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(54) **TRANSPORT DEVICE**

(57) The present application relates to a handling device. The handling device comprises a handling mechanism and a rotating mechanism. The handling mechanism comprises a pallet and a suction component, and materials can be suctioned or pushed out through movement of the suction component relative to the pallet. The rotating mechanism is connected with the handling mechanism and can drive the handling mechanism to rotate, so that an opening of the pallet faces an infeed position or an outfeed position. In this way, extending or retracting movement of the pallet is avoided, thereby effectively reducing a volume of the whole handling device and space occupation during operating.

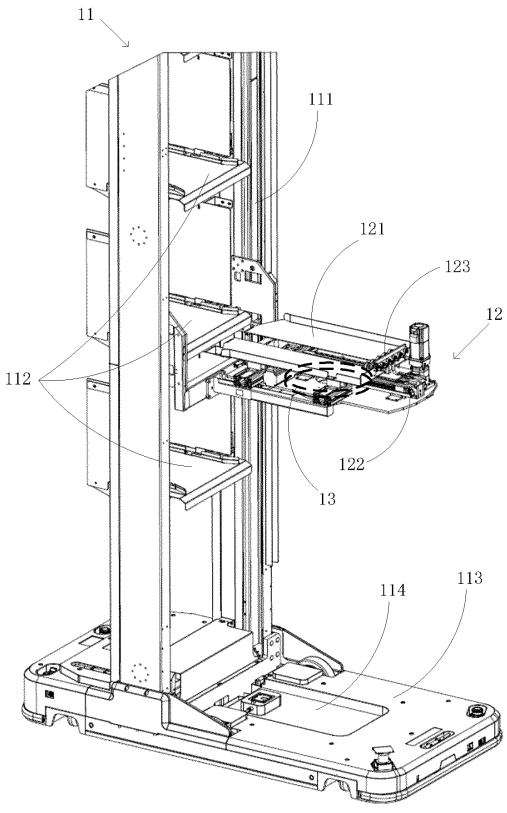

FIG. 2

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to the technical field of handling devices, and in particular, to a handling device.

BACKGROUND

[0002] In an operation process of a handling device, fork legs need to be extended to bottom of a material rack, and materials can be handled by using forward and backward telescopic movement of the fork legs, thereby effectively reducing human resource cost and labour intensity.

SUMMARY

[0003] Embodiment of the present application provides a handling device, including a handling mechanism and a rotating mechanism, where the handling mechanism includes a pallet, a first driver and a suction component arranged on the pallet; the pallet includes a front end provided with an opening and a rear end opposite to the front end; the first driver is connected with the suction component to drive the suction component to move between the front end and the rear end of the pallet; and a rotating output part of the rotating mechanism is connected with the handling mechanism to drive the front end of the pallet to face toward an infeed position or an outfeed position with rotation of the handling mechanism.

[0004] In some embodiments, the handling mechanism includes a substrate; the first driver and the pallet are assembled on one side of the substrate, and the pallet is located on one side of the first driver away from the substrate; and the rotating output part of the rotating mechanism is connected to another side of the substrate.

[0005] In some embodiments, the pallet is provided with at least one pair of connecting lugs on both sides along a width direction, the substrate is provided with assembling bosses in one-to-one correspondence with the connecting lugs, and the connecting lugs are fixedly connected with the assembling bosses.

[0006] In some embodiments, a bottom plate of the pallet is provided with an avoidance notch communicating the front end and the rear end; the suction component is disposed on the pallet, and is connected to the first driver through the avoidance notch.

[0007] In some embodiments, the bottom plate of the pallet includes a first portion and a second portion separated from each other, and the avoidance notch is formed between the first portion and the second portion.

[0008] In some embodiments, the suction component includes an assembling plate and at least one suction body; the assembling plate includes a vertical plate disposed along a movement direction perpendicular to the suction component and a connecting plate disposed parallel to a bottom plate of the pallet; the suction body is disposed on a side of the vertical plate facing toward the front end of the pallet; and the connecting plate is connected to the first driver.

[0009] In some embodiments, the suction component includes at least one of a suction cup or a magnetic member.

[0010] In some embodiments, the rotating mechanism includes a motor and a drive belt connected to an output end of the motor; and the rotating output part includes a turntable structure connected to the drive belt.

[0011] In some embodiments, the handling device further includes a base frame, and the base frame includes a base; the base is provided with a moving component and a second driver; the second driver is connected with the moving component to drive the moving component to drive the handling device to move.

[0012] In some embodiments, the handling device further includes a base frame, the base frame includes a support frame and at least one layer of storage shelf assembled to the support frame along a height direction; the handling device includes a lifting mechanism movably assembled to the support frame, and the handling device is assembled to the lifting mechanism.

[0013] The technical solutions provided by the embodiments of the present application may include following beneficial effects: as can be seen from the above embodiments, the handling device of the present disclosure includes a handling mechanism and a rotating mechanism. The handling mechanism includes a pallet and a suction component, and materials can be suctioned or pushed out through movement of the suction component relative to the pallet. The rotating mechanism is connected with the handling mechanism and can drive the handling mechanism to rotate, so that an opening of the pallet faces an infeed position or an outfeed position. In this way, extending or retracting movement of the pallet is avoided, thereby effectively reducing a volume of the whole handling device and space occupation during operating.

[0014] It should be understood that the above general description and the following detailed description are merely exemplary and explanatory, and do not limit the present disclosure.

BRIEF DESCRIPTION OF DRAWINGS

[0015] In order to more clearly illustrate the technical solutions in the embodiments of the present disclosure, the accompanying drawings required in the description of the embodiments will be briefly described below, obviously, the accompanying drawings in the following description are only some embodiments of the present disclosure, and for those skilled in the art, other accompanying drawings may also be obtained according to these accompanying drawings without making creative efforts.

FIG. 1 is a schematic structural diagram of a handling device according to an exemplary embodiment of the present disclosure.

FIG. 2 is a partial schematic structural diagram of a handling device according to an exemplary embodiment of the present disclosure.

FIG. 3 is a schematic diagram of an assembled structure of a handling mechanism in an exemplary embodiment of the present disclosure.

FIG. 4 is a schematic exploded structural diagram of a handling mechanism according to an exemplary embodiment of the present disclosure.

[0016] Reference numerals : 1 handling device; 11 base frame; 111 support frame; 112 storage shelf; 113 base; 114 second driver; 12 handling mechanism; 121 pallet; 1211 bottom plate; 1212 avoidance notch; 1213 connecting lug; 1214 first portion; 1215 second portion; 1216 front end; 1217 rear end; 122 first driver; 123 suction component; 1231 assembling plate; 1231a vertical plate; 1231b connecting plate; 1232 suction body; 124 substrate; 1241 assembling boss; 13 rotating mechanism; 131 turntable structure; 132 drive belt.

DETAILED DESCRIPTION

[0017] Exemplary embodiments will be described in detail herein, examples of which are illustrated in the accompanying drawings. When following description refers to the drawings, unless otherwise indicated, same numerals in different drawings indicate same or similar elements. Manners described in the following exemplary embodiments do not represent all manners consistent with the present disclosure. Rather, they are merely examples of apparatuses consistent with some aspects of the present disclosure as detailed in the appended claims.

[0018] Terms used in the present disclosure are for the purpose of describing particular embodiments only and is not intended to limit the present disclosure. Unless otherwise defined, technical terms or scientific terms used in the present disclosure shall be general meanings understood by those skilled in the art to which the present disclosure belongs. "First", "second" and similar words used in the specification and claims of the present disclosure do not represent any order, quantity or importance, but are merely used to distinguish different components. Similarly, words such as "a" or "an" do not indicate a quantity limitation, but indicate that there is at least one, and if only "one" is referred to, it will be specially described. "Multiple" or "several" means two or more. Unless otherwise indicated, words such as "front," "rear," "lower," and/or "upper" are for ease of illustration only and are not limited to one position or one spatial orientation. Words similar to "include" or "comprise" mean that elements or objects appearing before "include" or "comprise" cover elements or objects listed after "include" or "comprise" and equivalents thereof, and do not exclude other elements or objects. The terms "connected" or "coupled" and the like are not limited to physical or mechanical connections, and may include electrical connections, whether direct or indirect. Singular forms "a", "the" and "said" used in the specification of the present disclosure and the appended claims are also intended to include plural forms unless the context clearly indicates other meanings. It should also be understood that the term "and/or" as used herein refers to and encompasses any or all possible combinations of one or more associated listed items.

[0019] In an operation process of a handling device, fork legs need to be extended to bottom of a material rack, and materials can be handled by using forward and backward telescopic movement of the fork legs, thereby effectively reducing human resource cost and labor intensity. However, a structure size of the fork legs is large, and the forward and backward telescopic movement of the fork legs still needs to occupy a large operation space, resulting in technical problems of a large size of the handling device and inconvenient operation.

[0020] The present disclosure provides a handling device. FIG. 1 is a schematic structural diagram of a handling device in an exemplary embodiment of the present disclosure, and FIG. 2 is a schematic partial structural diagram of a handling device in an exemplary embodiment of the present disclosure. As shown in FIGS. 1 and 2, the handling device 1 includes a handling mechanism 12 and a rotating mechanism 13. The handling mechanism 12 includes a pallet 121, a first driver 122, and a suction component 123 disposed on the pallet 121. The pallet 121 includes a front end 1216 provided with an opening and a rear end 1217 opposite to the front end 1216, and the first driver 122 is connected to the suction component member 123 to drive the suction component 123 to move between the front end 1216 and the rear end 1217 of the pallet 121. A rotating output part of the rotating mechanism 13 is connected with the handling mechanism 12 to drive the front end 1216 of the pallet 121 to face toward an infeed position or an outfeed position with rotation of the handling mechanism 12. In some other embodiments, the handling device further includes a base frame 11, and the rotating mechanism 13 is assembled on the base frame 11.

[0021] In an embodiment of the present disclosure, the handling device 1 includes a handling mechanism 12 and a rotating mechanism 13. The handling mechanism 12 can suction or push out materials from the opening of the front end 1216 of the pallet 121 through the movement of the suction component 123 relative to the pallet 121, and the rotating mechanism 13 can drive the handling mechanism 12 to rotate so that the opening of the front end 1216 of the pallet 121 faces the infeed position or the outfeed position, thereby avoiding the extending or retracting movement of the pallet 121, and reducing the volume of the handling device 1 and the space occupation in the operation.

[0022] In some embodiments, the base frame 11 may

include a base 113 provided with a moving component and a second driver 114; the second driver 114 is connected to the moving component to drive the moving component to drive the handling device 1 to move. The moving component located on the base 113 can drive the whole handling device 1 to move according to a preset trajectory, so as to handle a material between two positions. The moving component may be wheels located at four corners of the base 113, the second driver 114 may be a motor located in a middle region of the base 113, and the motor 114 drives the wheels to move along a preset trajectory.

[0023] In some embodiments, the base frame 11 may include a support frame 111 and at least one layer of storage shelf 112 assembled to the support frame 111 along a height direction, the handling device 1 includes a lifting mechanism movably assembled to the support frame 111, and the handling mechanism 12 is assembled to the lifting mechanism. The lifting mechanism can drive the handling mechanism 12 to lift in the height direction to transfer a material to storage shelves 112 at different height positions.

[0024] In some embodiments, as shown in FIG. 3 and FIG. 4, the handling mechanism 12 includes a substrate 124, the first driver 122 and the pallet 121 are assembled on one side of the substrate 124 (for example, an upper side of the substrate 124), the pallet 121 is located above the first driver 122 (for example, a side away from the substrate 124), and the rotating output part of the rotating mechanism 13 is connected to another side of the substrate 124 (for example, a lower side of the substrate 124). Integrated assembly of the handling mechanism 12 is achieved through the substrate 124. The pallet 121 is located above the first driver 122, that is, the first driver 122 is disposed between the pallet 121 and the substrate 124, which not only can prevent the first driver 122 from interfering with the structure of the pallet 121 when supporting materials, but also can shield the first driver 122 by using the pallet 121, thereby improving aesthetics of the handling mechanism 12. In addition, assembling the rotating output part of the rotating mechanism 13 on the other side of the substrate 124 can also avoid structural and functional interference between the rotating mechanism 13 and the first driver 122 and the pallet 121.

[0025] In the above embodiments, two sides of the pallet 121 along the width direction may be provided with at least one pair of connecting lugs 1213, the width direction may be a direction indicated by a dotted arrow Y in FIG. 3, the substrate 124 is provided with assembling bosses 1241 corresponding to the connecting lugs 1213 one by one, and the connecting lugs 1213 are fixedly connected with the assembling bosses 1241. By fixedly connecting the assembling bosses 1241 and the connecting lugs 1213, the pallet 121 is fixed, and the structural stability of the pallet 121 is improved. For example, connecting lugs 1213 may be respectively disposed on two sides of the pallet 121 close to the front end 1216 (for example, two sides in the direction indicated by two arrows in the dashed arrow Y in FIG. 3) and two sides close to the rear end 1217, to enhance the structural reliability of the pallet 121. The connecting lugs 1213 may be bar structures assembled on both sides of the pallet 121, the assembling bosses 1241 may be a section of metal profiles assembled on the substrate 124, and plate reinforcement structures and an upper surface of the metal profiles may be fixedly assembled through a connecting member such as a screw.

[0026] In some embodiments, the bottom plate 1211 of the pallet 121 is provided with an avoidance notch 1212 communicating the front end 1216 and the rear end 1217, and the suction component 123 is disposed on the pallet 121 and connected to the first driver 122 through the avoidance notch 1212. The bottom plate 1211 of the pallet 121 is provided with the avoidance notch 1212, so that the suction component 123 respectively distributed on upper and lower sides of the pallet 121 and the first driver 122 can be kept connected through the avoidance notch 1212 during the movement of the suction component 123, thereby ensuring the driving stability of the first driver 122 to the suction component 123.

[0027] In the above embodiments, the bottom plate 1211 of the pallet 121 may include a first portion 1214 and a second portion 1215 separated from each other, and the avoidance notch 1212 is formed between the first portion 1214 and the second portion 1215. That is, the first portion 1214 and the second portion 1215 are respectively fixedly assembled to the substrate 124, so that structural strength of the pallet 121 can be improved when the avoidance notch 1212 is formed.

[0028] In some embodiments, the suction component 123 includes an assembling plate 1231 and at least one suction body 1232. The assembling plate 1231 includes a vertical plate 1231a arranged along a direction perpendicular to the movement direction of the suction component 123 and a connecting plate 1231b arranged parallel to a bottom plate 1211 of the pallet 121, and a pointed direction of the dashed line X arrow in FIG. 3 may represent the movement direction of the suction component 123. The suction body 1232 is disposed on a side of the vertical plate 1231a facing the front end 1216 of the pallet 121, and the connecting plate 1231b is connected to the first driver 122. Fixedly assembly of the suction body 1232 is realized through the assembling plate 1231, which helps to adjust the movement direction of the suction component 123, thereby effectively improving the convenience of the suction operation of the suction component 123 on the material. The vertical plate 1231a is perpendicular to the movement direction of the suction component 123, so that when the suction component 123 moves to the front end 1216 of the pallet 121, the suction operation is completed through the suction component 123 disposed on the vertical plate 1231a, thereby shortening a movement path of the suction component 123 and simplifying the suction action. The connecting plate 1231b is parallel to the bottom plate 1211 of the pallet 121, so that the connecting plate 1231b is connected to

the first driver 122 located below the pallet 121.

[0029] In the above embodiments, the suction body 1232 of the suction component 123 may include at least one of a suction cup or a magnetic member, to implement a suction operation by using the suction cup or the magnetic member. For example, the suction body 1232 may include a plurality of suction cups arranged in an array on the vertical plate 1231a, or may be one or more magnetic members. The material may be provided with a suction member matched with the suction cup or the magnetic member, so as to facilitate the suction of the suction body 1232 to the material.

[0030] In some embodiments, the rotating mechanism 13 includes a motor and a drive belt 132 connected to an output end of the motor, and the rotating output part of the rotating mechanism 13 includes a turntable structure 131 connected to the drive belt 132. When the turntable structure 131 is driven by the motor to rotate, the handling mechanism 12 may be driven to rotate on a plane parallel to the bottom plate 1211 of the pallet 121. A rotation angle range may be 360 °, or the angle may be set according to the infeed position and the outfeed position. For example, a storage shelf 112 of the base frame 11 is located behind the infeed position as the outfeed position, the front end 1216 of the pallet 121 may face the infeed position in an initial position, and a rotating angle of the handling mechanism 12 may range from 0° to 180°. Alternatively, when the front end 1216 of the pallet 121 is in the initial position, the front end 1216 of the pallet 121 may also face other orientations, which is not limited in the present disclosure.

[0031] The operation of the handling device 1 will be exemplarily described below by taking that an orientation of the pallet 121 in the initial position perpendicular to the direction of a connection line between the infeed position and the outfeed position, that is, the rotation angle range of the handling mechanism 12 may be from -90 ° to 90 ° relative to the direction of the connection line as an example.

[0032] The pallet 121 is driven by the rotating mechanism 13 to rotate by 90° so that the opening of the pallet 121 faces toward the infeed position. The suction component 123 moves from the rear end 1217 of the pallet 121 to the front end 1216 of the pallet 121 under the driving of the first driver 122, and the handling device 1 controls the suction component 123 to operate to suction a material located at the opening of the front end 1216 of the pallet 121. The suction component 123 may perform a reset movement toward the rear end 1217 of the pallet 121 after suctioning the material to bring the material back to the pallet 121. The pallet 121 is rotated again to a position of -90°, so that the opening of the front end 1216 of the pallet 121 faces the outfeed position of the storage shelf 112, and the material is pushed out to the storage shelf 112 through the suction component 123, and the handling device 1 controls the suction component 123 to stop operating to release the material, and then the suction component 123 is reset to the rear end 1217 of the pallet 121. After the storage shelf 112 at a height position is fully filled, the handling mechanism 12 can be lifted to a height of a next storage shelf 112 through a lifting mechanism, and the handling mechanism 12 repeats the above process to realize repeated handling of materials.

[0033] The specific embodiments described herein are merely illustrative of the present disclosure. Those skilled in the art to which this disclosure belongs may make various modifications, supplements, or replace the described specific embodiments with similar methods, but do not deviate from the scope defined by this disclosure or beyond the appended claims.

[0034] The technical features of the above embodiments may be combined arbitrarily, and in order to make the description concise, not all possible combinations of the technical features in the above embodiments are described, however, as long as there is no contradiction between the combinations of the technical features, it should be considered as the scope of the description.

Claims

1. A handling device, comprising:

a handling mechanism, comprising a pallet, a first driver and a suction component arranged on the pallet; wherein the pallet comprises a front end provided with an opening and a rear end opposite to the front end; the first driver is connected with the suction component to drive the suction component to move between the front end and the rear end of the pallet; and

a rotating mechanism, wherein a rotating output part of the rotating mechanism is connected with the handling mechanism to drive the front end of the pallet to face toward an infeed position or an outfeed position with rotation of the handling mechanism.

2. The handling device according to claim 1, wherein

the handling mechanism comprises a substrate; the first driver and the pallet are assembled on a side of the substrate, and the pallet is located on a side of the first driver away from the substrate; the rotating output part of the rotating mechanism is connected with another side of the substrate.

3. The handling device according to claim 2, wherein

the pallet is provided with at least one pair of connecting lugs on both sides along a width direction,

the substrate is provided with assembling bosses in one-to-one correspondence with the connecting lugs, and the connecting lugs are

fixedly connected with the assembling bosses.

4. The handling device according to any one of claims 1-3, wherein

a bottom plate of the pallet is provided with an avoidance notch communicating the front end and the rear end;
the suction component is disposed on the pallet, and is connected to the first driver through the avoidance notch.

5. The handling device according to claim 4, wherein the bottom plate of the pallet comprises a first portion and a second portion separated from each other, and the avoidance notch is formed between the first portion and the second portion.

6. The handling device according to any one of claims 1-5, wherein the suction component comprises an assembling plate and at least one suction body;

the assembling plate comprises a vertical plate arranged along a direction perpendicular to a movement direction of the suction component and a connecting plate arranged parallel to a bottom plate of the pallet;
the suction body is disposed on a side of the vertical plate facing toward the front end of the pallet;
the connecting plate is connected with the first driver.

7. The handling device according to any one of claims 1-6, wherein the suction component comprises at least one of a suction cup or a magnetic member.

8. The handling device according to any one of claims 1-7, wherein

the rotating mechanism comprises a motor and a drive belt connected to an output end of the motor;
the rotating output part comprises a turntable structure connected to the drive belt.

9. The handling device according to any one of claims 1-8, wherein the handling device further comprises a base frame, and the base frame comprises a base; the base is provided with a moving component and a second driver; the second driver is connected with the moving component to drive the moving component to drive the handling device to move.

10. The handling device according to any one of claims 1-9, wherein the handling device further comprises a base frame, the base frame comprises a support frame and at least one layer of storage shelf assembled to the support frame along a height direction; the handling device comprises a lifting mechanism movably assembled to the support frame, and the handling device is assembled to the lifting mechanism.

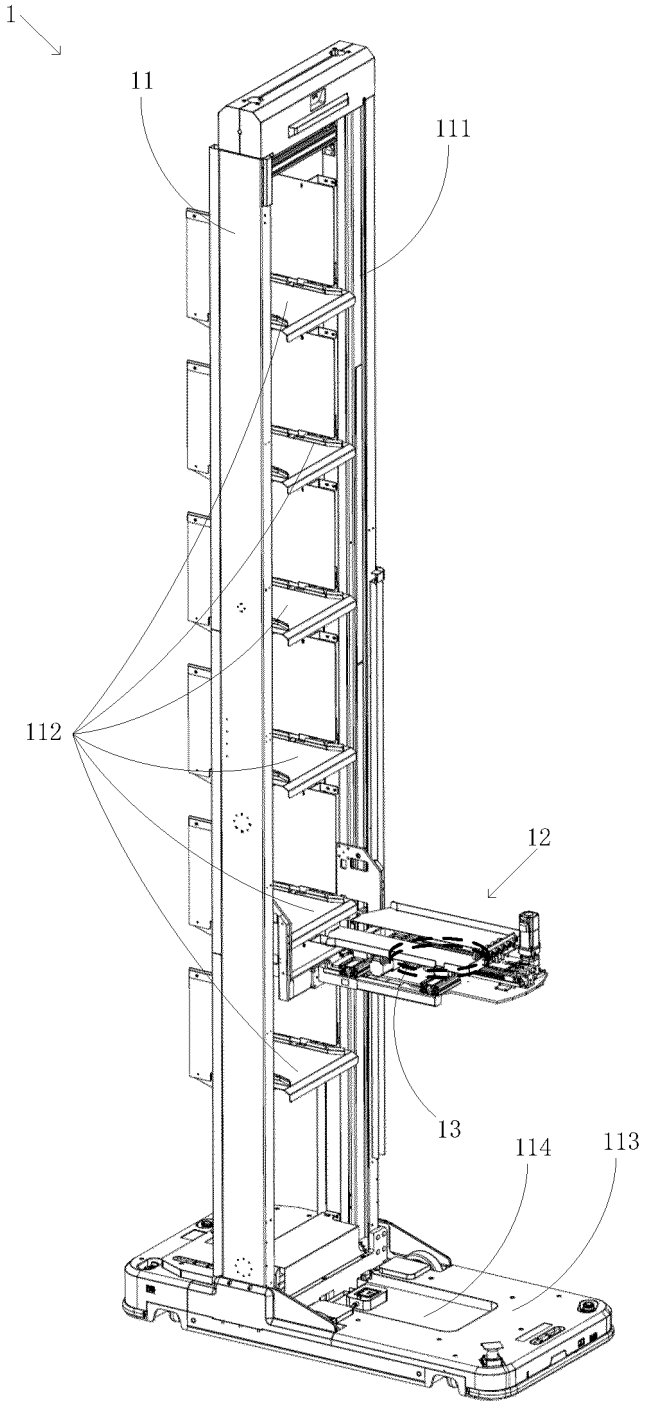

FIG. 1

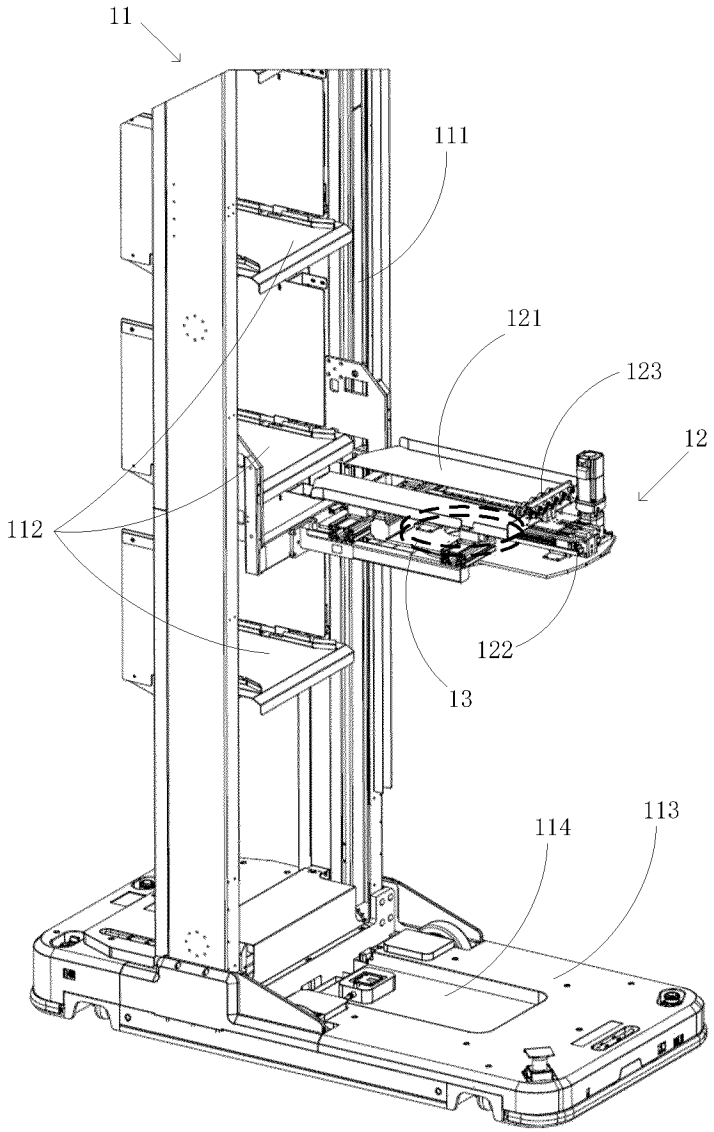

FIG. 2

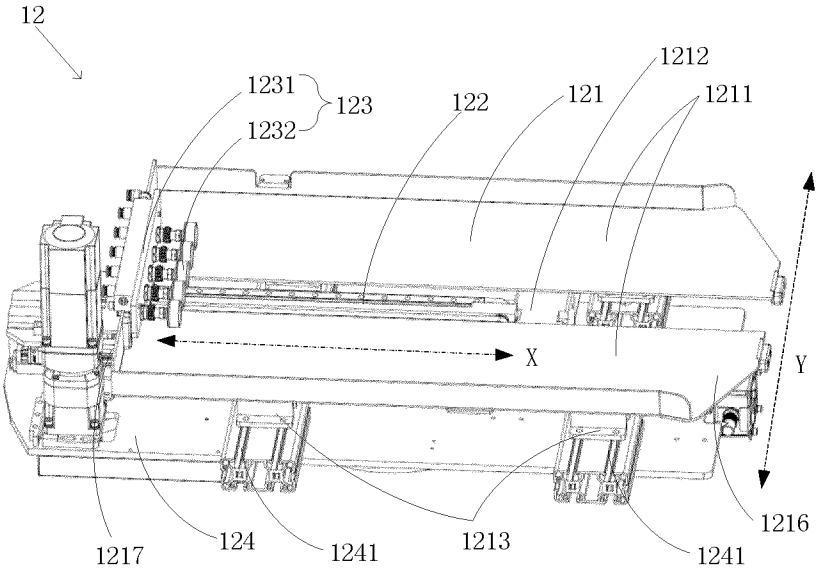
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FIG. 3

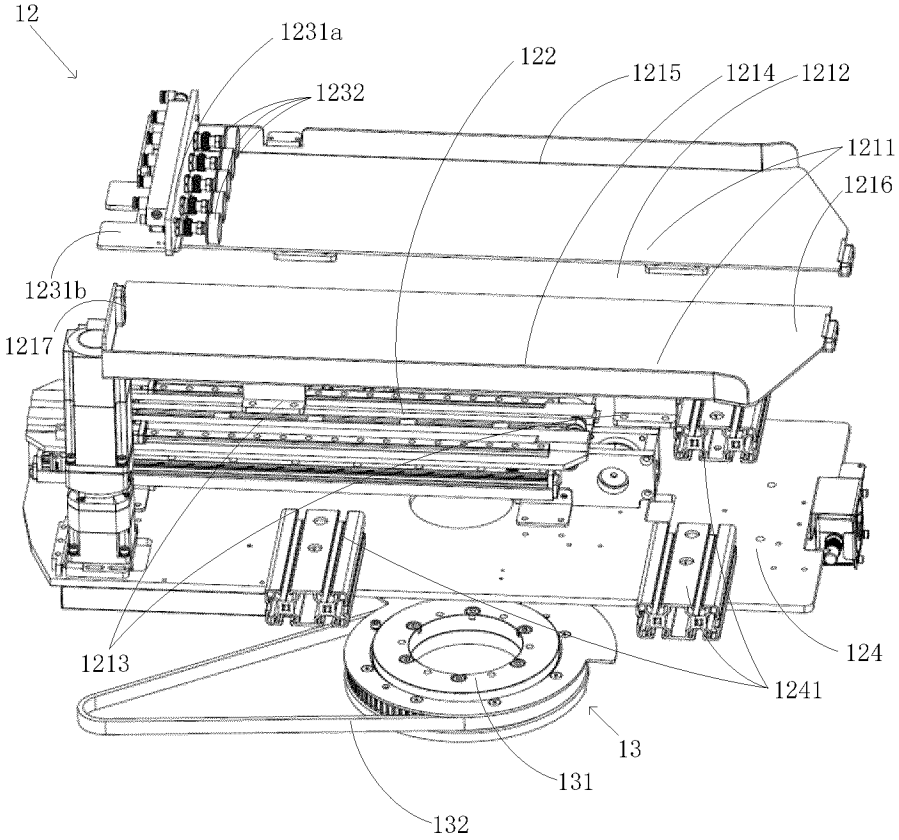
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FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2024/087371

A. CLASSIFICATION OF SUBJECT MATTER

B66F9/18(2006.01)i; B66F9/19(2006.01)i; B66F9/075(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: B66F, B65G

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)

CNKI; CNTXT; VEN; CNABS: 搬运, 吸附, 吸盘, 旋转, 回转, 转盘, 存放, 暂存, 托盘, handle, convey, logistic, lift, raise, suction, rotate, turn, tray, feed, discharge, storage

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	CN 115417053 A (SHENZHEN HAIROU INNOVATION TECHNOLOGY CO., LTD.) 02 December 2022 (2022-12-02) see description, paragraphs 99-171, and figures 1-20	1-7, 9-10
Y	CN 115417053 A (SHENZHEN HAIROU INNOVATION TECHNOLOGY CO., LTD.) 02 December 2022 (2022-12-02) see description, paragraphs 99-171, and figures 1-20	8
Y	CN 212892698 U (GUANGDONG ZHIYUAN ROBOT TECHNOLOGY CO., LTD.) 06 April 2021 (2021-04-06) see description, paragraphs 21-40, and figures 1-4	8
X	CN 113651000 A (SHENZHEN HAIROU INNOVATION TECHNOLOGY CO., LTD.) 16 November 2021 (2021-11-16) see description, paragraphs 99-171, and figures 1-20	1-7, 9, 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
"D" document cited by the applicant in the international application
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"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
23 May 2024	**07 June 2024**

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

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2024/087371

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 2020078936 A1 (ZHEJIANG GUOZI ROBOT TECHNOLOGY CO., LTD.) 12 March 2020 (2020-03-12) see entire document	1-10

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2024/087371

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