(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 957 537 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
23.02.2022 Bulletin 2022/08

(21) Application number: **20835610.5**

(22) Date of filing: **11.06.2020**

(51) Int Cl.:
B61D 17/22 *(2006.01)*

(86) International application number:
PCT/CN2020/095566

(87) International publication number:
WO 2021/000710 (07.01.2021 Gazette 2021/01)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **02.07.2019 CN 201910596823**

(71) Applicant: **CRRC Changchun Railway Vehicles Co., Ltd.**
Changchun, Jilin 130000 (CN)

(72) Inventors:
- **WANG, Lei**
  Changchun, Jilin 130000 (CN)
- **LIU, Qingbo**
  Changchun, Jilin 130000 (CN)
- **YANG, Shu**
  Changchun, Jilin 130000 (CN)
- **DENG, Yang**
  Changchun, Jilin 130000 (CN)
- **SUN, Guangqi**
  Changchun, Jilin 130000 (CN)

(74) Representative: **Sharman, Thomas Alexander**
Reddie & Grose LLP
The White Chapel Building
10 Whitechapel High Street
London E1 8QS (GB)

(54) RAIL VEHICLE AND WINDSHIELD HANGING DEVICE THEREOF

(57) Disclosed is a windshield hanging device (23), comprising mounting seats (11) arranged on two sides of the bottom of a vehicle frame, and a connection member (12) arranged in the middle of the bottom of the vehicle frame, wherein a middle bearing (121) is arranged in the middle of the connection member (12) in a vertical direction, and a middle supporting shaft (122) is coaxially inserted into the middle of the middle bearing (121) in a fixed-axis rotatable manner; a top end of the middle supporting shaft (122) is fixed to the bottom of an inner compartment body (22) of a vehicle, and a bottom end of the middle supporting shaft (122) is fixed to an inner wall of the bottom of a windshield (21) of the vehicle; and a vertically-arranged end bearing (111) is hinged to an inner side of the mounting seat (11), an end supporting shaft (112) is coaxially inserted into the middle of the end bearing (111) in a fixed-axis rotatable manner, an elastic buffer member (13), arranged in a width direction of the vehicle frame, is connected between the end bearing (111) and the connection member (12), and a sleeve (14) capable of extending and retracting in the width direction of the vehicle frame is mounted outside the elastic buffer member (13) in a sleeving manner.

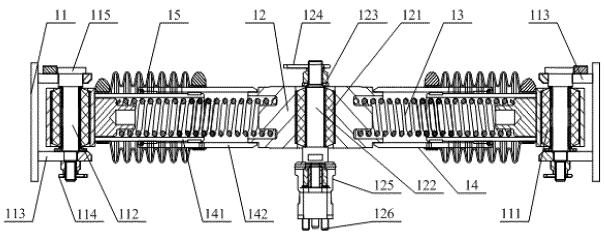

FIG. 2

EP 3 957 537 A1

Description

[0001] The present application claims the priority to Chinese Patent Application No. 201910596823.8, titled "RAIL VEHICLE AND WINDSHIELD HANGING DEVICE THEREOF", filed with the China National Intellectual Property Administration on July 2, 2019, which is incorporated herein by reference in its entirety.

FIELD

[0002] The present application relates to the technical field of vehicle body ancillary components of the rail vehicle, and in particular to a windshield suspension device. The present application further relates to a rail vehicle using the windshield suspension device.

BACKGROUND

[0003] During the development and operation of an existing rail vehicle, especially a high-speed multiple unit train, in order to ensure the aerodynamic performance of the vehicle and reduce the air resistance during operation, a windshield and corresponding structures are generally provided at ends of two adjacent compartments.

[0004] In order to facilitate understanding the existing solution, referring to FIG. 1, FIG. 1 is a schematic diagram showing a matching structure of an inner compartment and a windshield of a common rail vehicle in the conventional art. Regarding this kind of windshield 21 with a sealed bellows structure, due to its own structure and the structure form of related components, the windshield 21 and the related components may sink during the traveling process of the vehicle after installation, which may cause the vehicle body to exceed the limit requirement specified for the normal operation of the vehicle and adversely affect the normal and stable operation of the vehicle.

[0005] Therefore, how to improve the structural reliability of a windshield part of the rail vehicle and prevent the windshield from sinking is an important technical problem to be solved by those skilled in the art.

SUMMARY

[0006] An object of the present application is to provide a windshield suspension device, which can effectively ensure the structural support of a windshield part of a rail vehicle, significantly improve the structural reliability of the windshield part of the rail vehicle, and prevent the windshield from shaking and sinking during the operation of the vehicle. Another object of the present application is to provide a rail vehicle using the above windshield suspension device.

[0007] In order to solve the above technical problems, a windshield suspension device is provided according to the present application, which includes a mounting seat arranged on two sides of the bottom of a vehicle frame and a connecting member arranged in the middle of the bottom of the vehicle frame. A middle bearing is vertically arranged in the middle of the connecting member, and a middle supporting shaft is pivotably and coaxially inserted into the middle of the middle bearing. A top end of the middle supporting shaft is fixed to the bottom of an inner compartment of a vehicle, and a bottom end of the middle supporting shaft is fixed to an inner wall of the bottom of the windshield of the vehicle.

[0008] An end bearing arranged vertically is hinged to an inner side of the mounting seat, an end supporting shaft is pivotably and coaxially inserted into the middle of the end bearing, an elastic buffer member, arranged in a width direction of the vehicle frame, is connected between the end bearing and the connecting member, and a sleeve which is extendable and retractable in the width direction of the vehicle frame is sleeved outside the elastic buffer member.

[0009] Preferably, the sleeve includes an inner sleeve body hinged to the end bearing and an outer sleeve body hinged to the middle bearing, an inner end of the inner sleeve body is inserted into an outer end of the outer sleeve body, and an outer wall of the inner sleeve body fits an inner wall of the outer sleeve body such that the outer wall of the inner sleeve body is axially movable relative to the inner wall of the outer sleeve body.

[0010] Preferably, a dust cover which is axially extendable and retractable is coaxially sleeved on an outer circumference of a matching surface of the outer sleeve body and the inner sleeve body.

[0011] Preferably, an upper boss is provided at the top end of the middle bearing, and an upper locking pin detachably connected to the inner compartment is inserted into the upper boss; and
a lower boss is provided at the bottom end of the middle bearing, and a lower locking pin detachably connected to the windshield is provided on the lower boss.

[0012] Preferably, two opposite supporting lugs which are respectively aligned and fitted with two ends of the end supporting shaft are vertically arranged on the inner wall of the mounting seat, the two ends of the end supporting shaft respectively penetrate through and extend out of the corresponding supporting lugs vertically, a limiting pin is provided on a bottom extending end of the end supporting shaft, and a limiting boss which cooperates with the supporting lug is provided on a top extending end of the end supporting shaft.

[0013] Preferably, the elastic buffer member is a spring or a leaf spring.

[0014] A rail vehicle is further provided according to the present application, which includes a vehicle frame, inner compartments and a windshield sleeved outside ends of two adjacent inner compartments. The rail vehicle further includes a windshield suspension device, and the windshield suspension device is the windshield suspension device according to any one of the above.

[0015] Compared with the above conventional technology, the windshield suspension device provided according to the present application, after the assembly thereof is completed, can reliably connect the inner compartments to the windshield, and provide a sufficient and reliable structural support for the inner compartments, the windshield and related structure of the vehicle. During the traveling of the vehicle, in a case of topographic relief or other conditions that are easy to cause the windshield to sink, the elastic buffer member can effectively alleviate the structural impact of the windshield and its related components under this state through its own elastic deformation such as bending or expansion, so as to ensure the relative positional relationship between the inner compartments and the windshield and ensure the stability between the main structures such as the vehicle frame of the rail vehicle, prevent the windshield from sinking, and improve the structural reliability of the windshield and its related components. In addition, during a deformation process of the elastic buffer member, the sleeve can provide a sufficient protection for the elastic buffer member, avoid the interference of the external environment on the elastic buffer member, and simultaneously extend or retract when the elastic buffer member extends or retracts, so as to prevent the elastic buffer member from loosening or dislocating during the deformation process, and ensure the overall structural linkage and reliability of the windshield suspension device.

[0016] In another preferred solution according to the present application, the sleeve includes an inner sleeve body hinged to the end bearing and an outer sleeve body hinged to the middle bearing, an inner end of the inner sleeve body is inserted into an outer end of the outer sleeve body, and an outer wall of the inner sleeve body fits an inner wall of the outer sleeve body such that the outer wall of the inner sleeve body is axially movable relative to the inner wall of the outer sleeve body. This coaxial alignment and insertion structure of the inner and outer sleeves has desirable linkage, high reliability and less required assembly space, which can make full use of an internal assembly space of the rail vehicle and improve the structural rationality of the windshield suspension device and consistency of matching components.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] For more clearly illustrating embodiments of the present application or technical solutions in the conventional technology, the drawings referred to for describing the embodiments or the conventional technology will be briefly described hereinafter. Apparently, the drawings in the following description are only some examples of the present application, and for those skilled in the art, other drawings may be obtained based on the provided drawings without any creative efforts.

FIG. 1 is a schematic diagram showing a matching structure of an inner compartment and a windshield of a common rail vehicle in the conventional art;

FIG. 2 is a schematic diagram showing an assembly structure of a windshield suspension device according to a specific embodiment of the present application; and

FIG. 3 is a schematic diagram showing a matching structure of an inner compartment and the windshield suspension device in FIG. 2.

[0018] The reference numerals in the drawings are as follows:

11	mounting seat,	111	end bearing,
112	end supporting shaft,	113	supporting lug,
114	limiting pin,	115	limiting boss,
12	connecting member,	121	middle bearing,
122	middle supporting shaft,	123	upper boss,
124	upper locking pin,	125	lower boss,
126	lower locking pin,	13	elastic buffer member,
14	sleeve,	141	inner sleeve body,
142	outer sleeve body,	15	dust cover,
21	windshield,	22	inner compartment,

(continued)

23 windshield suspension device.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] A core of the present application is to provide a windshield suspension device, which can effectively ensure the structural support of a windshield part of a rail vehicle, significantly improve the structural reliability of the windshield part of the rail vehicle, and prevent the windshield from shaking and sinking during the operation of the vehicle. In addition, a rail vehicle using the above windshield suspension device is provided according to the present application.

[0020] In order to provide the person skilled in the art with a better understanding of the solution of the present application, the present application is described hereinafter in further detail in conjunction with the drawings and embodiments.

[0021] Referring to FIG. 2, FIG. 2 is a schematic diagram showing an assembly structure of a windshield suspension device according to a specific embodiment of the present application; and FIG. 3 is a schematic diagram showing a matching structure of an inner compartment and the windshield suspension device in FIG. 2.

[0022] It should be particularly noted that, in order to facilitate the understanding of the relative positional relationship and basic structure of relevant matching components, the windshield and the inner compartment involved in this embodiment both use the corresponding reference numerals in FIG. 1 to facilitate understanding the content of the solution.

[0023] In this embodiment, a windshield suspension device 23 is provided according to the present application, which includes a mounting seat 11 arranged on two sides of the bottom of a vehicle frame and a connecting member 12 arranged in the middle of the bottom of the vehicle frame. A middle bearing 121 is vertically arranged in the middle of the connecting member 12, and a middle supporting shaft 122 is pivotably and coaxially inserted into the middle of the middle bearing 121. Atop end of the middle supporting shaft 122 is fixed to the bottom of an inner compartment 22 of a vehicle, and a bottom end of the middle supporting shaft 122 is fixed to an inner wall of the bottom of a windshield 21 of the vehicle. An end bearing 111 arranged vertically is hinged to an inner side of the mounting seat 11, an end supporting shaft 112 is pivotably and coaxially inserted into the middle of the end bearing 111, an elastic buffer member 13, arranged in a width direction of the vehicle frame, is connected between the end bearing 111 and the connecting member 12, and a sleeve 14 which is extendable and retractable in the width direction of the vehicle frame is sleeved outside the elastic buffer member 13.

[0024] After the assembly is completed, the inner compartments 22 can be reliably connected to the windshield 21, and a sufficient and reliable structural support for the inner compartments 22, the windshield 21 and related structure can be provided. During the traveling of the vehicle, in a case of topographic relief or other conditions that are easy to cause the windshield 21 to sink, the elastic buffer member 13 can effectively alleviate the structural impact of the windshield 21 and its related components under this state through its own elastic deformation such as bending or expansion, so as to ensure the relative positional relationship between the inner compartments 22 and the windshield 21 and ensure the stability between the main structures such as the vehicle frame of the rail vehicle, prevent the windshield 21 from sinking, and improve the structural reliability of the windshield 21 and its related components. In addition, during a deformation process of the elastic buffer member 13, the sleeve 14 can provide a sufficient protection for the elastic buffer member 13, avoid the interference of the external environment on the elastic buffer member 13, and simultaneously extend or retract when the elastic buffer member 13 extends or retracts, so as to prevent the elastic buffer member 13 from loosening or dislocating during the deformation process, and ensure the overall structural linkage and reliability of the windshield suspension device 23.

[0025] It should be noted that, through the hinge adaption between the above bearings and the corresponding supporting shafts, the windshield suspension device 23 can form a universal joint structure which can flexibly swing and turn with the vehicle body, so as to ensure the operation flexibility of the windshield suspension device 23 and its linkage with the main structure of the vehicle, and ensure the overall operation stability of the rail vehicle.

[0026] Specifically, the sleeve 14 includes an inner sleeve body 141 hinged to the end bearing 111 and an outer sleeve body 142 hinged to the middle bearing 121, an inner end of the inner sleeve body 141 is inserted into an outer end of the outer sleeve body 142, and an outer wall of the inner sleeve body 141 fits an inner wall of the outer sleeve body 142 such that the outer wall of the inner sleeve body is axially movable relative to the inner wall of the outer sleeve body. This coaxial alignment and insertion structure of the inner and outer sleeves 14 has desirable linkage, high reliability and less required assembly space, which can make full use of an internal assembly space of the rail vehicle and improve the structural rationality of the windshield suspension device 23 and consistency of matching components.

[0027] More specifically, a dust cover 15 which is axially extendable and retractable is coaxially sleeved on an outer circumference of a matching surface of the outer sleeve body 142 and the inner sleeve body 141. The dust cover 15 can further ensure the relative isolation between the elastic buffer member 13 and the external environment, prevent dust and impurities in the external environment from adversely affecting the stable operation of the elastic buffer member

13 and the relevant matching components, and ensure the working efficiency and reliability of the elastic buffer member 13 and the sleeve 14.

[0028] It should be noted that, in practical application, both the above sleeve 14 and the dust cover 15 may use an axially extendable and retractable corrugated structure to further optimize the assembly space of the windshield suspension device 23. In order to ensure the assembly and operation requirements under different working conditions, the staff can flexibly choose the structure form of the sleeve 14 and the dust cover 15 according to the actual working conditions. In principle, the structure form would be acceptable, as long as it can meet the requirements for the actual use of the windshield suspension device 23.

[0029] Further, an upper boss 123 is provided at the top end of the middle bearing 121, and an upper locking pin 124 detachably connected to the inner compartment 22 is inserted into the upper boss 123; and a lower boss 125 is provided at the bottom end of the middle bearing 121, and a lower locking pin 126 detachably connected to the windshield 21 is provided on the lower boss 125. The bosses can provide a sufficient structural support for the corresponding locking pin and its connecting structure, and further ensure, via the detachable connection of the locking pins, the reliability of assembly of the windshield suspension device 23, the inner compartment 22 and the windshield 21 and the convenience of disassembly and assembly when maintenance is required.

[0030] Besides, two opposite supporting lugs 113 which are respectively aligned and fitted with two ends of the end supporting shaft 112 are vertically arranged on the inner wall of the mounting seat 11, the two ends of the end supporting shaft 112 respectively penetrate through and extend out of the corresponding supporting lugs 113 vertically, a limiting pin 114 is provided on a bottom extending end of the end supporting shaft 112, and a limiting boss 115 which cooperates with the supporting lug 113 is provided on a top extending end of the end supporting shaft 112. The supporting lugs 113 can provide a reliable structural support for the end supporting shaft 112 and its corresponding end bearing 111, and realize axial limiting of the end supporting shaft 112 via the cooperation between the limiting boss 115, the limiting pin 114, and the supporting lugs 113 at corresponding matching ends, so as to prevent the end supporting shaft 112 from loosening or dislocating, and ensure the overall structural reliability of the windshield suspension device 23 and the operation stability of the rail vehicle.

[0031] In addition, the elastic buffer member 13 is a spring or a leaf spring. In consideration of the structural matching and the buffer effect in practical application, under general working conditions, the above elastic buffer member 13 is preferably the spring as shown in the figure. However, in a case that the rigid impact in a vertical direction is large or the rigid supporting demand in a horizontal direction is high, the leaf spring may be selected. In principle, either would be acceptable, as long as it can meet the actual use requirements of the windshield suspension device 23.

[0032] In a specific embodiment, the rail vehicle according to the present application includes a vehicle frame, inner compartments 22 and a windshield 21 sleeved outside ends of two adjacent inner compartments 22. The rail vehicle further includes a windshield suspension device 23, and the windshield suspension device 23 is the windshield suspension device 23 according to any one of the above. The traveling process of the rail vehicle is relatively stable, and the windshield 21 may not sink.

[0033] In summary, the windshield suspension device provided according to the present application, after the assembly thereof is completed, can reliably connect the inner compartments to the windshield, and provide a sufficient and reliable structural support for the inner compartments, the windshield and related structure of the vehicle. During the traveling of the vehicle, in a case of topographic relief or other conditions that are easy to cause the windshield to sink, the elastic buffer member can effectively alleviate the structural impact of the windshield and its related components under this state through its own elastic deformation such as bending or expansion, so as to ensure the relative positional relationship between the inner compartments and the windshield and ensure the stability between the main structures such as the vehicle frame of the rail vehicle, prevent the windshield from sinking, and improve the structural reliability of the windshield and its related components. In addition, during a deformation process of the elastic buffer member, the sleeve can provide a sufficient protection for the elastic buffer member, avoid the interference of the external environment on the elastic buffer member, and simultaneously extend or retract when the elastic buffer member extends or retracts, so as to prevent the elastic buffer member from loosening or dislocating during the deformation process, and ensure the overall structural linkage and reliability of the windshield suspension device.

[0034] In addition, the rail vehicle using the above windshield suspension device according to the present application has a relatively stable traveling process, and the windshield may not sink.

[0035] The windshield suspension device and the rail vehicle using the windshield suspension device according to the present application have been described in detail above. The principle and implementations of the present application are described through specific examples herein. The description of the above-described embodiments is merely used to facilitate understanding the method and core idea of the present application. It should be noted that, for those skilled in the art, many modifications and improvements may be made to the present application without departing from the principle of the present application, and these modifications and improvements are also deemed to fall into the protection scope of the present application defined by the claims.

Claims

1. A windshield suspension device,s comprising: a mounting seat arranged on two sides of the bottom of a vehicle frame and a connecting member arranged in the middle of the bottom of the vehicle frame, wherein a middle bearing is vertically arranged in the middle of the connecting member, a middle supporting shaft is pivotably and coaxially inserted into the middle of the middle bearing, a top end of the middle supporting shaft is fixed to the bottom of an inner compartment of a vehicle, and a bottom end of the middle supporting shaft is fixed to an inner wall of the bottom of a windshield of the vehicle; and
an end bearing arranged vertically is hinged to an inner side of the mounting seat, an end supporting shaft is pivotably and coaxially inserted into the middle of the end bearing, an elastic buffer member, arranged in a width direction of the vehicle frame, is connected between the end bearing and the connecting member, and a sleeve which is extendable and retractable in the width direction of the vehicle frame is sleeved outside the elastic buffer member.

2. The windshield suspension device according to claim 1, wherein the sleeve comprises an inner sleeve body hinged to the end bearing and an outer sleeve body hinged to the middle bearing, an inner end of the inner sleeve body is inserted into an outer end of the outer sleeve body, an outer wall of the inner sleeve body fits an inner wall of the outer sleeve body, and the outer wall of the inner sleeve body is axially movable relative to the inner wall of the outer sleeve body.

3. The windshield suspension device according to claim 2, wherein a dust cover which is axially extendable and retractable is coaxially sleeved on an outer circumference of a matching surface of the outer sleeve body and the inner sleeve body.

4. The windshield suspension device according to claim 1, wherein an upper boss is provided at a top end of the middle bearing, and an upper locking pin detachably connected to the inner compartment is inserted into the upper boss; and a lower boss is provided at a bottom end of the middle bearing, and a lower locking pin detachably connected to the windshield is provided on the lower boss.

5. The windshield suspension device according to claim 1, wherein two opposite supporting lugs which are respectively aligned and fitted with two ends of the end supporting shaft are vertically arranged on an inner wall of the mounting seat, the two ends of the end supporting shaft respectively penetrate through and extend out of the corresponding supporting lugs vertically, a limiting pin is provided on a bottom extending end of the end supporting shaft, and a limiting boss which cooperates with the corresponding supporting lug is provided on a top extending end of the end supporting shaft.

6. The windshield suspension device according to claim 1, wherein the elastic buffer member is a spring or a leaf spring.

7. A rail vehicle, comprising a vehicle frame, inner compartments and a windshield sleeved outside ends of two adjacent inner compartments, wherein the rail vehicle further comprises a windshield suspension device, and the windshield suspension device is the windshield suspension device according to any one of claims 1 to 6.

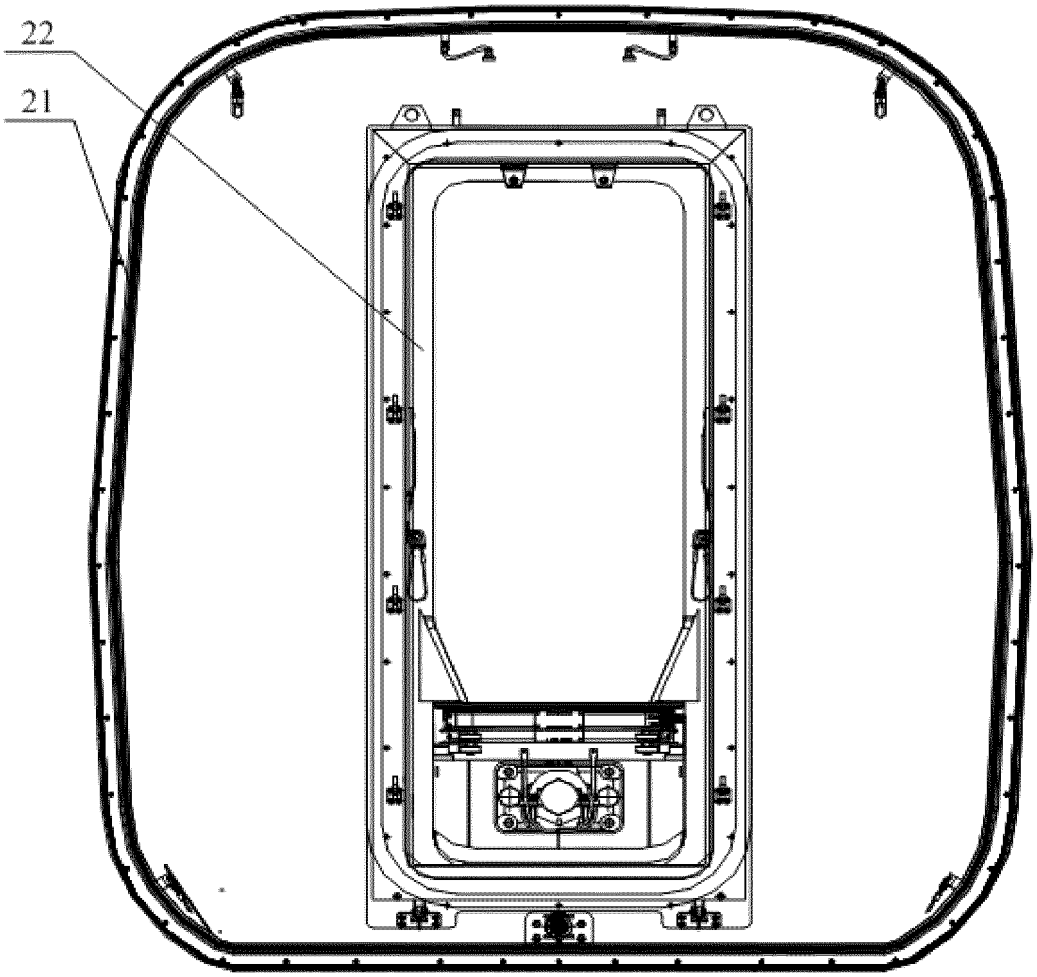

FIG. 1

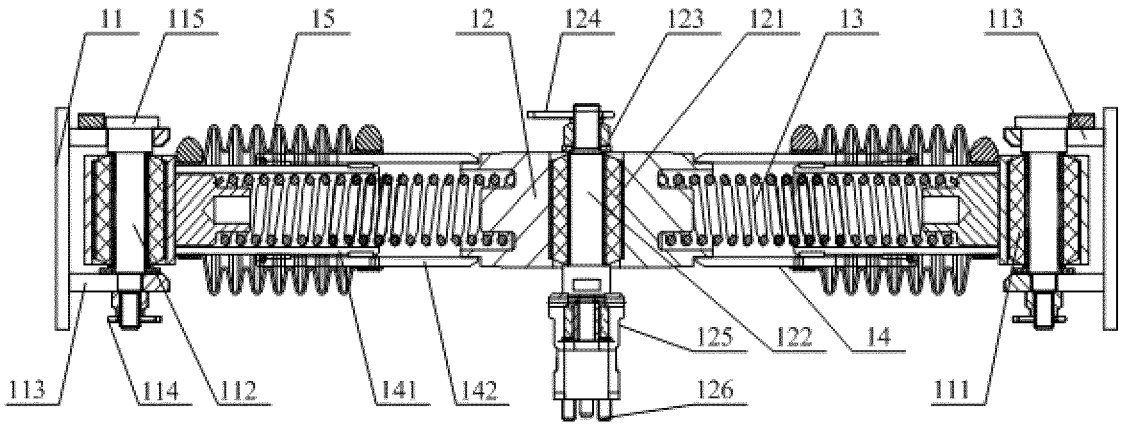
11
115
15
12
124
123
121
13
113
125
122
14
113
114
112
141
142
126
111

FIG. 2

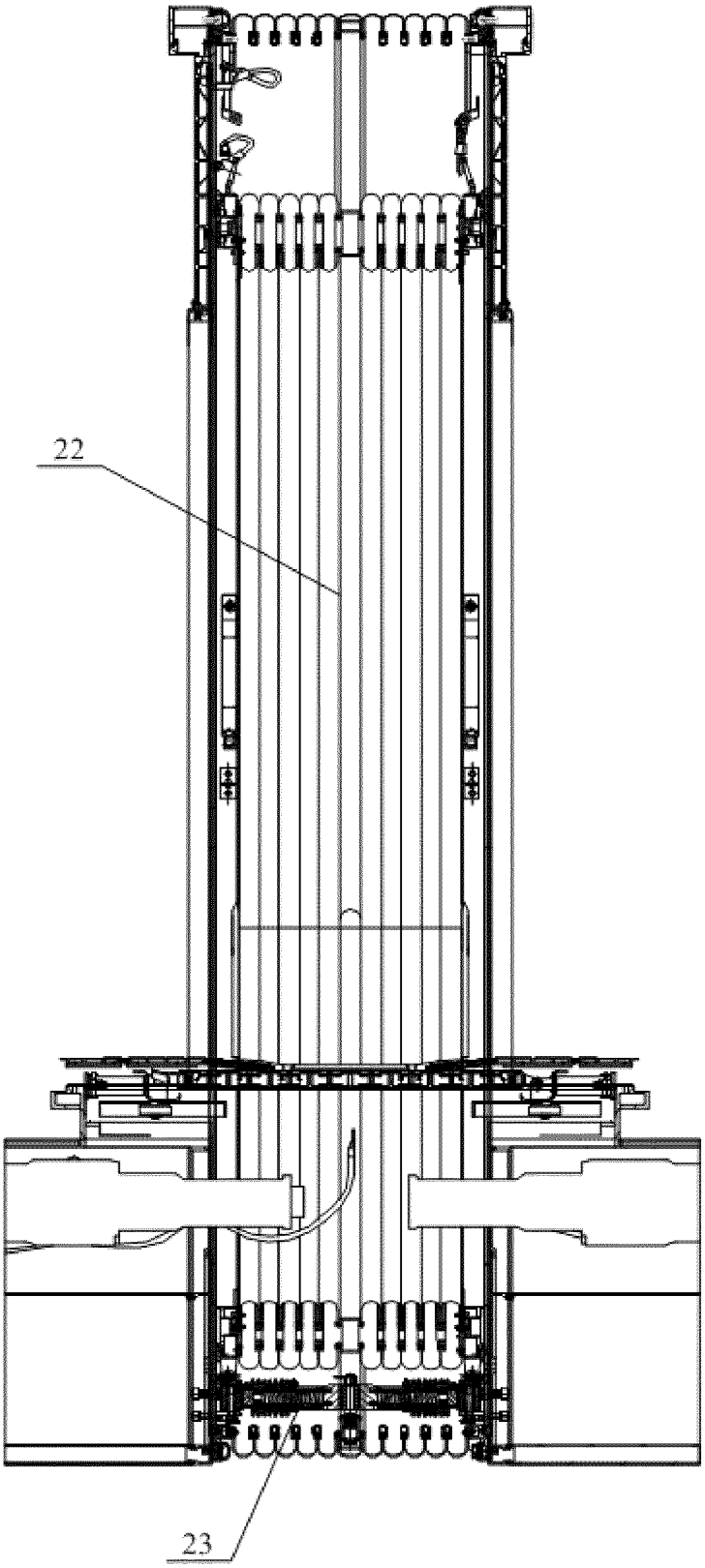

FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/095566

A. CLASSIFICATION OF SUBJECT MATTER

B61D 17/22(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)

CNABS; CNKI; CNTXT; VEN; EPTXT; USTXT; WOTXT: 风挡, 折棚, 摺棚, 吊挂, 悬挂, 座, 连接件, 轴承, 套筒, 弹簧, 弹性, 缓冲, 伸缩, bellows, gangway, windshield, hang+, suspen+, seat, connect+, bearing, sleeve, spring, buffer, elastic+, flex, telescopic

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 110254455 A (CRRC CHANGCHUN RAILWAY VEHICLES CO., LTD.) 20 September 2019 (2019-09-20) claims 1-7	1-7
A	US 4318345 A (MASCHF AUGSBURG NUERNBERG AG) 09 March 1982 (1982-03-09) description, column 2, line 24 to column 3, line 10, and figures 1-3	1-7
A	DE 19516171 A1 (HUEBNER GUMMI & KUNSTSTOFF) 07 November 1996 (1996-11-07) entire document	1-7
A	DE 10238110 A1 (HUEBNER GMBH) 11 March 2004 (2004-03-11) entire document	1-7

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* 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

Date of the actual completion of the international search	Date of mailing of the international search report
05 August 2020	**27 August 2020**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China**	Authorized officer
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/CN2020/095566

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	110254455	A	20 September 2019	None			
US	4318345	A	09 March 1982	FR	2450731	A1	03 October 1980
				CA	1125098	A	08 June 1982
				DE	2908354	A1	04 September 1980
				BR	8001296	A	04 November 1980
				IT	1131801	B	25 June 1986
				AT	A116080	A	15 September 1981
				GB	2047186	B	02 February 1983
				GB	2047186	A	26 November 1980
				DE	2908354	C2	16 June 1982
				HU	22884	T	28 July 1982
				FI	800607	A	31 October 1980
DE	19516171	A1	07 November 1996	EP	0824411	A1	25 February 1998
				EP	0824411	B1	15 September 1999
				WO	9634774	A1	07 November 1996
				ES	2137676	T3	16 December 1999
				DE	59603081	D1	21 October 1999
DE	10238110	A1	11 March 2004	None			

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CN 201910596823 **[0001]**