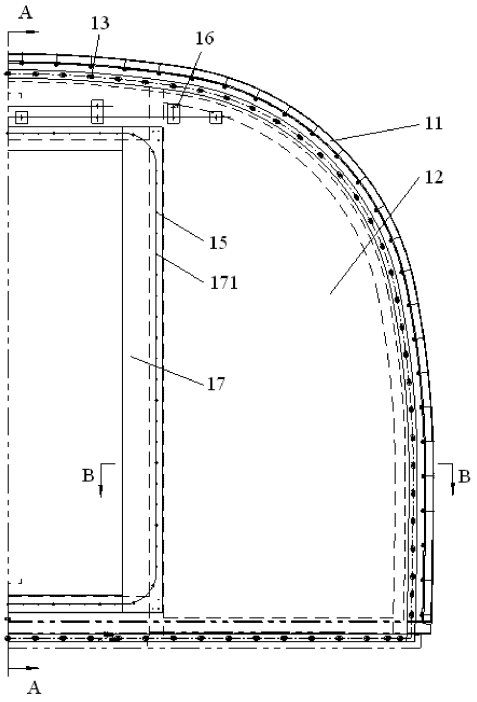

Figure 1

EP 3 805 069 A1

Description

[0001] The present application claims the priority to Chinese Patent Application No. 201810564661.5, titled "RAILWAY VEHICLE AND END WALL THEREOF", and the priority to Chinese Patent Application No. 201820859756.5, titled "RAILWAY VEHICLE AND END WALL THEREOF", filed with the China National Intellectual Property Administration on June 4, 2018, both of which are incorporated herein by reference in their entireties.

FIELD

[0002] The present application relates to the technical field of railway vehicles, and in particular to a railway vehicle and end wall thereof.

BACKGROUND

[0003] A body of a rail vehicle is generally composed of a chassis, side walls, a roof and end walls. An end wall is located at the end of the vehicle body, with a door-shaped space in the middle for passengers to pass through. The end wall also serves to connect inner and outer windshields.

[0004] At present, the end wall of the railway vehicle is generally an integrated structure. After the vehicle body is tailor-welded, it is necessary to carry out the overall transportation and installation of large modules in the vehicle such as toilets and power distribution cabinets. The end wall of the integrated structure cannot reserve a large access space for the installation and transportation of large modules in the vehicle. In addition, the weight of the end wall structure is heavy, which cannot meet the requirements of lightweight vehicle body.

[0005] In view of this, how to improve the existing end wall structure to facilitate the installation and deployment of large modules in the vehicle, and at the same time to meet the design requirements of lightweight vehicle body, is a technical problem that needs to be solved by those skilled in the art.

SUMMARY

[0006] An object of the present application is to provide a railway vehicle and end wall thereof. The end wall is a split design of an external frame and an end wall main body, which is convenient for the installation and transportation of large modules in the vehicle. At the same time, the main structure of the end wall adopts aluminum honeycomb panel structure, which can meet the requirements of lightweight vehicle body.

[0007] In order to solve the above technical problems, the present application provides an end wall of a railway vehicle, which includes the external frame and the end wall main body. The external frame is used for being fixedly connected to the vehicle body of the railway vehicle, and the end wall main body is detachably connected to the external frame through a fastening assembly. The end wall main body is a honeycomb panel. The honeycomb panel includes two panels, a honeycomb structure arranged between the two panels, and edge sealing profiles for sealing the peripheral parts of the two panels.

[0008] The end wall provided by this application is a split structure, the external frame is used for connecting to the vehicle body, and the end wall main body is detachably connected to the external frame. With this arrangement, after the tailor welding of the vehicle is completed, when large modules inside the vehicle need to be installed, such as a toilet module or an electrical cabinet module, only the end wall main body needs to be separated from the external frame by detaching the fastening assembly. After the installation is completed, the end wall main body is fixed to the external frame by the fastening assembly. This kind of structural design is convenient for disassembly and assembly, which is beneficial to the installation and transportation of large modules in the vehicle. Meanwhile, the end wall main body is a honeycomb panel, and its internal honeycomb structure can greatly reduce the weight of the end wall to meet the design requirements of lightweight vehicle body.

[0009] In the end wall as described above, the fastening assembly is specifically a bolt assembly. The bolt assembly includes a T-shaped nut and a bolt, and the T-shaped nut is fixed to the external frame. The external frame and the end wall main body both define mounting holes which is configured to align with the threaded holes of the T-shaped nut. The bolts sequentially pass through the end wall main body and the mounting holes of the external frame and are in threaded connection with the T-shaped nut.

[0010] In the end wall as described above, the T-shaped nut is fixed to the external frame by a screw.

[0011] In the end wall as described above, a washer is further provided between the bolt and the end wall main body.

[0012] In the end wall as described above, a first support beam extending along the longitudinal direction of the vehicle body is formed on one side of the external frame, and the first support beam and the external frame from an installation space of an outer windshield. The first support beam defines a mounting port for connecting to the outer windshield.

[0013] In the end wall as described above, a second support beam extending in the longitudinal direction of the vehicle

body is formed on the other side of the external frame, and the second support beam is used for connecting to the vehicle body.

[0014] In the end wall as described above, one side of the external frame close to the second support beam is further provided with an extension beam which extends inward and is perpendicular to the second support beam.

[0015] In the end wall as described above, the end wall body further defines a mounting seat port for fixing a steel wire rope of the outer windshield.

[0016] In the end wall as described above, the edge sealing profile of the end wall body is pre-embedded with a rivet nut to form a connection port for an inner windshield.

[0017] In the end wall as described above, the end wall main body further defines an external hanger connection port.

[0018] In the end wall as described above, a profile part is embedded in the end wall main body, and a steel plate is arranged in the profile part. The steel plate defines a threaded hole in threaded connection with a bolt, and the profile part defines a through hole configured to align with the threaded hole. The threaded hole forms the connection port of an external hanger.

[0019] In the end wall as described above, the surface of the steel plate is coated with zinc chromate primer.

[0020] In the end wall as described above, the honeycomb panel is specifically an aluminum honeycomb panel.

[0021] In the end wall as described above, the middle part of the end wall main body is further fixedly provided with a door frame.

[0022] In the end wall as described above, the door frame and the end wall main body are fixedly connected by a rivet.

[0023] The present application further provides a railway vehicle, including the vehicle body and the end wall located at the end of the vehicle body. The end wall is the end wall described in any one of the above. The external frame is fixedly connected to the vehicle body.

[0024] Since the above end wall has the above technical effect, the railway vehicle including the end wall also has the same technical effects, which will not be repeated here.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025]

Figure 1 is a partial front view of a specific embodiment of the end wall provided by this application;

Figure 2 is a schematic cross-sectional view taken along the line A-A in Figure 1;

Figure 3 is a partial enlarged view of part I in Figure 2;

Figure 4 is a schematic cross-sectional view taken along the line B-B in Figure 1;

Figure 5 is a schematic diagram of the connection structure between the external frame of the end wall and the end wall main body in Figure 1;

Figure 6 is a schematic diagram of the structure of the connection port of the external hanger on the end wall in Figure 1.

[0026] One-to-one correspondence between component names and reference numerals in Figures 1 to 6 is as follows:

11 external frame	111 first support beam
112 second support beam	113 extension beam
12 end wall main body	121 panel
122 honeycomb structure	123 edge sealing profile
13 bolt assembly	131T-shaped nut
132 bolt	133 screw
134 washer	14 mounting seat port
15 rivet nut	
16 external hanger connection port	
161 profile part	162 steel plate
163 hanging bolt	164 hanger
17 door frame	171 rivet
18 outer windshield	19 inner windshield

(continued)

20 vehicle roof 21 side wall

DETAILED DESCRIPTION

[0027] In order to provide those skilled in the art with a better understanding of the solutions of the present application, the present application is described hereinafter in further detail in conjunction with the drawings and embodiments.

[0028] For convenience of understanding and concise description, the following description will be combined with the railway vehicle and its end wall, and the beneficial effects will not be repeated.

[0029] The vehicle body of railway vehicles usually includes a chassis, side walls, a roof and end walls. T end wall are respectively located at two ends of the vehicle body. It can be understood that each of the end walls needs to be connected to the roof and side walls of the vehicle body, and the curved transition section between the roof and the side wall.

[0030] The specification focuses on the structural improvement of the end wall of railway vehicles, and the end wall structure is described in detail below.

[0031] Referring to Figures 1 to 6, Figure 1 is a partial front view of a specific embodiment of the end wall provided by this application; Figure 2 is a schematic cross-sectional view taken along the line A-A in Figure 1; Figure 3 is a partial enlarged view of part I in Figure 2; Figure 4 is a schematic cross-sectional view taken along the line B-B in Figure 1; Figure 5 is a schematic diagram of the connection structure between the external frame of the end wall and the end wall main body in Figure 1; Figure 6 is a schematic diagram of the structure of the connection port of the external hanger on the end wall in Figure 1.

[0032] In this embodiment, the end wall includes an external frame 11 and an end wall main body 12, and the external frame 11 is used for connecting to the vehicle body. It can be understood that the external frame 11 is connected to the vehicle roof 20 or the side wall 21 of the vehicle body according to different parts. The end wall main body 12 and the external frame 11 are detachably connected by a fastening assembly.

[0033] The end wall main body 12 is a honeycomb panel, which specifically includes two panels 121, a honeycomb structure 122 arranged between the two panels 121, and an edge sealing profile 123 for sealing a peripheral part of the two panels 121.

[0034] Specifically, the edge sealing profile 123 may be fixed to the panel 121 by welding, which is safe and reliable. More specifically, the edge sealing profile 123 may be fixed to the panel 121 by friction stir welding for reducing heat input and prevent deformation of the end wall main body 12.

[0035] As described above, the end wall provided by this embodiment is a split structure, the external frame 11 is used for connecting to the vehicle body, and the end wall main body 12 is detachably connected to the external frame 11. With this arrangement, after the tailor welding of the vehicle is completed, when large modules inside the vehicle need to be installed, such as a toilet module or an electrical cabinet module, only the end wall main body 12 needs to be separated from the external frame 11 by removing the fastening assembly. After the installation is completed, the end wall main body 12 is fixed to the external frame 11 by fastening assembly. This kind of structural design is convenient for disassembly and assembly, which is beneficial to the installation and transportation of large modules in the vehicle. Meanwhile, the end wall main body 12 is a honeycomb panel, and its internal honeycomb structure 122 can greatly reduce the weight of the end wall to meet the design requirements of lightweight vehicle body.

[0036] After the end wall is assembled with the vehicle body, the external frame 11 can be used as a part of the end wall, as well as a part of a roof bent beam and corner column, which can be used as a load-bearing component of the vehicle body to enhance the strength and rigidity of the vehicle body.

[0037] In a specific scheme, the honeycomb panels may be an aluminum honeycomb panel , which further improves the level of lightweight.

[0038] In a specific scheme, the fastening assembly between the external frame 11 and the end wall main body 12 is a bolt assembly 13. As shown in Figure 5, the bolt assembly 13 includes a T-shaped nut 131 and a bolt 132. The T-shaped nut 131 is fixed on the external frame 11, and both the external frame 11 and the end wall main body 12 have mounting holes that are configured to align with the threaded holes of the T-shaped nut 131. The bolts 132 pass through the mounting holes of the end wall main body 12 and the mounting holes of the external frame 11 for having threaded connection to the T-shaped nut 131, thereby fixing the end wall main body 12 and the external frame 11 together.

[0039] It can be understood that the T-shaped nut 131 is fixed to the external frame 11 in advance. When the end wall main body 12 is disassembled, the T-shaped nut 131 does not need to be disassembled, but only the bolt 132 needs to be disassembled. During installation, only the bolt 312 needs to be screwed in corresponding positions. This detachable connection mode is simple in structure and easy to operate.

[0040] The T-shaped nut 131 may be fixed to the external frame 11 by a screw 133.

[0041] More specifically, a washer 134 may be provided between a head of the bolt 132 and the end wall main body

12, so as to improve the fastening force of the bolt 132 and prevent the bolt 132 from loosening.

[0042] In a specific scheme, a first support beam 111 extending in the longitudinal direction of the vehicle body is formed on one side of the external frame 11, and the first support beam 111 and the external frame 11 form an installation space for the outer windshield 18. As shown in Figure 2 to Figure 4, the first support beam 111 has a mounting port, and the outer windshield 18 can overlap with the first support beam 111, and the outer windshield 18 is connected to the first support beam 111 by a fastener (such as a bolt, etc.).

[0043] More specifically, a mounting seat port 14 is also provided on the end wall main body 12 for fixing the steel wire rope of the outer windshield 18.

[0044] On this basis, a second support beam 112 extending along the longitudinal direction of the vehicle body is formed on the other side of the external frame 11, and the second support beam 112 is used for connecting to the vehicle body.

[0045] As shown in Figure 2 and Figure 3, at the top position of the external frame 11, the second support beam 112 of the external frame 11 is used for connecting to the vehicle roof 20 of the vehicle body. The second support beam 112 and the external frame 11 form a right-angle structure which overlaps the vehicle roof 20. After the vehicle roof 20 overlaps the second support beam 112, they can be fixed by a rivet, and an outer side of the vehicle roof 20 and the external frame 11 can be fixed by, for example, welding.

[0046] It can be understood that the distance between the second support beam 112 and the top end of the external frame 11 should be equal to the thickness of the vehicle roof 20.

[0047] As shown in Figure 4, at the side position of the external frame 11, the second support beam 112 of the external frame 11 is used for connecting the side walls 21 of the vehicle body, and a right-angle structure is formed between the second support beam 112 and the external frame 11, which can be fixed by a rivet.

[0048] It can be understood that the distance between the second support beam 112 and the top of the external frame 11 should be equal to the thickness of the side wall 21.

[0049] Further, one side of the external frame 11 close to the second support beam 112 is also provided with an extension beam 113 extending inward and perpendicular to the second support beam 112 as shown in Figure 3 and Figure 4. In practice, due to different vehicle types or production reasons, the distance between the second support beam 112 and the top of the external frame 11 may not be necessarily equal to the thickness of the connected vehicle body parts. At this time, the second support beam 112 formed in advance may be milled off, and the extension beam 113 may be bent at an appropriate position to form a structure connected to the vehicle body. It can be understood that at this time, the bent extension beam 113 is equivalent to the aforementioned second support beam 112.

[0050] In a specific scheme, the edge sealing profile 123 of the end wall main body 12 is also embedded with a rivet nut 15 to form a connection port of the inner windshield 19, as shown in Figure 1 and Figure 2.

[0051] In a specific scheme, the end wall main body 12 also defines an external hanger connection port 16. In practice, other structural parts may be mounted on the end wall main body 12 according to actual needs. As the end wall main body 12 is a honeycomb panel structure, it is not suitable to be directly used as a bearing member. Therefore, the end wall main body 12 defines an external hanger connection port 16 to meet the requirement of installing external hangers (such as an external door, etc.).

[0052] As shown in Figure 6, specifically, a profile part 161 is embedded in the end wall main body 12, and a steel plate 162 is provided in the profile part 161, and the steel plate 162 has a threaded hole having threaded connection with a hanging bolt 163. The profile part 161 has a through hole aligning with the threaded hole. The threaded hole forms an external hanger connection port 16.

[0053] It can be understood that the external hanger 164 may be fixed with the steel plate 162 buried in the end wall main body 12 by the hanging bolt 163.

[0054] The profile part 161 and the end wall main body 12 may be fixed with each other by welding, and specifically, friction stir welding may be used for reducing the heat input.

[0055] The profile part 161 may be an aluminum profile.

[0056] More specifically, the surface of the steel plate 162 is coated with zinc chromate primer to prevent corrosion between different metals of the profile part 161 and the steel plate 162.

[0057] The middle part of the end wall main body 12 is further provided with a door structure for people to pass through, and a door frame 17 is fixedly arranged at the middle part of the end wall main body 12 for installing doors. Specifically, the door frame 17 may be fixedly connected with the end wall main body 12 by a rivet 171.

[0058] The railway vehicle and end wall thereof according to the present application is described in detail hereinbefore. The principle and embodiments of the present application are described through specific examples herein. The description of the above embodiments is merely used to facilitate understanding the method and core idea of the present application. It should be noted that several improvements and modifications can be made to the present application by those skilled in the art without departing from the principles of the present application. These improvements and modifications should also fall within the scope of the claims of the present application.

Claims

1. An end wall of railway vehicle, comprising an external frame (11) and an end wall main body (12), wherein the external frame (11) is configured to be fixedly connected to the vehicle body of the railway vehicle, and the end wall main body (12) is detachably connected to the external frame through a fastening assembly;
the end wall main body (12) is a honeycomb panel, and the honeycomb panel comprises two panels (121), a honeycomb structure (122) arranged between the two panels (121), and a edge sealing profile (123) for sealing peripheral parts of the two panels (121).

2. The end wall according to claim 1, wherein, the fastening assembly is a bolt assembly (13);
the bolt assembly (13) comprises a T-shaped nut (131) and a bolt (132), the T-shaped nut (131) is fixed on the external frame (11), and
both the external frame (11) and the end wall main body (12) have mounting holes that is configured to align with the threaded holes of the T-shaped nut (131), and
the bolt (132) is configured to pass through the mounting holes of the end wall main body (12) and the mounting holes of the external frame (11) for having threaded connection with the T-shaped nut (131).

3. The end wall according to claim 2, wherein, the T-shaped nut (131) is fixed to the external frame (11) by a screw (133).

4. The end wall according to claim 2, wherein, a washer (134) is provided between the bolt (132) and the end wall main body (12).

5. The end wall according to any one of claims 1 to 4, wherein, a first support beam (111) extending in a longitudinal direction of the vehicle body is formed on one side of the external frame (11), and
the first support beam (111) and the external frame (11) form an installation space for an outer windshield (18), and the first support beam (111) has a mounting port connected to the outer windshield (18).

6. The end wall according to claim 5, wherein, a second support beam (112) extending along the longitudinal direction of the vehicle body is formed on the other side of the external frame (11), and
the second support beam (112) is configured to connect to the vehicle body.

7. The end wall according to claim 5, wherein, one side of the external frame (11) close to the second support beam (112) is also provided with an extension beam (113) extending inward and perpendicular to the second support beam (112).

8. The end wall according to claim 5, wherein, the end wall main body (12) also defines a mounting seat port (14) for fixing the steel wire rope of the outer windshield (18).

9. The end wall according to any one of claims 1 to 4, wherein, the edge sealing profile (123) of the end wall main body (12) is also embedded with a rivet nut (15) to form a connection port of the inner windshield (19).

10. The end wall according to any one of claims 1 to 4, wherein, the end wall main body (12) also defines an external hanger connection port (16).

11. The end wall according to claim 10, wherein, a profile part (161) is embedded in the end wall main body (12), and a steel plate (162) is provided in the profile part (161), and the steel plate (162) has a threaded hole for having threaded connected with a hanging bolt (163);
the profile part (161) has a through hole that is configured to align with the threaded hole; and
the threaded hole forms an external hanger connection port (16).

12. The end wall according to claim 11, wherein, a surface of the steel plate (162) is coated with zinc chromate primer.

13. The end wall according to any one of claims 1 to 4, wherein, the honeycomb panel is an aluminum honeycomb panel.

14. The end wall according to any one of claims 1 to 4, wherein, a middle part of the end wall main body (12) is further fixedly connected to a door frame (17).

15. The end wall according to claim 14, wherein, the door frame (17) and the end wall main body (12) are fixedly

connected by a rivet (171).

16. A railway vehicle, comprising a vehicle body and an end wall located at an end of the vehicle body, wherein, the end wall is the end wall described in any one of claims 1 to 15, and
the external frame (11) is fixedly connected to the vehicle body.

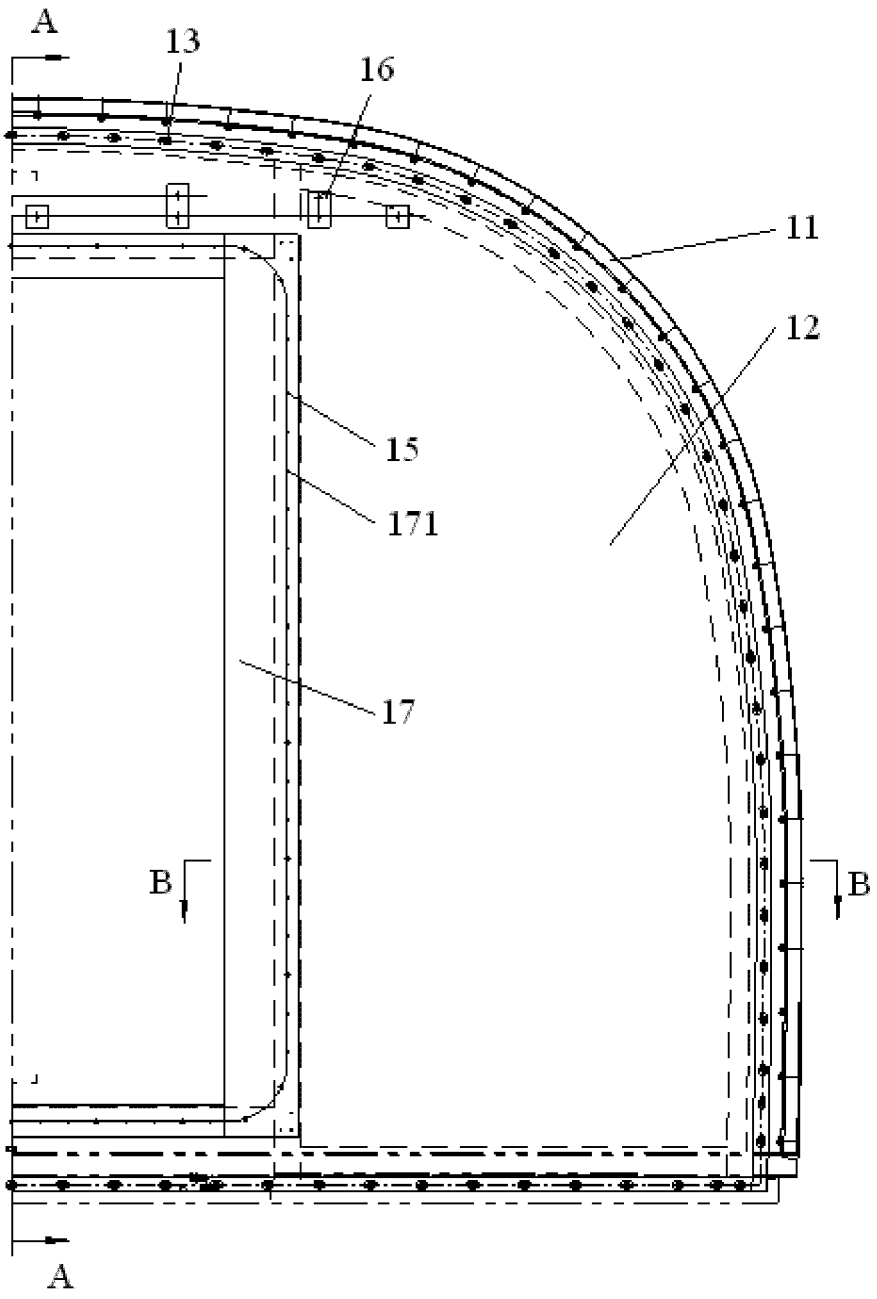

Figure 1

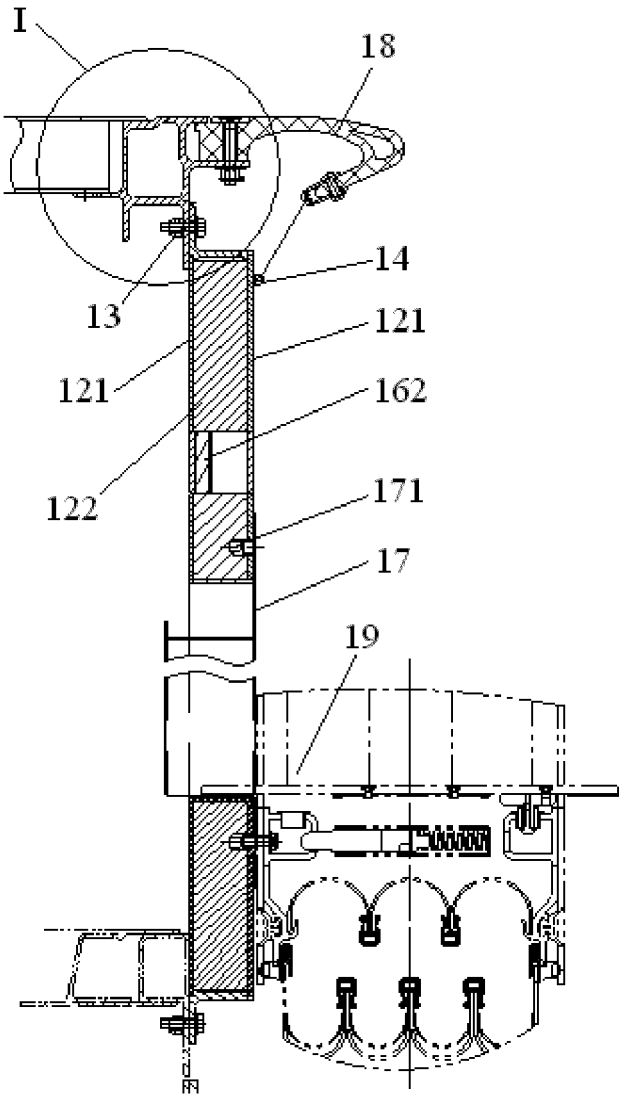

Figure 2

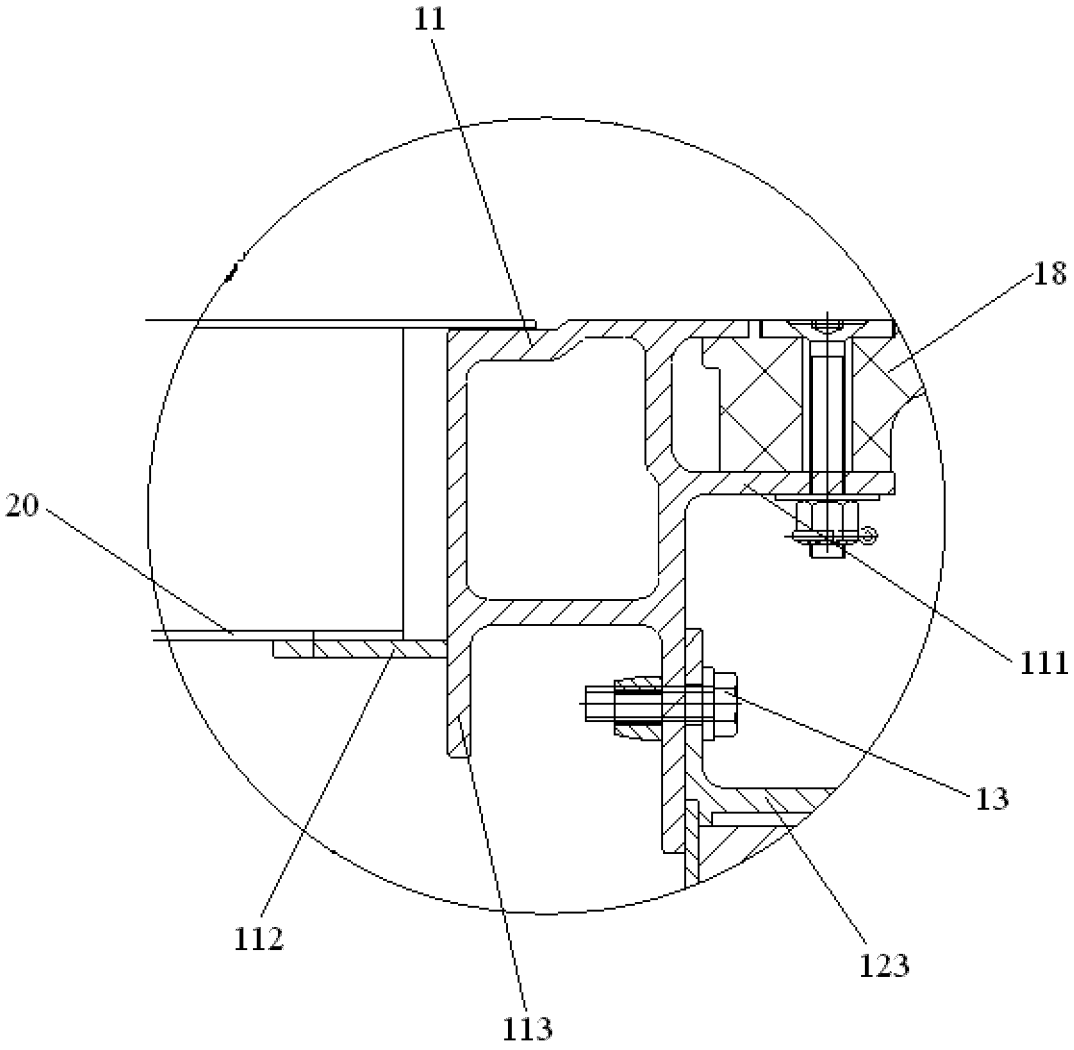

Figure 3

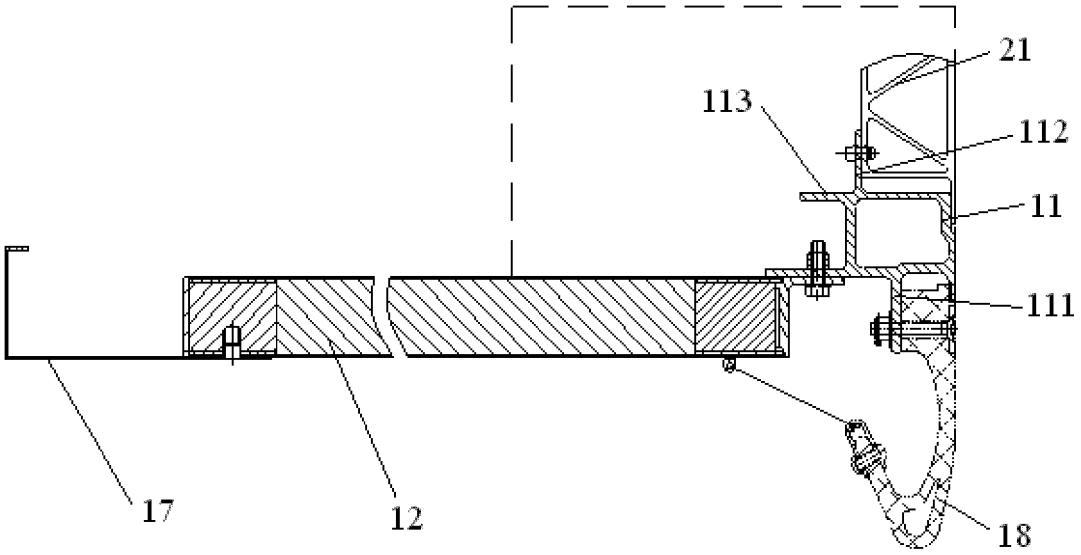

Figure 4

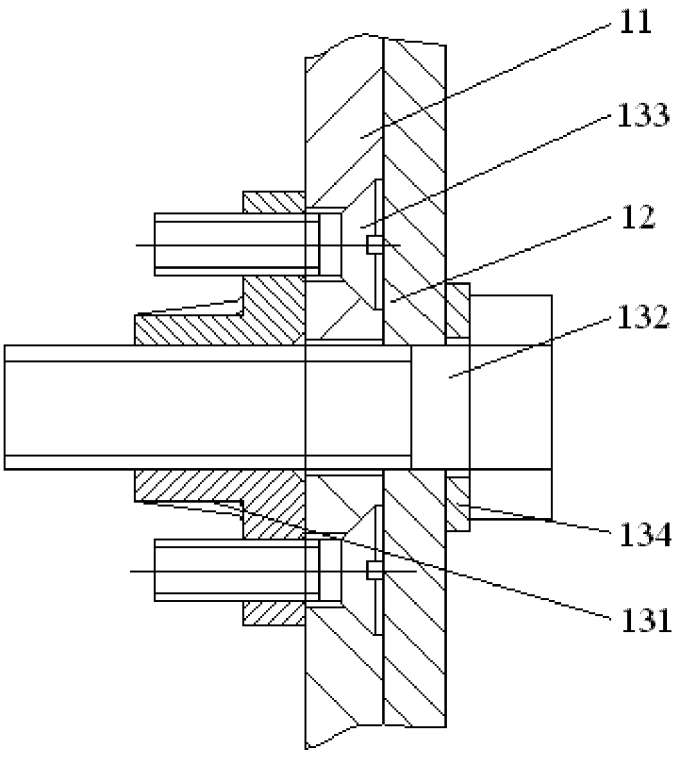

Figure 5

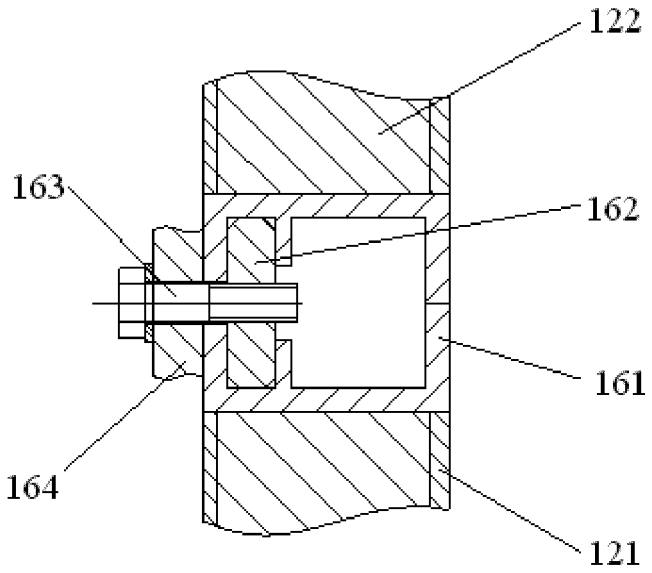

Figure 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/077610

A. CLASSIFICATION OF SUBJECT MATTER

B61D 17/06(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)

B61D

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)

VEN, CPRSABS, CNKI; 轨道车辆, 端墙, 可拆卸, 蜂窝板

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	CN 205737557 U (CNR TANGSHAN LOCOMOTIVE VEHICLE CO., LTD.) 30 November 2016 (2016-11-30) description, pages 1-5, and figure, pages 1-3	1-16
Y	CN 107792103 A (JIANGSU HENGSHEN CO., LTD.) 13 March 2018 (2018-03-13) description, pages 1-4, and figure, pages 1-3	1-16
Y	CN 201198310 Y (RAILWAY TRANSPORT BUREAU; CSR SIFANG LOCOMOTIVE AND ROLLING STOCK CO., LTD.) 25 February 2009 (2009-02-25)	1-16
Y	CN 206856716 U (QINGDAO TAIHONG TRACK EQUIPMENT CO., LTD.) 09 January 2018 (2018-01-09) entire document	1-16

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Date of the actual completion of the international search	Date of mailing of the international search report
01 April 2019	**18 April 2019**

Name and mailing address of the ISA/CN	Authorized officer
National Intellectual Property Administration, PRC (ISA/CN) **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** **China**	
Facsimile No. **(86-10)62019451**	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/077610

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
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CN	201198310	Y	25 February 2009	None	
CN	206856716	U	09 January 2018	None	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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- CN 201810564661 **[0001]**
- CN 201820859756 **[0001]**