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(54) **MOTOR TRAIN UNIT AND OBSTACLE PUSHING-ASIDE APPARATUS THEREOF**

(57) Provided are an obstacle pushing-aside apparatus of a motor train unit, and a motor train unit. The obstacle pushing-aside apparatus is fixedly mounted at a front end of a vehicle body bottom frame (101), and comprises a cowcatcher body (1) erected at a lower end of the vehicle body bottom frame, wherein a front end of the cowcatcher body is provided with a height adjustment device (2) arranged in a width direction of the cowcatcher body; the height adjustment device is provided with a plurality of strip-shaped holes (7) with a lengthwise direction thereof being arranged vertically; and a positioning bolt is provided between the height adjustment device and the cowcatcher body for positioning the two. When the height of the cowcatcher body needs to be adjusted, the height of the cowcatcher body can be adjusted to be higher and lower by means of the strip-shaped holes arranged in the height adjustment device, so that the height of the height adjustment device can be adjusted as a wheel tread turns, thereby ensuring that the height of the obstacle pushing-aside apparatus of a motor train unit does not change, and improving the security of a cowcatcher.

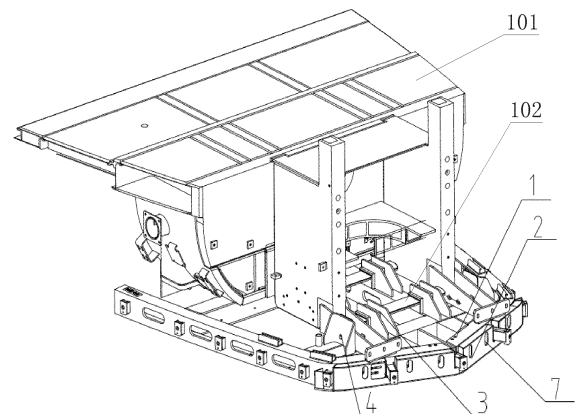


Figure 1

Description

[0001] The present application claims the priority to Chinese patent application No. 201920157130.4, titled "MOTOR TRAIN UNIT AND OBSTACLE PUSHING-ASIDE APPARATUS THEREOF", filed with the China National Intellectual Property Administration on January 29, 2019, which is incorporated herein by reference in its entirety.

FIELD

[0002] The present disclosure relates to the technical field of passenger trains, and in particular to a multiple-unit train and a pilot device of the multiple-unit train.

BACKGROUND

[0003] With the development of society, people travel more and more frequently and have higher and higher requirements for the safety of multiple-unit trains.

[0004] A pilot is mounted in a lower part of the underframe of the locomotive of the multiple-unit train, which meets the strength requirements. If there are protruding foreign objects on the rail, the foreign objects can be removed from the rail by collision to protect the safe operation of the multiple-unit train. However, the existing pilot has disadvantages. The main structure of the pilot is assembled with the welding structure of the underframe by bolts, and the height of the pilot is not adjustable. The height of the lower plane of the pilot is about 185mm from the rail surface. The mounting position is relatively high, and the pilot effect is limited, which does not meet the safety requirements of the existing multiple-unit trains. However, if the mounting height of the pilot is too low, as the train runs and the wheel tread is turning repaired, the height of the pilot will decrease, and the pilot may even enter the construction boundary and the pilot will collide with the protruding construction in the rail. The pilot is required to have certain strength to remove the obstructions in the rail. However, in order to meet the collision safety requirements, the strength of the pilot should not be too high. During the collision of the trains, the mounting bolts of the pilot are required to be sheared off, so as to ensure that the anti-climbing energy-absorbing structures of the trains contact with each other and absorb energy.

[0005] It should be noted herein that the technical content provided in this section is intended to help those skilled in the art to understand the present disclosure, and may not necessarily constitute the prior art.

SUMMARY

[0006] In view of this, an object of the present disclosure is to provide a pilot device of a multiple-unit train to improve the safety of the pilot. A multiple-unit train is further provided according to the present disclosure.

[0007] In order to achieve the above object, the following technical solutions are provided according to the present disclosure.

[0008] A pilot device of a multiple-unit train is fixedly mounted on a front end of a train body underframe, and includes a pilot body mounted on a lower end of the train body underframe. A height adjustment device is provided on a front end of the pilot body along a width direction of the pilot body. The height adjustment device is provided with multiple strip-shaped holes of which a length direction is arranged in a vertical direction. A positioning bolt for positioning the height adjustment device and the pilot body is provided between the height adjustment device and the pilot body.

[0009] Preferably, in the above-mentioned pilot device of the multiple-unit train, a crossbeam arranged along a width direction of the train body is provided on the train body underframe, and a hanging bracket hung on the crossbeam is provided on a top surface of the pilot body. A first mounting bolt connecting the hanging bracket with the crossbeam is provided between the hanging bracket and the crossbeam, and a shearing direction of the first mounting bolt is arranged in a pilot direction.

[0010] Preferably, in the above-mentioned pilot device of the multiple-unit train, the pilot body is further provided with mounting brackets respectively located on two sides of the train body underframe in the width direction, a second mounting bolt connecting each of the mounting brackets with the train body underframe is provided between the corresponding mounting bracket and the train body underframe, and a shearing direction of the second mounting bolt is arranged in the pilot direction.

[0011] Preferably, in the above-mentioned pilot device of the multiple-unit train, the crossbeam includes a front crossbeam and a rear crossbeam arranged in the front-rear direction of the train body underframe, and the hanging bracket includes a front hanging bracket hung on the front crossbeam and a rear hanging bracket hung on the rear crossbeam.

[0012] Preferably, in the above-mentioned pilot device of the multiple-unit train, multiple front hanging brackets and multiple rear hanging brackets are provided along the width direction of the train body underframe.

[0013] Preferably, in the above-mentioned pilot device of the multiple-unit train, two front hanging brackets and two rear hanging brackets are provided along the width direction of the train body underframe.

[0014] Preferably, in the above-mentioned pilot device of the multiple-unit train, the hanging bracket includes an anti-falling portion extending vertically out of the top surface of the pilot body and a hanging portion extending laterally out of a top of the anti-falling portion, and the anti-falling portion is located at a front end of the crossbeam.

[0015] Preferably, in the above-mentioned pilot device of the multiple-unit train, multiple mounting lugs for mounting the opening and closing mechanism at the front end of the train body underframe are fixedly provided on

a periphery the pilot body.

[0016] Preferably, in the above-mentioned pilot device of the multiple-unit train, the pilot body includes a pilot bottom plate and a pilot frame for fixing the pilot bottom plate, and the pilot frame is provided with a mounting slideway for mounting the pilot bottom plate in a sliding manner.

[0017] A multiple-unit train is further provided according to the present disclosure, wherein a pilot device is provided at the front end of the train body, and the pilot device is the pilot device of the multiple-unit train according to any one of the above aspects.

[0018] The pilot device of the multiple-unit train provided by the present disclosure is fixedly mounted on the front end of the train body underframe, and includes the pilot body mounted on the lower end of the train body underframe. The height adjustment device is provided on the front end of the pilot body along the width direction of the pilot body. The height adjustment device is provided with multiple strip-shaped holes of which the length direction is arranged in a vertical direction. The positioning bolt for positioning the height adjustment device and the pilot body is provided between the height adjustment device and the pilot body. The height adjustment device is arranged at the front end of the pilot body and is provided with multiple strip-shaped holes. The height adjustment device and the pilot body are positioned and locked by the positioning bolt. When it is necessary to adjust the height of the pilot body, the height of the height adjustment device on the pilot body can be adjusted up and down through the strip-shaped holes arranged on the height adjustment device, so that the height of the height adjustment device can be adjusted after the wheel tread is turning repaired, so as to ensure that the height of the pilot device of the multiple-unit train remains unchanged, thereby improving the safety of the pilot.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The above and other objects, features, and advantages of the present disclosure are apparent from the following description of embodiments of the present disclosure with reference to the drawings. In the drawings:

Figure 1 is a schematic view showing the mounting structure of a pilot device of a multiple-unit train according to the present disclosure; and

Figure 2 is a schematic view showing the structure of a pilot bottom plate of the pilot device of the multiple-unit train according to the present disclosure.

DETAILED DESCRIPTION OF EMBODIMENTS

[0020] The present disclosure is described below based on embodiments, and the present disclosure is not limited to the embodiments.

[0021] As shown in Figures 1 and 2, Figure 1 is a sche-

matic view showing the mounting structure of a pilot device of a multiple-unit train according to the present disclosure; and Figure 2 is a schematic view showing the structure of a pilot bottom plate of the pilot device of the multiple-unit train according to the present disclosure.

[0022] This embodiment provides a pilot device of a multiple-unit train which is fixedly mounted on a front end of a train body underframe 101 and includes a pilot body 1 mounted on a lower end of the train body underframe 101. A height adjustment device 2 is provided on a front end of the pilot body 1 along a width direction of the pilot body. The height adjustment device 2 is provided with multiple strip-shaped holes 7 of which a length direction is arranged in a vertical direction. A positioning bolt for positioning the height adjustment device and the pilot body 1 is provided between the height adjustment device 2 and the pilot body. The height adjustment device 2 is arranged at the front end of the pilot body 1 and is provided with multiple strip-shaped holes 7. The height adjustment device 2 and the pilot body 1 are positioned and fixed by the positioning bolt. When it is necessary to adjust the height of the pilot body 1, the height of the height adjustment device 2 on the pilot body 1 can be adjusted up and down through the strip-shaped holes arranged on the height adjustment device, so that the height of the height adjustment device 2 can be adjusted after the wheel tread is turning repaired, so as to ensure that the height of the pilot device of the multiple-unit train remains unchanged, thereby improving the safety of the pilot.

[0023] In a specific embodiment of the present disclosure, a crossbeam 102 arranged along a width direction of the train body is provided on the train body underframe 101, and a hanging bracket 3 hung on the crossbeam is provided on a top surface of the pilot body 1. A first mounting bolt connecting the hanging bracket 3 with the crossbeam 102 is provided between the hanging bracket and the crossbeam, and a shearing direction of the first mounting bolt is arranged in a pilot direction. The pilot body 1 is connected with the train body underframe 101 by hoisting. The crossbeam 102 is arranged on the train body underframe 101 along the width direction of the train body. The hanging bracket 3 extends out of the pilot body 1. After being mounted to the crossbeam 102, the hanging bracket 3 is fixed through the first mounting bolt. "Through the hanging bracket 3" refers to that after being placed onto the crossbeam 102, the hanging bracket 3 is fixed to the crossbeam 102 through the first mounting bolt. The method of hanging is adopted to reduce the difficulty of mounting of the pilot body 1. The shearing direction of the first mounting bolt is arranged in the pilot direction to ensure that the first mounting bolt is sheared off when the pilot body 1 is impacted to guarantee the pilot function.

[0024] In a specific embodiment of the present disclosure, the pilot body 1 is further provided with mounting brackets 4 respectively located on two sides of the train body underframe in the width direction, a second mounting bolt connecting each of the mounting brackets 4 with

the train body underframe 101 is provided between the corresponding mounting bracket and the train body underframe, and a shearing direction of the second mounting bolt is arranged with the pilot direction. The pilot body 1 is further provided with mounting brackets 4. Two mounting brackets 4 are arranged in the width direction of the train body underframe 101, which are respectively fixed on two ends of the train body frame 101. The mounting brackets 4 ensure the accurate positioning of the pilot body 1 at the bottom of the train body underframe 101 to avoid affecting the normal running of the multiple-unit train. Besides, to prevent the structure of the mounting brackets 4 from affecting the normal pilot function of the pilot device, the shearing direction of the second mounting bolt for connecting the mounting bracket 4 with the train body underframe 101 is also arranged in the pilot direction of the pilot device, to ensure that the second mounting bolt can be sheared off smoothly, thereby meeting the pilot function.

[0025] In a specific embodiment of the present disclosure, the crossbeam 102 includes a front crossbeam and a rear crossbeam arranged in the front-rear direction of the train body underframe 101, and the hanging bracket 3 includes a front hanging bracket hung on the front crossbeam and a rear hanging bracket hung on the rear crossbeam. The crossbeam 102 is arranged in the front-rear direction of the train body underframe 101 by the front crossbeam and the rear crossbeam. Correspondingly, the hanging bracket 3 is connected front and rear by the front hanging bracket and the rear hanging bracket. Multiple front hanging brackets and multiple rear hanging brackets are provided in the width direction of the train body underframe 101, thereby ensuring the support balance between the pilot device and the train body underframe 101, and further improving the stability of the connection structure of the pilot device.

[0026] Preferably, multiple front hanging brackets and multiple rear hanging brackets are provided along the width direction of the train body underframe 101. The number of the hanging brackets 3 should avoid affecting the pilot and shearing functions of the pilot device. Multiple front hanging brackets and multiple rear hanging brackets are provided. Preferably, two front hanging brackets and two rear hanging brackets are provided, that is four hanging brackets are provided in all. Each hanging bracket is connected to the crossbeam 101 through the first mounting bolt, which meets the stability of the connection structure and the safety of the pilot.

[0027] In a specific embodiment of the present disclosure, the hanging bracket 4 includes an anti-falling portion extending vertically out of the top surface of the pilot body 1 and a hanging portion extending laterally out of the top of the anti-falling portion, and the anti-falling portion is located at a front end of the crossbeam 102. The vertically arranged anti-falling portion of the hanging bracket 4 extends out of the top surface of the pilot body, and the hanging portion is laterally arranged on the top of the anti-falling portion. The anti-falling portion and the

hanging portion are hung on the crossbeam in an L shape. Besides, the anti-falling portion is arranged at the front end of the crossbeam in the forward direction. Therefore, after the first mounting bolt and the second mounting bolt are sheared off when the pilot device is impacted, through the collision limit of the anti-falling portion and the crossbeam, and the pilot body 1 is still hung on the crossbeam 102 by the hanging bracket 4, which prevents the pilot device from falling off to a certain extent and has an anti-falling effect.

[0028] In a specific embodiment of the present disclosure, multiple mounting lugs 6 for mounting the opening and closing mechanism at the front end of the train body underframe 101 are fixedly provided on the periphery the pilot body 101. The pilot device is located on the train body underframe 101 at the front end of the locomotive of the multiple-unit train. The opening and closing mechanism of the locomotive of the multiple-unit train for closing the components of the train body underframe 101 is further provided at this position. Multiple mounting lugs 6 extend out of the periphery the pilot body 1 to ensure the connection stability of the opening and closing mechanism.

[0029] In a specific embodiment of the present disclosure, the pilot body 1 includes a pilot bottom plate 5 and a pilot frame 8 for fixing the pilot bottom plate 5, and the pilot frame 8 is provided with a mounting slideway for mounting the pilot bottom plate 5 in a sliding manner. The pilot frame 8 is provided with the mounting slideway, and the pilot bottom plate 5 is mounted in the pilot frame 8 through the slideway structure. After the first and second mounting bolts fail, the slideway also has an anti-falling function for the pilot body 1. The pilot bottom plate 5 is fixed in an integrated manner through the pilot frame 8. Specifically, after being mounted through the mounting slideway, the pilot bottom plate 5 is locked by bolts to avoid wind resistance during operation of the high-speed train.

[0030] The initial mounting height of the pilot device is 145mm from the rail surface, and the height of the adjustable portion is adjusted as the wheel is turning repaired, so that the height of the pilot device from the rail surface remains unchanged, which can effectively play the pilot role. The hanging bracket and the mounting bracket are fixedly connected with the pilot bottom plate by welding, which has high strength. The structure of the pilot device is reliable.

[0031] Based on the pilot device of the multiple-unit train provided in the above embodiments, a multiple-unit train is further provided according to the present disclosure. A pilot device is provided at the front end of the train body, and the pilot device provided in the multiple-unit train is the pilot device of the multiple-unit train according to any one of the above embodiments.

[0032] Since the pilot device of the multiple-unit train according to the above embodiments is adopted in the multiple-unit train, reference may be made to the above embodiments for the beneficial effects of the multiple-

unit train brought by the pilot device of the multiple-unit train.

[0033] The description above only shows the preferred embodiments of the present disclosure, and is not intended to limit the present disclosure. For those skilled in the art, various modifications and changes may be made to the present disclosure. Any modifications, equivalent substitutions and improvements made within the spirit and the principle of the present disclosure are within the protection scope of the present disclosure.

Claims

1. A pilot device of a multiple-unit train, fixedly mounted on a front end of a train body underframe, wherein the pilot device comprises a pilot body provided on a lower end of the train body underframe, a height adjustment device is provided on a front end of the pilot body along a width direction of the pilot body, the height adjustment device is provided with a plurality of strip-shaped holes of which a length direction is arranged in a vertical direction, and a positioning bolt for positioning the height adjustment device and the pilot body is provided between the height adjustment device and the pilot body.
2. The pilot device of the multiple-unit train according to claim 1, wherein a crossbeam arranged along a width direction of the train body is provided on the train body underframe, a hanging bracket hung on the crossbeam is provided on a top surface of the pilot body, a first mounting bolt connecting the hanging bracket with the crossbeam is provided between the hanging bracket and the crossbeam, and a shearing direction of the first mounting bolt is arranged in a pilot direction.
3. The pilot device of the multiple-unit train according to claim 2, wherein the pilot body is further provided with mounting brackets respectively located on two sides of the train body underframe in the width direction of the train body underframe, a second mounting bolt connecting each of the mounting brackets with the train body underframe is provided between the corresponding mounting bracket and the train body underframe, and a shearing direction of the second mounting bolt is arranged in the pilot direction.
4. The pilot device of the multiple-unit train according to claim 3, wherein the crossbeam comprises a front crossbeam and a rear crossbeam arranged in a front-rear direction of the train body underframe, and the hanging bracket comprises a front hanging bracket hung on the front crossbeam and a rear hanging bracket hung on the rear crossbeam.
5. The pilot device of the multiple-unit train according to claim 4, wherein a plurality of front hanging brackets and a plurality of rear hanging brackets are provided along the width direction of the train body underframe.
6. The pilot device of the multiple-unit train according to claim 5, wherein two front hanging brackets and two rear hanging brackets are provided along the width direction of the train body underframe.
7. The pilot device of the multiple-unit train according to claim 2, wherein the hanging bracket comprises an anti-falling portion extending vertically out of a top surface of the pilot body and a hanging portion extending laterally out of a top of the anti-falling portion, and the anti-falling portion is located at a front end of the crossbeam.
8. The pilot device of the multiple-unit train according to claim 1, wherein a plurality of mounting lugs for mounting an opening and closing mechanism at a front end of the train body underframe are fixedly provide on a periphery the pilot body.
9. The pilot device of the multiple-unit train according to claim 1, wherein the pilot body comprises a pilot bottom plate and a pilot frame for fixing the pilot bottom plate, and the pilot frame is provided with a mounting slideway for mounting the pilot bottom plate in a sliding manner.
10. A multiple-unit train, wherein a pilot device is provided at a front end of a train body, and the pilot device is the pilot device of the multiple-unit train according to any one of claims 1 to 9.

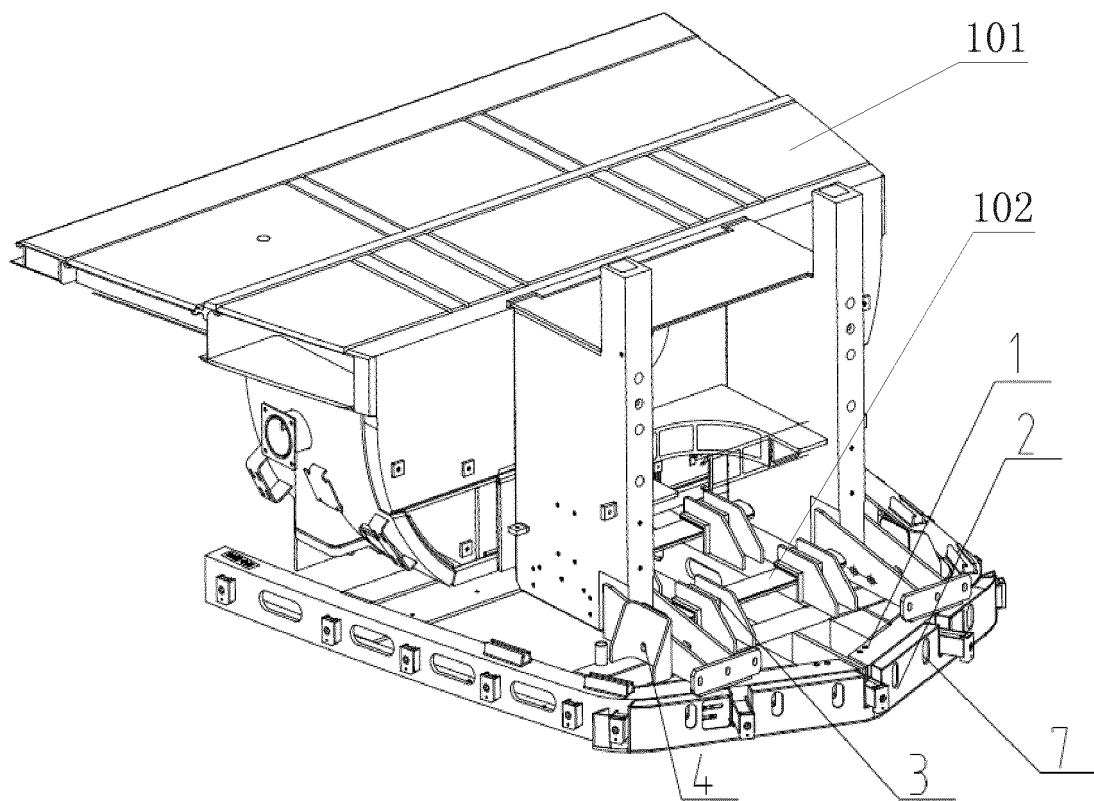


Figure 1

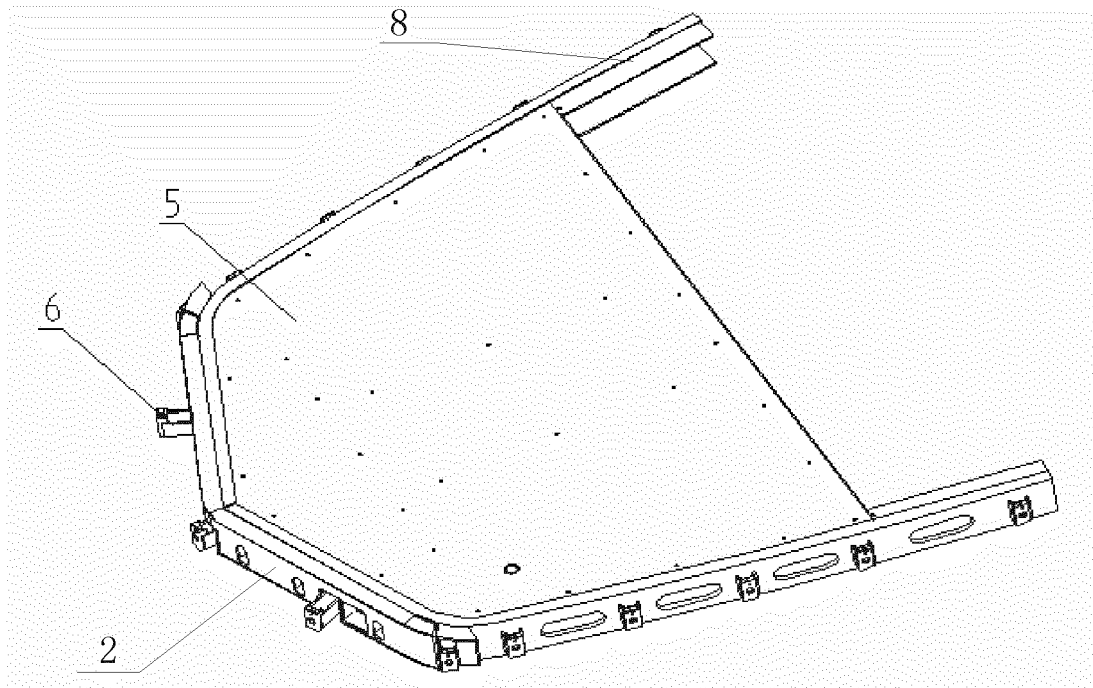


Figure 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/070439

A. CLASSIFICATION OF SUBJECT MATTER B61F 19/06(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) B61																		
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, VEN: 排障, 清障, 清轨, 扫轨, 排石, 高度, 调节, 调整, 调高, 吊装, 梁, 框架, cowcatcher, remov+, integrat+, height, adjust+, frame																		
C. DOCUMENTS CONSIDERED TO BE RELEVANT																		
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>PX</td> <td>CN 209454762 U (CRRC CHANGCHUN RAILWAY VEHICLES CO., LTD.) 01 October 2019 (2019-10-01) claims 1-10</td> <td>1-10</td> </tr> <tr> <td>X</td> <td>CN 109109901 A (CRRC ZHUZHOU LOCOMOTIVE CO., LTD.) 01 January 2019 (2019-01-01) description, paragraphs [0030]-[0049], and figures 1-6</td> <td>1-10</td> </tr> <tr> <td>X</td> <td>CN 102320312 A (CHANGCHUN RAILWAY VEHICLES CO., LTD.) 18 January 2012 (2012-01-18) description, paragraphs [0008] and [0009], and figure 1</td> <td>1, 10</td> </tr> <tr> <td>X</td> <td>CN 201685828 U (CHANGCHUN RAILWAY VEHICLES CO., LTD.) 29 December 2010 (2010-12-29) description, paragraph [0007], and figure 1</td> <td>1, 10</td> </tr> <tr> <td>A</td> <td>US 4478152 A (HOLLEY ENGINEERING COMPANY, INC.) 23 October 1984 (1984-10-23) entire document</td> <td>1-10</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	PX	CN 209454762 U (CRRC CHANGCHUN RAILWAY VEHICLES CO., LTD.) 01 October 2019 (2019-10-01) claims 1-10	1-10	X	CN 109109901 A (CRRC ZHUZHOU LOCOMOTIVE CO., LTD.) 01 January 2019 (2019-01-01) description, paragraphs [0030]-[0049], and figures 1-6	1-10	X	CN 102320312 A (CHANGCHUN RAILWAY VEHICLES CO., LTD.) 18 January 2012 (2012-01-18) description, paragraphs [0008] and [0009], and figure 1	1, 10	X	CN 201685828 U (CHANGCHUN RAILWAY VEHICLES CO., LTD.) 29 December 2010 (2010-12-29) description, paragraph [0007], and figure 1	1, 10	A	US 4478152 A (HOLLEY ENGINEERING COMPANY, INC.) 23 October 1984 (1984-10-23) entire document	1-10
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.																		
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Date of the actual completion of the international search 16 March 2020	Date of mailing of the international search report 01 April 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 Facsimile No. (86-10)62019451	Authorized officer Telephone No.																	

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2020/070439

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 209454762 U	01 October 2019	None	
CN 109109901 A	01 January 2019	None	
CN 102320312 A	18 January 2012	None	
CN 201685828 U	29 December 2010	None	
US 4478152 A	23 October 1984	None	

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Patent documents cited in the description

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