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(54) **PIVOT-TYPE SUSPENDED MONORAIL MULTI-TURNOUT BEAM AND RUNNING RAIL JOINT DEVICE THEREOF**

(57) A pivot-type suspended monorail multi-way turnout beam and a traveling rail jointing device thereof. The traveling rail jointing device for the pivot-type suspended monorail multi-way turnout beam includes: a jointing plate (10), a rotating support seat (20), a lever (30) and a push-pull assembly (40). The jointing plate (10) is disposed with a rotation shaft (12) thereon along an extension direction of a plate surface thereof. The rotation shaft (12) is rotatably embedded on the rotating support seat (20). A first end of the lever (30) is fixed on the jointing plate (10), and a second end of the lever (30) is connected to the push-pull assembly (40). The technical solution of the disclosure can realize reliable jointing for pivot-type suspended monorail multi-way turnout beams through a simple structure.

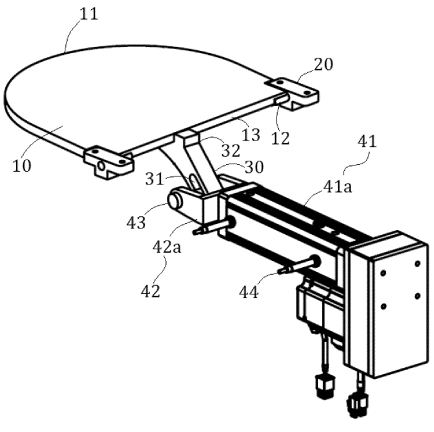

FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the priority to the Chinese patent application No. 202210082452.3 filed on January 24, 2022 and entitled "Pivot-type suspended monorail multi-way turnout beam and traveling rail jointing device thereof', the disclosure of which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The disclosure relates to the technical field of suspended monorail traffic, and particularly to a pivot-type suspended monorail multi-way turnout beam and traveling rail jointing device thereof.

BACKGROUND

[0003] In a pivot-type suspended monorail multi-way turnout system, in order to ensure the smooth deflection of the turnout, a certain gap is often left at the place where the turnout beam and the branch rail beam are docked to avoid obstruction and scratching. In the related technology, bridging structures are often disposed to reduce the impact of gaps on rail traffic. Such bridging structures usually are used for specific gaps under single-way working conditions, that is, they are embedded into gaps with shapes and specifications fitted with them. However a multi-way turnout has gaps with various gap shapes and specifications, and therefore, the needs of multi-way turnout working conditions cannot be met by such bridging structures, resulting in unreliable jointing effects.

SUMMARY

[0004] The disclosure provides a pivot-type suspended monorail multi-way turnout beam and traveling rail jointing device thereof to solve the technical problem in the prior art that jointing effects of a turnout beam and a rail beam in the pivot-type suspended monorail multi-way turnout system are unreliable.

[0005] In an aspect of the disclosure, a traveling rail jointing device for a pivot-type suspended monorail multi-way turnout beam is provided, including: a jointing plate, a rotating support seat, a lever and a push-pull assembly. The jointing plate is disposed with a rotation shaft thereon along an extension direction of a plate surface thereof. The rotation shaft is rotatably embedded on the rotating support seat. A first end of the lever is fixed on the jointing plate, and a second end of the lever is connected to the push-pull assembly.

[0006] In some embodiments, a body of the lever is disposed with a waist-shaped hole thereon; the push-pull assembly comprises: an axial push-pull member, a push rod head and a pin shaft; the push rod head is connected to an axial moving end of the axial push-pull member; the pin shaft is disposed on the push rod head, and is embedded in the waist-shaped hole; and a push-pull direction of the axial push-pull member intersects with a direction of long axis of the waist-shaped hole.

[0007] In some embodiments, the push rod head includes: a U-shaped bracket; the pin shaft is rotatably embedded on two support arms of the U-shaped bracket; a bottom of the U-shaped bracket is fixed on the axial push-pull member.

[0008] In some embodiments, the axial push-pull member includes: an electric push rod; an end of the electric push rod is connected to the push rod head.

[0009] In another aspect of the disclosure, a pivot-type suspended monorail multi-way turnout beam is provided, including: a turnout beam body and the traveling rail jointing device for the pivot-type suspended monorail multi-way turnout beam according to any one of the above embodiments, the traveling rail jointing device is provided at an end of the turnout beam body.

[0010] In some embodiments, a sink platform is opened and disposed on a rail surface of the turnout beam body, and the rotating support seat is disposed in the sink platform; a housing area is opened and disposed in the sink platform, and the jointing plate is placed in the housing area; the sink platform is opened and disposed with a lever housing hole that passes through the turnout beam body, and the lever is deflectably arranged in the lever housing hole.

[0011] In some embodiments, wherein a depth of the housing area for the jointing plate relative to the rail surface is less than or equal to a thickness of the jointing plate.

[0012] In some embodiments, the push-pull assembly is detachably fixed under the turnout beam body through fasteners.

[0013] In some embodiments, an edge of the jointing plate is disposed with an arc-shaped connecting section.

[0014] In some embodiments, a first end of the lever is disposed with a horizontal support profile surface and a vertical support profile surface. A bottom surface of the jointing plate is welded to the horizontal support profile surface. A side surface of the jointing plate is welded to the vertical support profile surface.

[0015] The pivot-type suspended monorail multi-way turnout beam and the traveling rail jointing device thereof are provided according to some embodiments of the disclosure. The jointing device is disposed with the rotating support seat to rotatably support the jointing plate, and is disposed with the lever and the push-pull assembly to provide a deflection power to push the jointing plate to deflect, so that the jointing plate can stand up and lay down on the rail surface of the traveling rail of the turnout beam, and therefore functional requirements that the jointing plate needs to be retracted during a switching process and the jointing plate is required to join the gap after the switching can be respectively met. The jointing device can cover the gaps by laying down the jointing plate to meet needs of joining the gaps with various

shapes and specifications, and has high reliability and adaptability. The jointing device can implement jointing through a way of deflecting the jointing plate, and therefore the jointing device has a simple structure and operation for jointing the gaps and is high efficiency.

BRIEF DESCRIPTION OF DRAWINGS

[0016] In order to more clearly illustrate the technical solutions in the embodiments of this application, a brief introduction will be made below to the accompanying drawings needed to be used in the description of the embodiments. Obviously, the accompanying drawings in the following description illustrate some embodiments of this application. For those skilled in the art, other accompanying drawings can also be obtained according to these drawings without creative labor.

FIG. 1 shows a schematic structural diagram of a jointing device for a pivot-type suspended monorail multi-way turnout beam according to some embodiments of the disclosure;

FIG. 2 shows a schematic diagram of a joint in a disconnected state of the pivot-type suspended monorail multi-way turnout beam according to some embodiments of the disclosure;

FIG. 3 shows a schematic diagram of the joint in a connected state of the pivot-type suspended monorail multi-way turnout beam in FIG. 2.

DESCRIPTION OF EMBODIMENTS

[0017] The technical solutions in the embodiments of this application will be clearly and completely described below with reference to the accompanying drawings in the embodiments of this application. Obviously, the described embodiments are only some embodiments of this application, rather than all embodiments. Based on the embodiments in this application, all other embodiments obtained by those skilled in the art without creative efforts fall within the scope of protection of this application.

[0018] It should be noted that all directional indications in the embodiments of this application are only used to explain relative positional relationships, movement conditions and so on among various components in a specific posture. If the specific posture changes, the directional indications also change accordingly.

[0019] The following disclosure provides many different embodiments or examples for implementing different structures of this application. To simplify the disclosure of this application, the components and arrangements of specific examples are described below. Of course, the specific examples are merely for illustrating and are not intended to limit the application. Furthermore, though reference numbers and/or reference letters may be repeated in different examples in the disclosure, such repetition is for the purposes of simplicity and clarity and does not by itself indicate a relationship between various embodiments and/or arrangements discussed. In addition, this application provides examples of various specific processes and materials, but those skilled in the art will recognize applications of other processes and/or uses of other materials.

[0020] The disclosure is described below in conjunction with the accompanying drawings and with reference to the embodiments.

[0021] The disclosure provides a pivot-type suspended monorail multi-way turnout beam and traveling rail jointing device thereof to solve the technical problem in the prior art of unreliable joints between a turnout beam and a rail beam of the pivot-type suspended monorail multi-way turnout system.

[0022] In order to better understand the technical solutions of the disclosure, the technical solutions will be described in detail below with reference to the accompanying drawings and the embodiments. It should be understood that the embodiments of the disclosure and the specific features in the embodiments are a detailed description of the technical solutions of this application, rather than limiting the technical solutions of this application. The embodiments of this application and the technical features in the embodiments can be combined with one another in the case of no conflict.

[0023] Referring to FIG. 1, the disclosure provides a traveling rail jointing device for a pivot-type suspended monorail multi-way turnout beam, to adapt gaps with a variety of shapes and specifications, meet requirements of working conditions of the multi-way turnout beams, and improve the reliability, adaptability and stability of joints.

[0024] In some embodiments, the traveling rail jointing device for the pivot-type suspended monorail multi-way turnout beam may include a jointing plate 10, a rotating support seat 20, a lever 30 and a push-pull assembly 40. A deflecting of a jointing plate 10 is implemented by corporations of the jointing plate 10, a rotating support seat 20, a lever 30 and a push-pull assembly 40. Therefore, the jointing plate 10 can realize a jointing by covering gaps, and in turn, the traveling rail jointing device has a wide range of adaptability to gaps of different shapes and specifications, and can perform reliable and stable jointing.

[0025] In some embodiments, the jointing plate 10 is disposed with a rotation shaft 12 thereon along an extension direction of a plate surface thereof. The rotation shaft 12 is rotatably embedded on the rotating support seat 20, and thus the jointing plate 10 can rotate relative to the rotating support seat 20.

[0026] A first end of the lever 30 is fixed on the jointing plate 10, and a second end of the lever 30 is connected to the push-pull assembly 40, so that the push-pull assembly 40 can push the jointing plate 10 to deflect so as to cover gaps or stand up. Therefore, a wide range of reliable and efficient jointing operations for various gaps can be achieved by a simple deflection operation of the jointing plate 10. The jointing device has a relatively

simple structure and good on-site mounting adaptability.

[0027] The push-pull assembly 40 is configured to provide a driving torque to drive the lever 30 to deflect. The rotating support seat 20 is, during assembly, fixed onto the turnout beam. Correspondingly, the push-pull assembly 40 can also be fixed to the turnout beam, and based on the push-pull assembly 40 a force can be applied to the lever 30. In order to meet rotation requirements of the lever 30, the push-pull assembly 40 can be configured in a variety of ways.

[0028] In some embodiments, the push-pull assembly 40 includes: an axial push-pull member 41, a push rod head 42, and a pin shaft 43. A body of the lever 30 is disposed with a waist-shaped hole 31 thereon.

[0029] The push rod head 42 is connected to an axial moving end of the axial push-pull member 41, and can be driven by the axial push-pull member 41 to reciprocate axially to perform push-pull operations. The pin shaft 43 is disposed on the push rod head 42. The pin shaft 43 is embedded in the waist-shaped hole 31, and a push-pull direction of the axial push-pull member 41 intersects with a direction of long axis of the waist-shaped hole 31, so that in a condition that a linear reciprocating movement of the push rod head 42 is ensured, the pin shaft 43 can be ensured to move along the waist-shaped hole 31 to push the lever 30 to deflect. Therefore, the driving operations are simple and efficient.

[0030] A position in which the push rod head 42 is relatively far away from the jointing plate 10 is an initial position, and in this condition, the jointing plate 10 is in a state of laying down for jointing. A position in which the push rod head 42 is relatively close to the jointing plate 10 is an action limit position of the axial push-pull member 41, and in this condition the jointing plate 10 is in a state of standing up for joint breaking. With a driving structure in which the waist-shaped hole 31 is provided to cooperate with the axial push-pull member 41, a deflection speed of the lever 30 can gradually reduce when jointing operations are performed, that is, the deflection speed is first fast and then slow, and the jointing operations are efficient and therefore the jointing plate 10 can be placed smoothly and slowly on the turnout beam and a rail beam to be connected with the turnout beam, to ensure a quality of the jointing. when a switching of the turnout beam is implemented and the jointing plate 10 is to be retracted, the deflection speed of the lever 30 gradually increases, that is, the deflection speed is first slow and then quick; therefore, the jointing plate 10 slowly start to move away from a surface of the rail beam, and then accelerates to move away, and then quickly move in position to adapt to a switching operation of the turnout beam, and therefore an operating efficiency is improved. Therefore, it is ensured that a stable and reliable process of laying down the jointing plate 10 to cover the gap is stable and reliable

[0031] Since the pin shaft 43 transmits an axial push-pull torque, and in order to ensure a stability and reliability of the axial push-pull torque, the push rod head 42 may be configured as a U-shaped bracket 42a, and the pin shaft 43 is rotatably embedded on two support arms of the U-shaped bracket 42a, thereby ensuring the stable force on the pin shaft 43. A bottom of the U-shaped bracket 42a is fixed on the axial push-pull member 41 for a stable connection.

[0032] In some embodiments, the axial push-pull member 41 may be configured as an electric push rod 41a. An end of the electric push rod 41a is connected to the push rod head 42. A rod body of the electric push rod 41a is driven to move axially by electromagnetism to achieve an application of axial push-pull force.

[0033] In some embodiments, the electric push rod 41a may be a specific push-pull member, and may also use action elements such as electric hydraulic cylinders and air cylinders which are not limited here.

[0034] In some embodiments, the lever 30 is driven to deflect through the axial push-pull member 41 and the lever 30 as well as the waist-shaped hole 31. In addition, it also can be configured as a motor, which cooperates with a reducer structure and a connecting rod. The connecting rod may be directly connected to the lever 30 to drive the lever 30 to deflect.

[0035] Referring to FIG. 2 and FIG. 3, in other embodiments, a pivot-type suspended monorail multi-way turnout beam based on the above-mentioned jointing device is also provided, which includes: a turnout beam body 50 and the above traveling rail jointing device for pivot-type suspended monorail multi-way turnout beam.

[0036] The traveling rail jointing device is disposed at an end of the turnout beam body 50 and cooperates with a switching operation of the turnout beam body 50 to realize jointing operations between the turnout beam body 50 and a branch rail beam 60.

[0037] In order to reduce an impact of the jointing device on a flatness of a rail surface on the turnout beam body 50, a sink platform 51 may be opened and disposed on the rail surface of the turnout beam body 50. The rotating support seat 20 is disposed in the sink platform 51. The sink platform 51 is opened and disposed with a housing area 51a therein and the jointing plate 10 is placed in the housing area 51a, thereby preventing the rotating support seat 20 and jointing plate 10 from protruding from the rail surface of the turnout beam body 50, ensuring the flatness of the rail surface, and reducing an impact on a traveling of train.

[0038] The sink platform 51 is opened and disposed with a lever housing hole 52 therein that passes through the turnout beam body 50. The lever 30 is deflectably arranged in the lever housing hole 52, so that the axial push-pull member 41 can be fixed in the turnout beam body 50 and located below a rail surface of a traveling rail. The jointing plate 10 is placed on the rail surface of the traveling rail. Therefore, the jointing device, with its overall small scale and simple structure, can well adapt to an internal space of the turnout beam body 50. The jointing device can implement jointing operations through a simple deflection action within a range of slightly larger than 90 degrees, and can also efficiently and stably adapt to

gaps of various specifications and shapes through the deflection of the jointing plate 10. Therefore requirements of jointing working conditions of the pivot-type suspended monorail multi-way turnout beam can be met.

[0039] In order to ensure a smooth undulation of the rail surface after jointing, a depth of the housing area 51a for the jointing plate 10 relative to the rail surface is equal to a thickness of the jointing plate 10, thereby ensuring that the rail surface of the traveling rail of the turnout beam is flat in a state that gaps are joined.

[0040] Referring to FIG. 1, the push-pull assembly 41 may be disposed with a fastener 44, so that the push-pull assembly 41 can be detachably fixed under the turnout beam body 50.

[0041] An edge of the jointing plate 10 is disposed with an arc-shaped connecting section 11. The arc-shaped connecting section 11 can smoothly dock with a rail surface sink platform 61 of the branch rail beam 60. An arc-shaped structural form can adapt gaps with various angles and forms. A side wall of the rail surface sink platform 61 of the branch rail beam 60 is also configured in an arc shape.

[0042] In order to meet reliability requirements of a stressed state, the first end 32 of the lever 30 is welded to a bottom surface 14 and a side surface 13 of the jointing plate 10 respectively, thereby achieving a stable fixation.

[0043] The pivot-type suspended monorail multi-way turnout beam and the traveling rail jointing device thereof are provided according to some embodiments of the disclosure. The jointing device is disposed with the rotating support seat to rotatably support the jointing plate, and is disposed with the lever and the push-pull assembly to provide a deflection power to push the jointing plate to deflect, so that the jointing plate can stand up and lay down on the rail surface of the traveling rail of the turnout beam, and therefore functional requirements that the jointing plate needs to be retracted during a switching process and the jointing plate is required to join the gap after the switching can be respectively met. The jointing device can cover the gaps by laying down the jointing plate to meet jointing requirements for the gaps with various shapes and specifications, and has high reliability and adaptability. The jointing device can implement jointing through a way of deflecting the jointing plate, and therefore the jointing device has a simple structure and operation, and high efficiency and reliability.

[0044] In this application, unless otherwise clearly stated and limited, the terms "connection", "fixing" and so on should be understood in a broad sense. For example, the "fixing" may be a fixed connection, a detachable connection, or in an integral body; the "connection" may be a mechanical connection or an electrical connection, and may be a direct connection or an indirect connection through an intermediate medium, and may be an internal connection between two elements or an interactive relationship between two elements, unless otherwise clearly limited. For those skilled in the art, specific implications of the above terms in this application can be understood according to specific circumstances.

[0045] In the description of this application, it needs to be understood that the directions and positions or the positional relationships indicated by the terms "center", "longitudinal", "transverse", "length", "width", "thickness", "upper", "lower", "front", "back", "left", "right", "vertical", "horizontal", "top", "bottom", "inside", "outside", "clockwise", "counterclockwise" and so on are based on the orientations or positional relationships shown in the accompanying drawings, which are only for the convenience of describing this application and simplifying the description, and does not indicate or imply that the device or element referred to must have a specific orientation, be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation on this application.

[0046] In addition, descriptions such as "first", "second" and so on in this application are for descriptive purposes only and cannot be understood as indicating or implying the relative importance or implicitly indicating the number of indicated technical features. Therefore, features defined as "first" and "second" may explicitly or implicitly include at least one of these features. In addition, the technical solutions in various embodiments can be combined with each other, but it must be based on the realization by those skilled in the art. When the combination of technical solutions is contradictory or cannot be realized, it should be considered that such a combination of technical solutions does not exist, nor is it within the protection scope sought by this application.

[0047] In the description of the present invention, unless otherwise expressly stated and limited, "above" or "below" a first feature to a second feature may include the first and second features being in direct contact, or may include the first and second features being not in direct contact but being in contact through another feature between them. Furthermore, a first feature is "over", "on a top of" and "above" a second feature includes the first feature being directly above and diagonally above the second feature, or simply indicates that the first feature is higher in level than the second feature. The first feature is "below", "under" and "beneath" the second feature includes the first feature being directly below and diagonally below the second feature, or simply indicates that the first feature is lower in level than the second feature.

[0048] In the description of this specification, the description with reference to the terms "one embodiment", "some embodiments", "an example", "specific examples" or "some examples" or the like indicates that specific features, structures, materials or characteristics described in connection with the embodiment or example are included in at least one embodiment or example of this application. In this specification, the schematic expressions of the above terms are not necessarily directed to the same embodiment or example. Furthermore, the specific features, structures, materials or characteristics described may be combined in any suitable manner in

any one or more embodiments or examples. Furthermore, those skilled in the art may incorporate and combine the different embodiments or examples described in this specification.

[0049] Although preferred embodiments of this application have been described, those skilled in the art will be able to make additional changes and modifications to these embodiments once the basic inventive concepts are understood. Therefore, it is intended that the appended claims be construed to include the preferred embodiments and all changes and modifications that fall within the scope of this application.

[0050] Obviously, those skilled in the art can make various changes and modifications to this application without departing from the spirit and scope of this application. In this way, if these modifications and variations of this application fall within the scope of the claims of this application and equivalent technologies, this application is also intended to include these modifications and variations.

Claims

1. A traveling rail jointing device for a pivot-type suspended monorail multi-way turnout beam, comprising: a jointing plate, a rotating support seat, a lever and a push-pull assembly;

   the jointing plate is disposed with a rotation shaft thereon along an extension direction of a plate surface thereof, the rotation shaft being rotatably embedded on the rotating support seat;
   a first end of the lever is fixed on the jointing plate, and a second end of the lever is connected to the push-pull assembly.

2. The traveling rail jointing device for the pivot-type suspended monorail multi-way turnout beam according to claim 1, wherein a body of the lever is disposed with a waist-shaped hole thereon;

   the push-pull assembly comprises an axial push-pull member, a push rod head and a pin shaft;
   the push rod head is connected to an axial moving end of the axial push-pull member;
   the pin shaft is disposed on the push rod head, and is embedded in the waist-shaped hole; and
   a push-pull direction of the axial push-pull member intersects with a direction of a long axis of the waist-shaped hole.

3. The traveling rail jointing device for the pivot-type suspended monorail multi-way turnout beam according to claim 2, wherein the push rod head comprises a U-shaped bracket;

   the pin shaft is rotatably embedded on two support arms of the U-shaped bracket; and
   a bottom of the U-shaped bracket is fixed on the axial push-pull member.

4. The traveling rail jointing device for the pivot-type suspended monorail multi-way turnout beam according to claim 2, wherein the axial push-pull member comprises an electric push rod;
   an end of the electric push rod is connected to the push rod head.

5. A pivot-type suspended monorail multi-way turnout beam, comprising: a turnout beam body and the traveling rail jointing device for the pivot-type suspended monorail multi-way turnout beam according to any one of claims 1 to 4;
   the traveling rail jointing device is provided at an end of the turnout beam body.

6. The pivot-type suspended monorail multi-way turnout beam according to claim 5, wherein a sink platform is opened and disposed on a rail surface of the turnout beam body, and the rotating support seat is disposed in the sink platform;

   the sink platform is opened and disposed with a housing area therein, and the jointing plate is placed in the housing area;
   the sink platform is opened and disposed with a lever housing hole therein that passes through the turnout beam body, and the lever is deflectably arranged in the lever housing hole.

7. The pivot-type suspended monorail multi-way turnout beam according to claim 6, wherein a depth of the housing area for the jointing plate relative to the rail surface is less than or equal to a thickness of the jointing plate.

8. The pivot-type suspended monorail multi-way turnout beam according to claim 6, wherein the push-pull assembly is detachably fixed under the turnout beam body through fasteners.

9. The pivot-type suspended monorail multi-way turnout beam according to claim 6, wherein an edge of the jointing plate is disposed with an arc-shaped connecting section.

10. The pivot-type suspended monorail multi-way turnout beam according to claim 9, wherein a bottom surface and a side surface of the jointing plate are respectively welded to the first end of the lever.

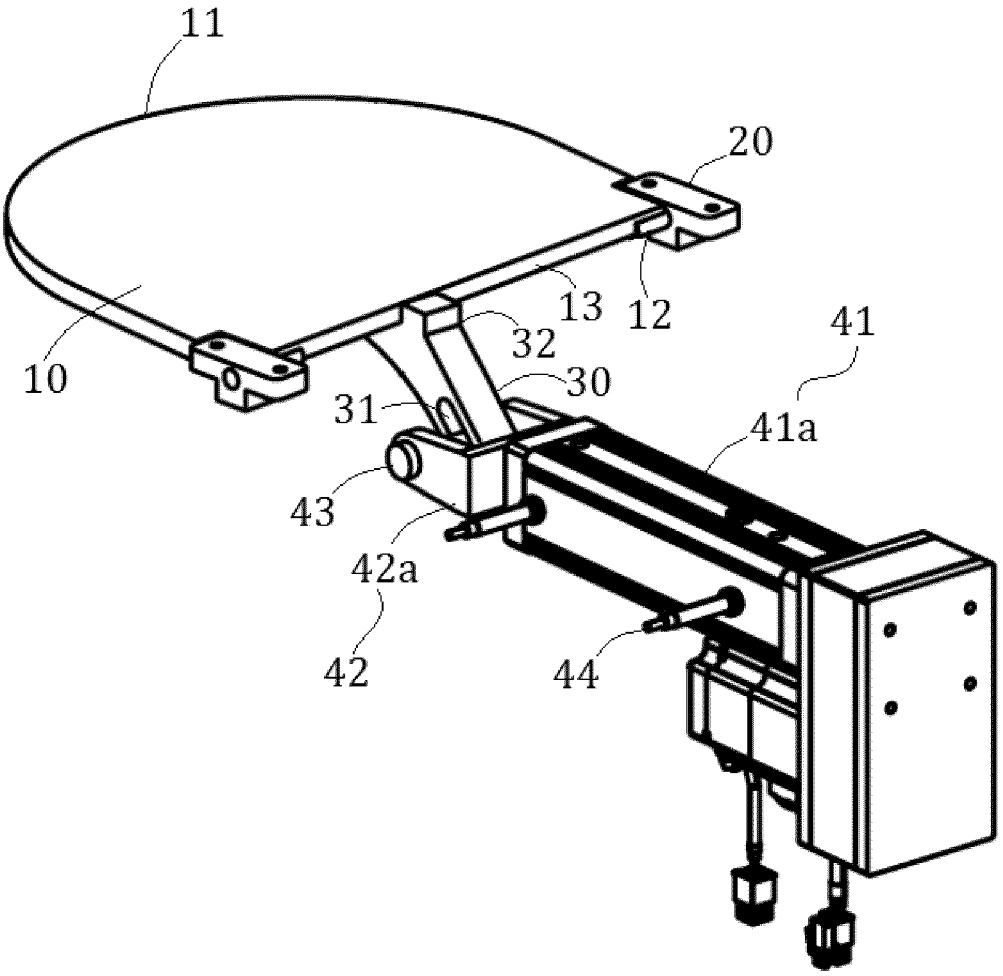

FIG. 1

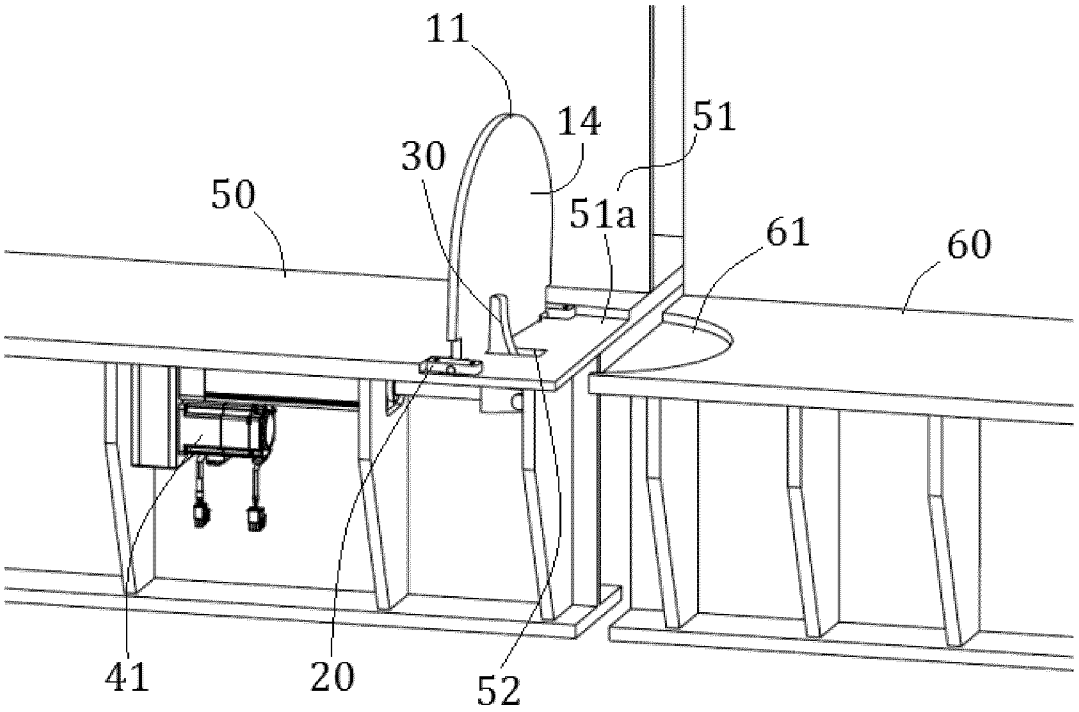

FIG. 2

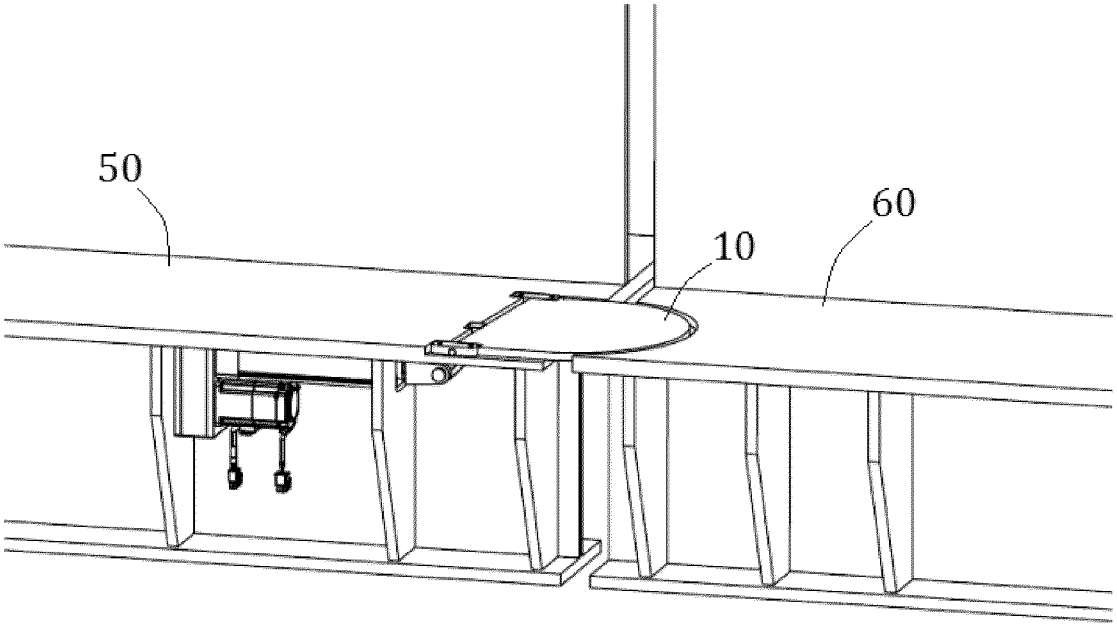

FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/073101

A. CLASSIFICATION OF SUBJECT MATTER

E01B25/22(2006.01)i;E01B25/24(2006.01)i;E01B25/26(2006.01)i;B61L5/10(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)

IPC: E01B, B61L

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)

CNTXT, ENTXTC, VEN, CNKI: 枢轴, 旋转, 悬挂, 道岔, 接缝, 衔接, 拨杆, 导杆, 推杆, 支座, 推拉, 牵引, 腰孔, 轴, U型, 支架, 沉台, 容置, pivot, rotate, suspend, turnout, joint, connect, shift rod, guide rod, push rod, support, push, pull, tract, waist hole, shaft, U-shaped, sink, accommodate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 114351515 A (CRRC YANGTZE RIVER TRANSPORTATION EQUIPMENT GROUP CO., LTD.) 15 April 2022 (2022-04-15) claims 1-10	1-10
PX	CN 217705793 U (CRRC YANGTZE RIVER TRANSPORTATION EQUIPMENT GROUP CO., LTD.) 01 November 2022 (2022-11-01) description, "specific embodiments", and figures 9-11	1-10
Y	CN 213799693 U (CHINA RAILWAY CONSTRUCTION HEAVY INDUSTRY CORP., LTD.) 27 July 2021 (2021-07-27) description, paragraphs 0021-0027, and figures 1-4	1-10
Y	CN 211713528 U (BYD CO., LTD.) 20 October 2020 (2020-10-20) description, paragraphs 0030-0049, and figures 1-7	1-10
A	CN 206581081 U (BYD CO., LTD.) 24 October 2017 (2017-10-24) entire document	1-10
A	DE 102018116537 A1 (LANG CHRISTIAN) 09 January 2020 (2020-01-09) entire document	1-10

☐ 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
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Date of the actual completion of the international search	Date of mailing of the international search report
24 April 2023	**25 April 2023**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2023/073101

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 114351515 A	15 April 2022	None	
CN 217705793 U	01 November 2022	None	
CN 213799693 U	27 July 2021	None	
CN 211713528 U	20 October 2020	None	
CN 206581081 U	24 October 2017	None	
DE 102018116537 A1	09 January 2020	None	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 202210082452 **[0001]**