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(54) **UNMANNED WAREHOUSE-GOODS SORTING OPERATION DEVICE**

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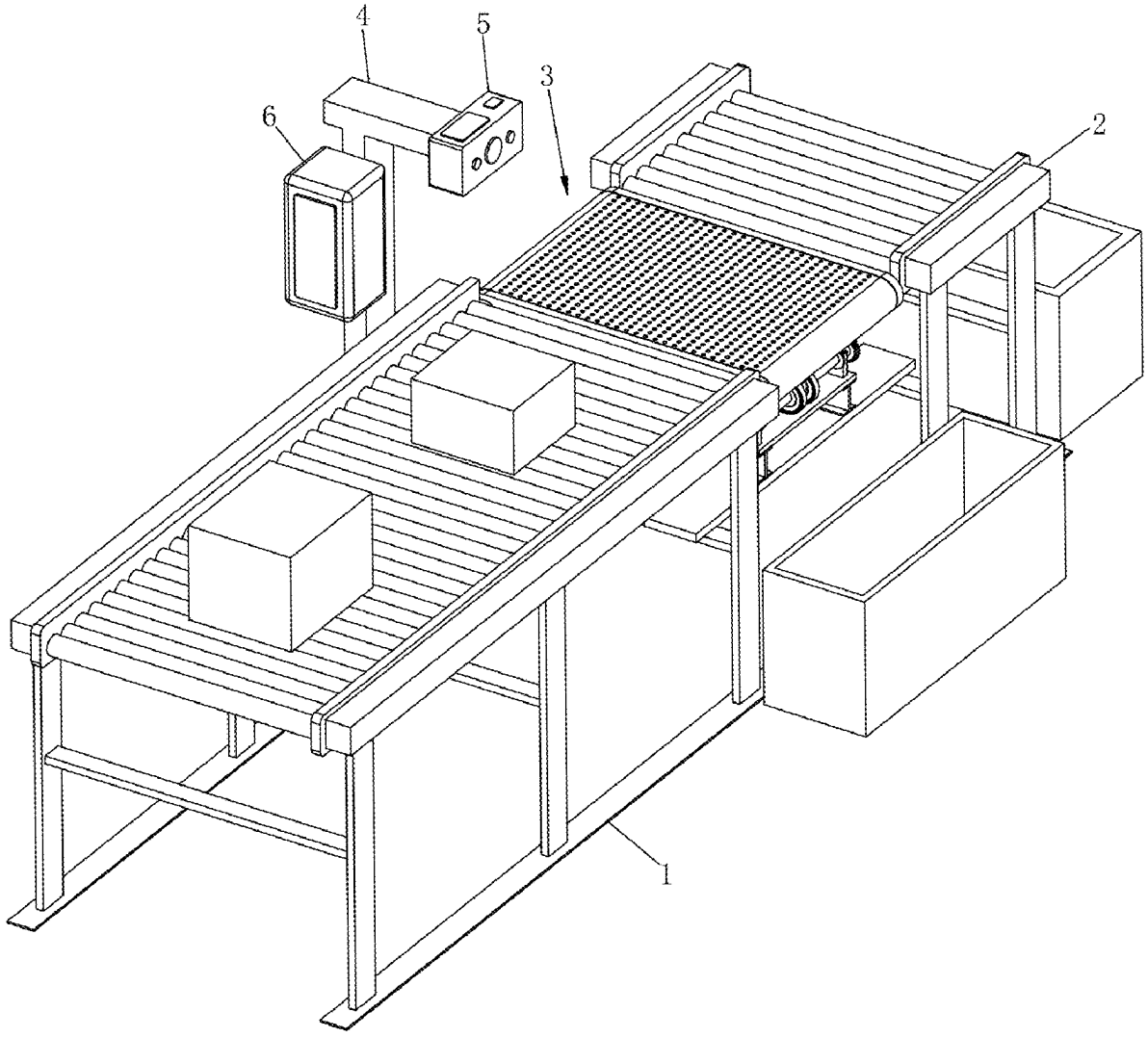
(57) **ABSTRACT**

An unmanned warehouse-goods sorting operation device is provided, and includes a goods feeding conveyor, a tiltable tray assembly, and a goods discharging conveyor which are arranged in sequence in a longitudinal direction. The tiltable tray assembly is configured to perform bidirectional sorting on goods in a lateral direction. The tiltable tray assembly includes a tiltable tray part, load-bearing shaft rods, and a support frame.



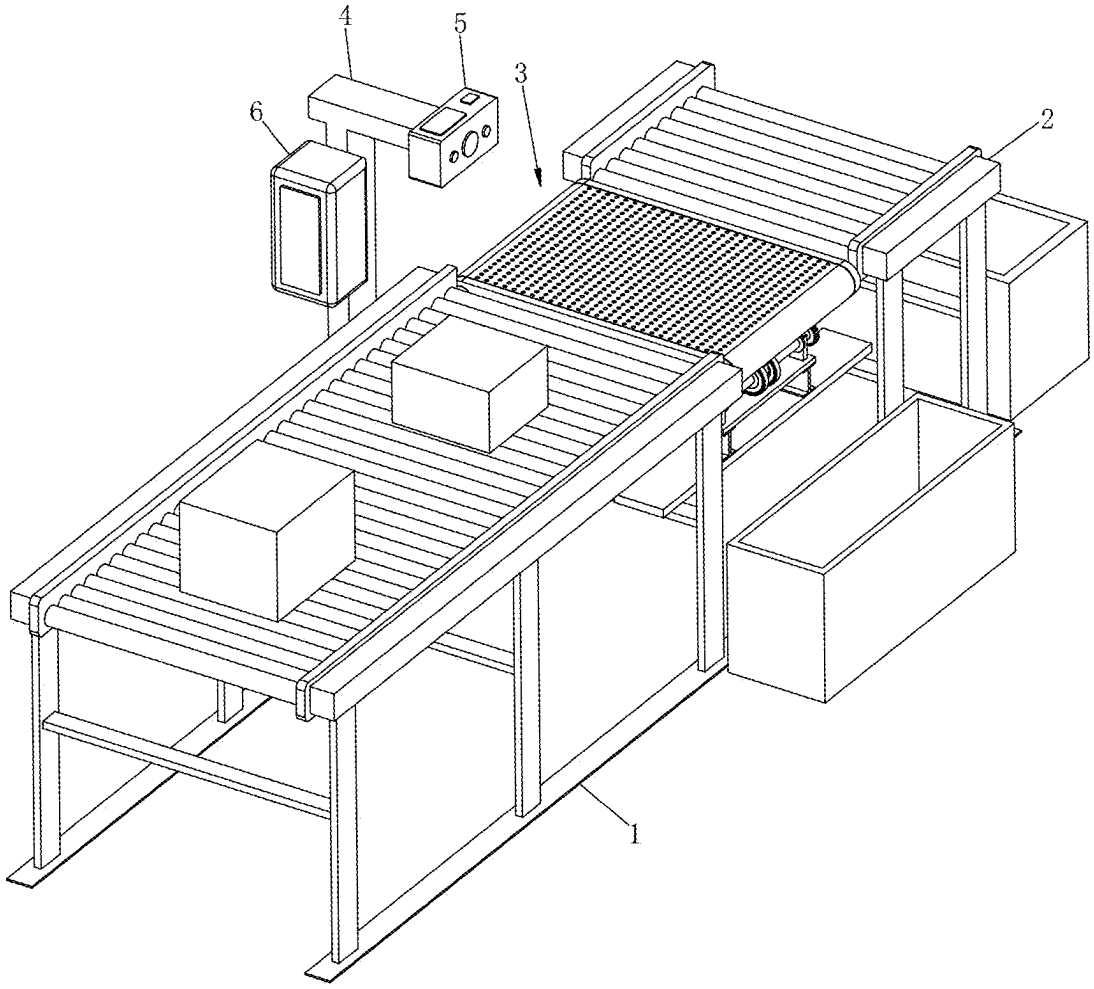


FIG. 1

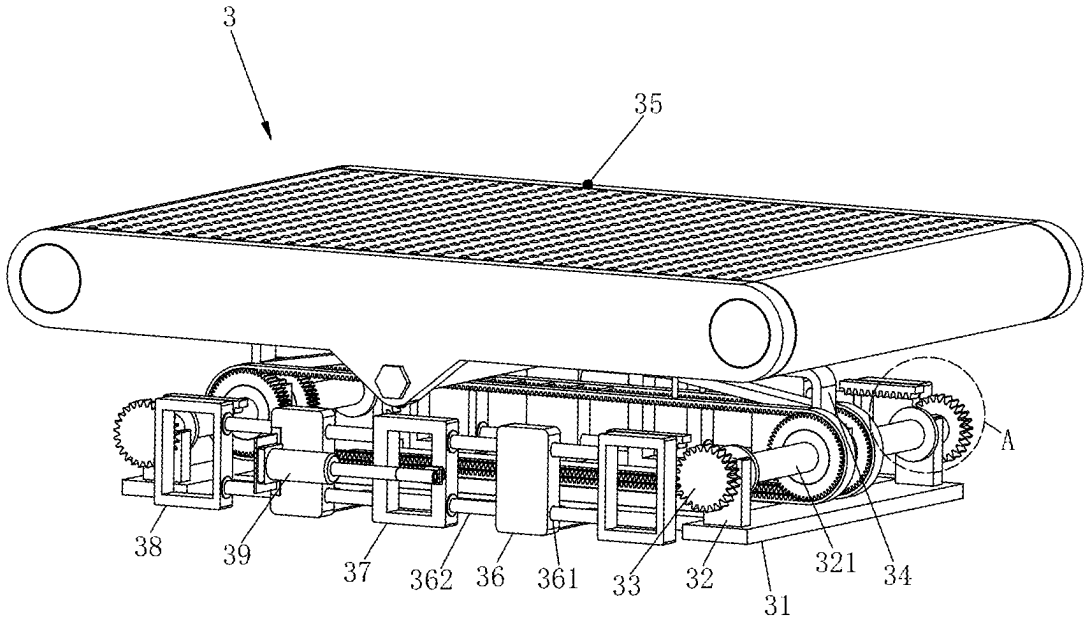


FIG. 2

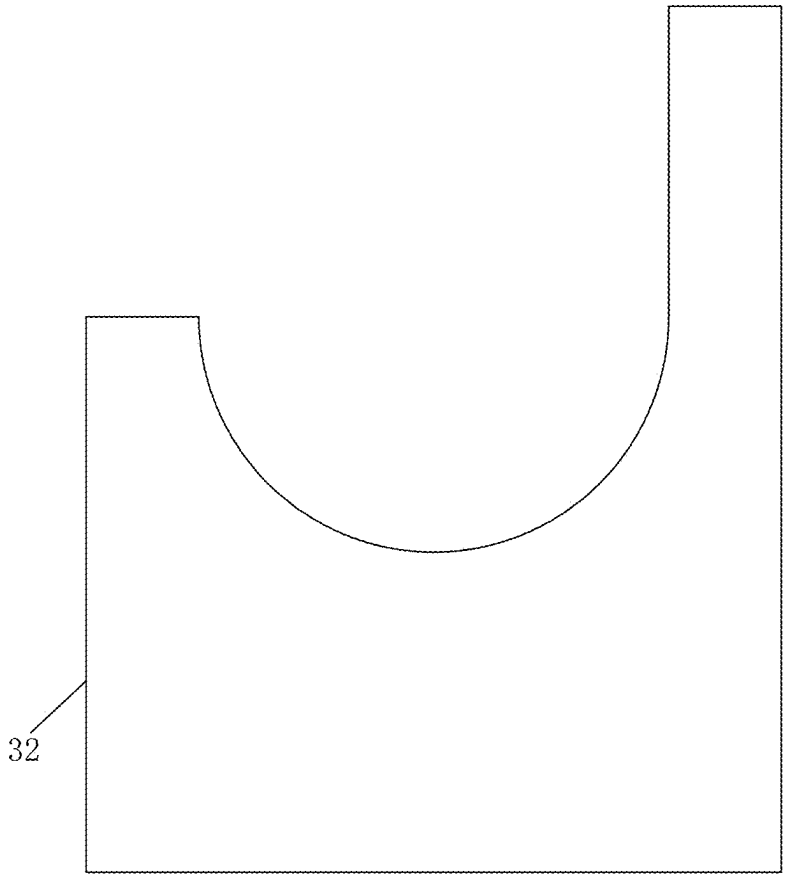


FIG. 3

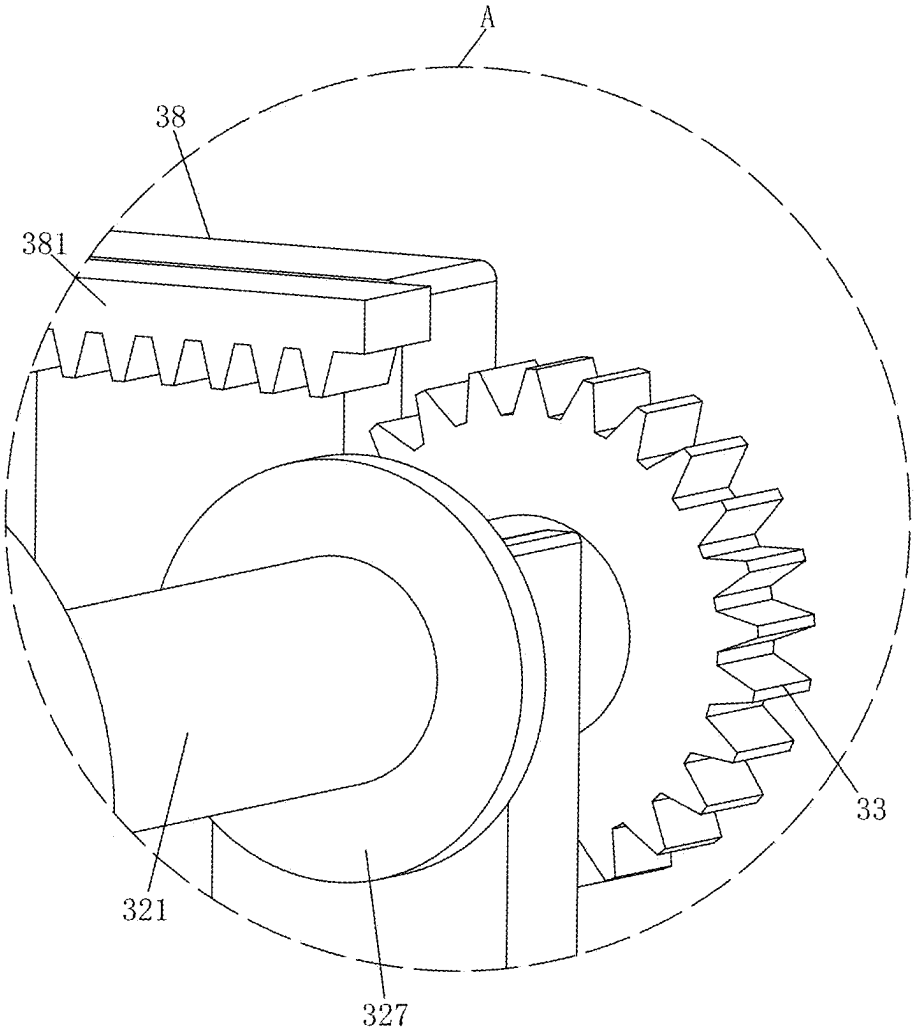


FIG. 4

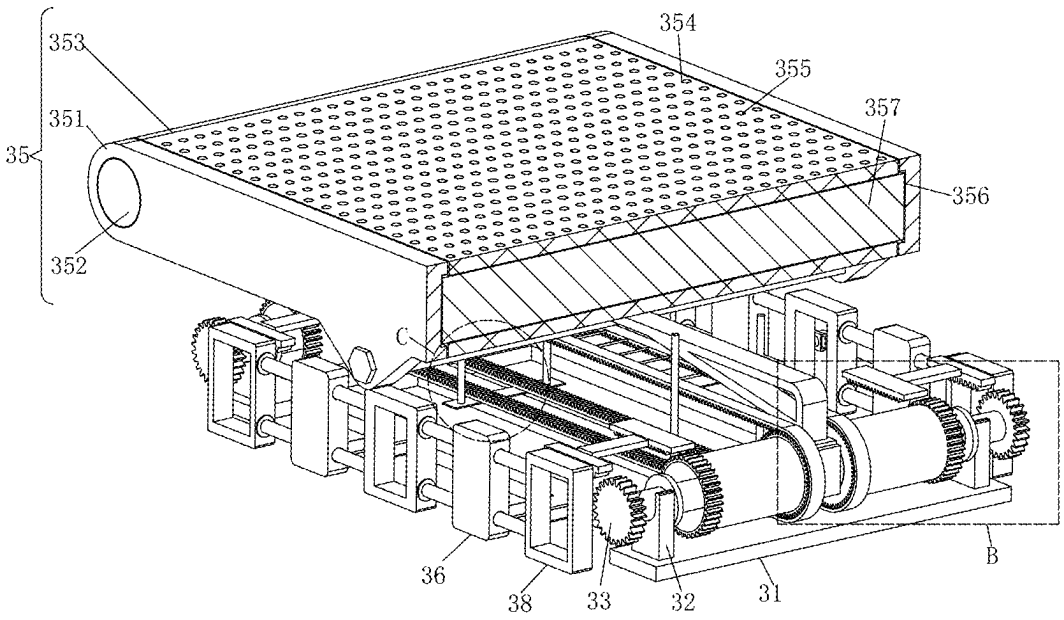


FIG. 5

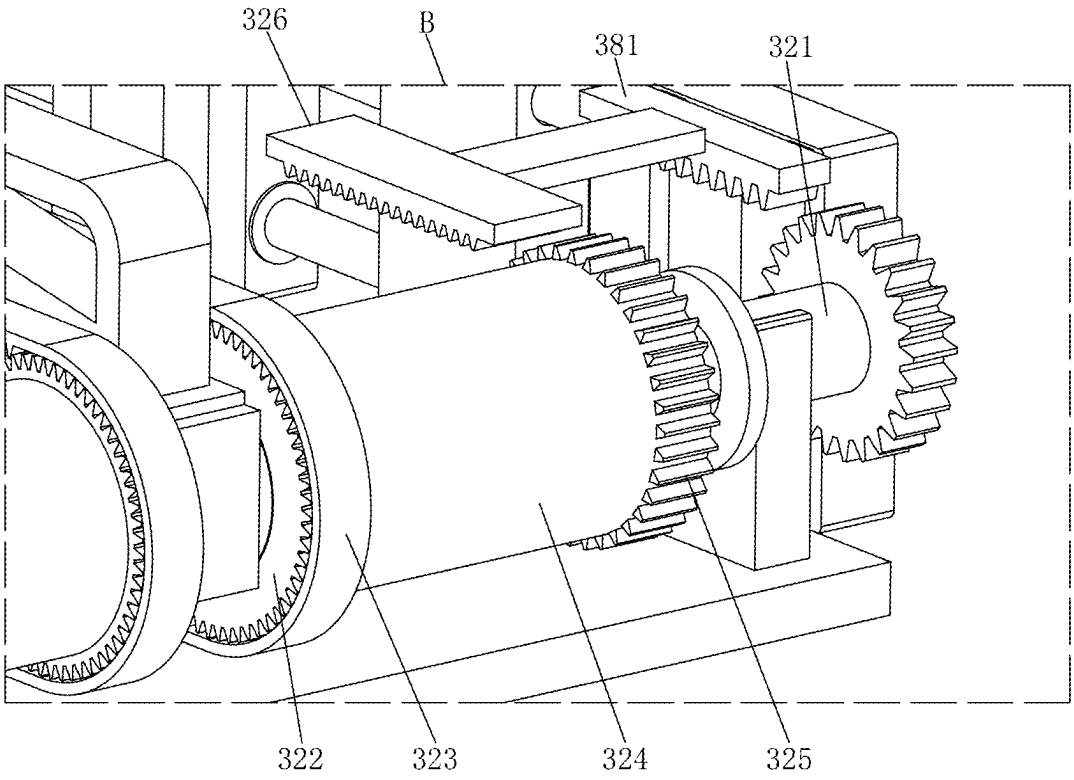


FIG. 6

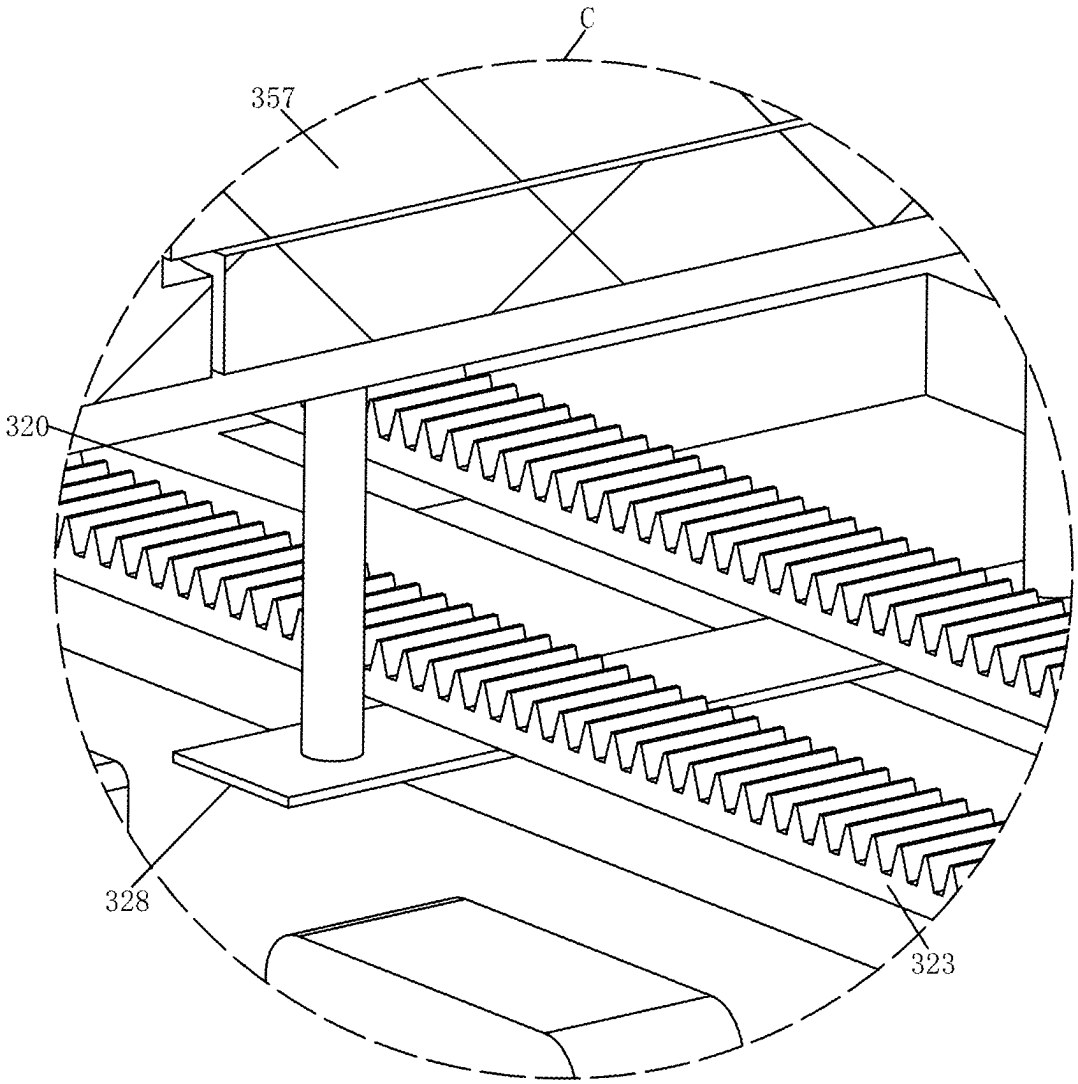


FIG. 7

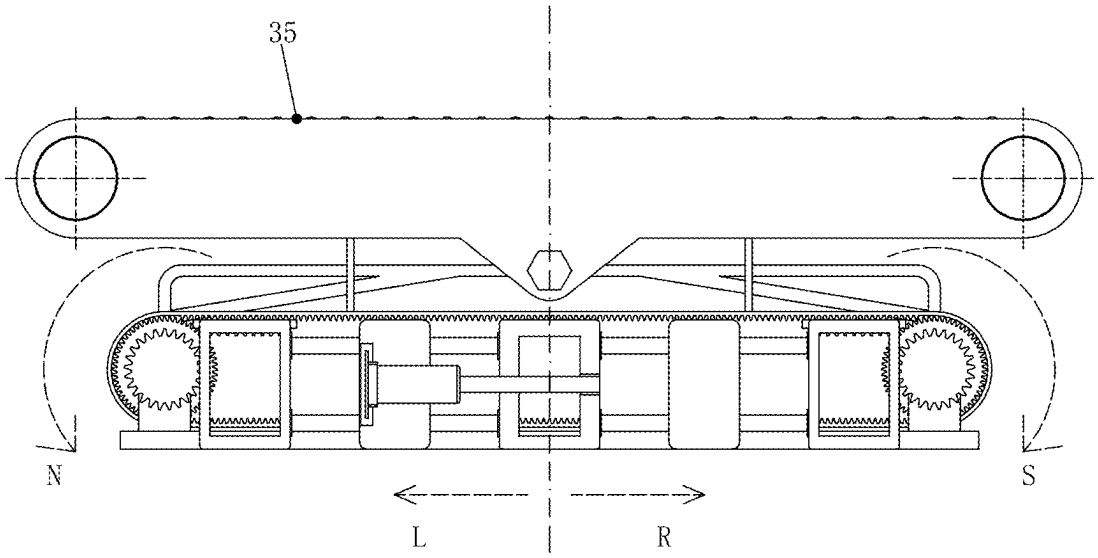


FIG. 8

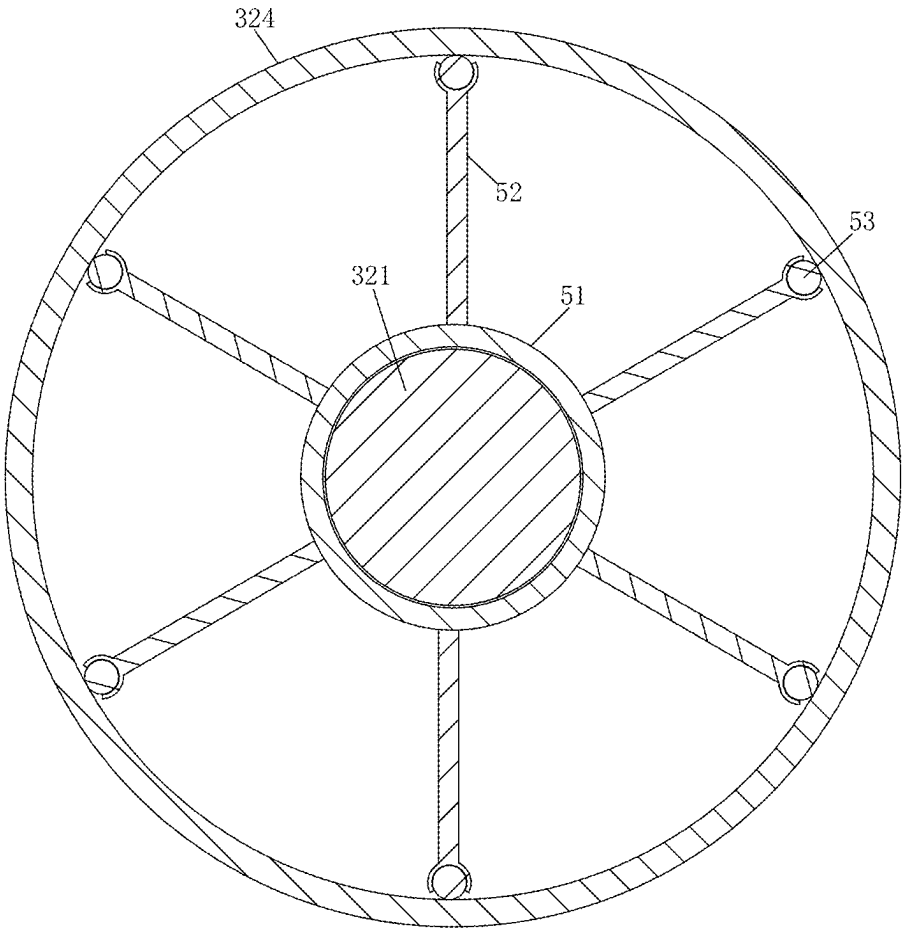


FIG. 9

UNMANNED WAREHOUSE-GOODS SORTING OPERATION DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the priority of Chinese Patent Application No. 202411507701.4, entitled "Unmanned warehouse-goods sorting operation device", filed with the Chinese Patent National Intellectual Property Administration on Oct. 28, 2024, which is incorporated herein by reference in its entirety as part of the present application.

TECHNICAL FIELD

[0002] The present disclosure belongs to the technical field of sorting devices, and in particular, to an unmanned warehouse-goods sorting operation device.

BACKGROUND

[0003] Unmanned warehouse-goods sorter is a process of using an automation technology and equipment to classify and organize goods in a warehouse. An entire sorting system is mainly composed of an identification system, a control system, and a sorting system. The automation equipment in unmanned sorting can quickly and accurately complete a sorting task, with high sorting speed and accuracy. Furthermore, by optimizing a layout of goods storage and sorting, a utilization rate of a warehouse space is increased, and a warehouse occupation area is reduced. A data management system can record detailed information and sorting processes of goods, which facilitates goods traceability and quality control. An identification system and a control system are almost mature, but a sorting system requires to be selected according to different requirements.

[0004] At present, common types of sorter on the market include tiltable tray sorter, slider sorter, and carbel sorter. The slider sorter means that a slider that can laterally slide is arranged on a sliding plate of a conveyor. When goods arrive at a designated position, the slider pushes the goods to slide towards corresponding goods outlets. The carbel sorter is a sorting system composed of a series of small belt conveyors. Goods are placed on cross belts. By being controlled through a computer, the cross belts can accurately convey the goods to a designated goods outlet.

[0005] During sorting of warehouse goods, the main method is the tiltable tray sorting. The tiltable tray sorter can be simply understood as placing goods on a tiltable tray. The tiltable tray can be tilted according to an instruction of a control system to pour the goods into a designated goods outlet or conveyor line. The common tiltable tray sorter is one-way deflection sorter, which can only sort goods with the same information. However, in the one-way sorting, goods are easily stacked at one outlet, which can lead to blockage of the outlet.

[0006] Therefore, it is required to provide an unmanned warehouse-goods sorting operation device to solve the above technical problems.

SUMMARY

[0007] The present disclosure aims to overcome the shortcomings in the prior art, and provides an unmanned warehouse-goods sorting operation device.

[0008] The unmanned warehouse-goods sorting operation device includes a goods feeding conveyor, a tiltable tray assembly, and a goods discharging conveyor which are arranged in sequence in a longitudinal direction, wherein the tiltable tray assembly is configured to perform bidirectional sorting on goods in a lateral direction;

[0009] the tiltable tray assembly includes a tiltable tray part, two load-bearing shaft rods, and a support frame; the two load-bearing shaft rods are respectively arranged below two lateral sides of the tiltable tray part; the support frame is mounted between the two load-bearing shaft rods; the tiltable tray part is mounted at a top of a center of the support frame; when the load-bearing shaft rods rotate, the tiltable tray part is tilted laterally;

[0010] a surface of the tiltable tray part includes a conveyor belt laterally sleeving; a synchronous belt sleeves between the two load-bearing shaft rods; and the synchronous belt is pulled and connected to a bottom surface of the conveyor belt via a synchronous rope to control the conveyor belt to rotate.

[0011] In some embodiments, driving gears are arranged at two ends of each of the two load-bearing shaft rods; driving rods are arranged between the two load-bearing shaft rods; two ends of each of the driving rods are connected to driving racks; the driving racks are meshed with the driving gears, one of the driving rods is connected to a hydraulic push rod; and the hydraulic push rod is configured to: control the one driving rod to laterally translate and drive the two load-bearing shaft rods to rotate.

[0012] In some embodiments, a drum is rotatably mounted on each of the two load-bearing shaft rods; a gear plate and annular tooth blocks are arranged on each drum; the driving racks are fixedly connected with linkage racks; the linkage racks are meshed with the annular tooth blocks; and the synchronous belt sleeves the gear plate.

[0013] In some embodiments, a bottom of the synchronous belt is fixedly connected with a pallet; a bottom end of the synchronous rope is fixed on the pallet; and a top end of the synchronous rope is fixed at a bottom of the conveyor belt.

[0014] In some embodiments, balls are distributed on a surface of the conveyor belt.

[0015] A method for using the unmanned warehouse-goods sorting operation device includes the following steps:

[0016] Step I: in a goods conveying direction that is a longitudinal direction, mounting the goods feeding conveyor, the tiltable tray assembly, and the goods discharging conveyor in sequence, and laterally arranging the tiltable tray assembly; mounting a scanning module and a control system on the goods feeding conveyor; arranging sorting baskets for two types of goods on two lateral sides of the tiltable tray assembly respectively;

[0017] Step II: before the goods feeding conveyor conveys the goods to the tiltable tray assembly, distinguishing the types of goods by the scanning module; and

[0018] Step III: moving the goods onto the conveyor belt; when the goods are in one of the two types of goods, controlling, by the control system, the two load-bearing shaft rods and the synchronous belt to rotate, causing the tiltable tray part to tilt towards a lateral side and the synchronous rope to pull the con-

veyor belt to rotate, causing the goods to fall into the sorting basket from the lateral side of the tiltable tray part.

[0019] In some embodiments, the tiltable tray assembly and the goods discharging conveyor that are adjacent to each other form a sorting unit, and multiple sorting units are arranged in the unmanned warehouse-goods sorting operation device according to a quantity of types of goods to be distinguished.

[0020] Beneficial effects of the present disclosure are as follows:

[0021] 1) According to the present disclosure, since at a top of the tiltable tray assembly, the tiltable tray part is included, the tiltable tray part can be controlled to deflect laterally to two sides through the load-bearing shaft rods. When a sorting operation is performed on warehouse goods, a deflection direction of the tiltable tray assembly can be changed by controlling the extension and contraction of the hydraulic push rod. When the tiltable tray part is tilted relative to a horizontal plane, the goods slide on the conveyor belt, thereby achieving a bidirectional deflection sorting effect of the tiltable tray part, meeting sorting requirements of goods with different information, and effectively avoiding a situation of goods stacking caused by one-way sorting.

[0022] 2) According to the present disclosure, on the surface of the tiltable tray part, the conveyor belt laterally arranged is included. In a sorting operation, when the tiltable tray part deflects, the synchronous belt pulls the bottom surface of the conveyor belt to enable the bottom surface to synchronously rotate, so that the goods can automatically slide down along the deflected inclined surface, avoiding the situation that goods cannot be self-separated because of a large frictional force on surfaces of the goods. This further increases a separation speed of the goods. Furthermore, the active rotation mode can meet sorting requirements of different goods, and the applicability is broader.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] FIG. **1** is a schematic diagram of an entire structure of the present disclosure;

[0024] FIG. **2** is a three-dimensional diagram I of a tiltable tray assembly according to the present disclosure;

[0025] FIG. **3** is a front view of a shaft bracket according to the present disclosure;

[0026] FIG. **4** is a partially enlarged view of region A in FIG. **2** according to the present disclosure;

[0027] FIG. **5** is a three-dimensional diagram II of a tiltable tray assembly according to the present disclosure;

[0028] FIG. **6** is a partially enlarged view of region B in FIG. **5** according to the present disclosure;

[0029] FIG. **7** is a partially enlarged view of region C in FIG. **5** according to the present disclosure;

[0030] FIG. **8** is a front view of a tiltable tray assembly according to the present disclosure; and

[0031] FIG. **9** is a sectional view of a drum according to the present disclosure.

[0032] Reference numerals in the drawings: goods feeding conveyor **1**, goods discharging conveyor **2**, tiltable tray assembly **3**, mounting frame **4**, scanning module **5**, control system **6**, support plate **31**, shaft bracket **32**, driving gear **33**, support frame **34**, tiltable tray part **35**, rectangle block **36**, centering block **37**, external block **38**, hydraulic push rod **39**, side plate **351**, rotating shaft **352**, conveyor belt **353**, internal slot **354**, ball **355**, lateral round slot **356**, inner supporting round pipe **357**, synchronous belt **320**, load-bearing shaft rod **321**, gear plate **322**, synchronous belt **323**, drum **324**, annular tooth block **325**, linkage rack **326**, positioning disk **327**, pallet **328**, insertion hole **361**, driving rod **362**, driving rack **381**, shaft sleeve **51**, ejector pin **52**, and steel ball **53**.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0033] The present disclosure will be further described below in conjunction with embodiments. The explanations of the following embodiments are merely used for helping understand the present disclosure. It should be pointed out that a person of ordinary skill in the art can also make several modifications to the present disclosure without departing from the principles of the present disclosure, and these improvements and modifications also fall within the scope of protection of the claims of the present disclosure.

Embodiment I

[0034] As an embodiment, as shown in FIG. **1**, an unmanned warehouse-goods sorting operation device includes a goods feeding conveyor **1** and a goods discharging conveyor **2**. The goods feeding conveyor **1** and the goods discharging conveyor **2** are arranged longitudinally along a straight line, and a tiltable tray assembly **3** is arranged in an arrangement gap between the goods feeding conveyor **1** and the goods discharging conveyor **2**. The goods feeding conveyor **1** and the goods discharging conveyor **2** can automatically convey goods. The goods discharging conveyor **2** and the tiltable tray assembly **3** are combined into a sorting unit, and at least one sorting unit is arranged longitudinally in each unmanned warehouse-goods sorting operation device to perform bidirectional sorting on goods.

[0035] A mounting frame **4** is arranged on one side of each tiltable tray assembly **3**. A scanning module **5** for identifying goods information is horizontally mounted at a top of the mounting frame **4**. The scanning module **5** is mainly configured to scan and obtain the goods information. The information is not limited to destination, size, color, and the like. One sorting unit is taken as an example. A single tiltable tray assembly **3** can sort two different types of goods. Different types of goods are sorted to two sides of the tiltable tray assembly **3**.

[0036] It is also possible to sort the same type of goods to two sides of the sorting unit, which effectively avoids a situation of goods accumulation caused by one-way sorting.

[0037] A control system **6** is mounted on an outer side wall of the mounting frame **4**. The control system **6** includes a central processing module that receives and processes information identified by the scanning module **5**, and a control module that controls the operations of the tiltable tray assembly **3**. The information identified by the scanning module **5** is directly transmitted to the control system **6**. The central processing module located in the control system **6** can compare the received information, transmit, when a sorting requirement is met, a signal to the control module, and send an instruction to notify the control module to drive the tiltable tray assembly **3** to operate, which achieves an unmanned sorting function. A specific operation procedure

of this unmanned sorting system will not be elaborated. For details, refer to a common unmanned sorting system on the market.

[0038] As shown in FIG. **2** to FIG. **4**, the tiltable tray assembly **3** includes two support plates **31** fixedly connected to the goods feeding conveyor **1** and the goods discharging conveyor **2**. Shaft brackets **32** are symmetrically welded at tops of the two parallel support plates **31**, and a semi-circular slot is provided in a top of each shaft bracket **32**. A height of an outer side of a top of each semi-circular slot is greater than a height of an inner side of the top of the each semi-circular slot. The load-bearing shaft rods **321** are placed inside the shaft brackets **32**, and the two ends of each load-bearing shaft rod **321** are welded with driving gears **33** for being connected to a driving device to make each load-bearing shaft rod **321** rotate.

[0039] Positioning disks **327** are fixedly mounted on an outer wall of each load-bearing shaft rod **321**. Two end surfaces of each positioning disk **327** are smooth surfaces. One end surface of each positioning disk **327** is in contact with a side wall of each shaft bracket **32** but not connected. By the contact between the shaft brackets **32** and the positioning disks **327**, longitudinal displacements of the load-bearing shaft rods **321** can be limited to prevent longitudinal offsets of the load-bearing shaft rods **321**.

[0040] Rectangle blocks **36** are symmetrically welded on two sides of each of the support plates **31**. Insertion holes **361** are symmetrically provided in each of the rectangle blocks **36**. Driving rods **362** are laterally inserted into the insertion holes **361**. A centering block **37** and two external blocks **38** are respectively arranged between the two rectangle blocks **36** and at outer side positions of the two rectangle blocks on the same side. Side walls of the centering block **37** and side walls of the external blocks **38** are fixedly connected to the driving rod **362**. Top side walls of the external blocks **38** are welded with driving racks **381**, and the driving racks **381** are meshed with the driving gears **33**. A hydraulic push rod **39** is mounted on a side wall of one of the rectangle blocks **36**. An end of a piston rod of the hydraulic push rod **39** is connected to a side wall of one centering block **37** via a connecting rod.

[0041] A support frame **34** is fixedly mounted between the two load-bearing shaft rods **321**, and a tiltable tray part **35** is mounted at a center position of a top of the support frame **34**. The hydraulic push rod **39** horizontally drives the centering block **37**, and the centering block **37** drives the two external blocks **38** on the same side to move synchronously through the driving rods **362**. In this case, the driving racks **381** at one end move towards the driving gears **33** and are meshed with the driving gears, and the driving racks **381** at the other end gradually move away from the driving gears **33** on the same side. After the driving racks **381** are meshed with the driving gears **33** adjacent thereto, where the driving gears **33** can drive the load-bearing shaft rods **321** to rotate inside the shaft brackets **32**. The tiltable tray part **35** is fixed to the load-bearing shaft rods **321** via the supporting frame **34**. When the load-bearing shaft rods **321** rotate, the supporting frame **34** correspondingly rotates, causing the tiltable tray part **35** to rotate with the load-bearing shaft rods **321**. Namely, the tiltable tray part **35** has oblique deflection laterally. A surface of the tiltable tray part **35** is smooth, so that goods easily slide from the tiltable tray part **35**.

[0042] After the tiltable tray part **35** deflects an angle, goods at its top position can slide down under their gravities, achieving a sorting effect.

Embodiment II

[0043] As another embodiment, Embodiment II provides more specific unmanned warehouse-goods sorting operation device based on Embodiment I. A conveyor belt **353** covers a surface of the tiltable tray part **35**, and the conveyor belt **353** is driven by a synchronous rope **320**.

[0044] As shown in FIG. **5**, the tiltable tray part **35** includes two side plates **351**, rotating shafts **352**, and the conveyor belt **353**. The two side plates **351** are fixedly mounted on the support frame **34** via bolts. The rotating shafts **352** are symmetrically mounted at positions that are between the two side plates **351** and close to ends of the two side plates. The conveyor belt **353** sleeves outer walls of the two rotating shafts **352**. The conveyor belt **353** is laterally arranged. Lateral round slots **356** are provided at equal spacing in inner walls of the side plates **351**. An inner supporting round pipes **357** are horizontally placed between two lateral round slots **356** corresponding to the two side plates **351**, and outer walls of the inner supporting round pipes **357** resist against an inner wall of the conveyor belt **353**. The multiple inner supporting round pipes **357** are laterally arranged in a cavity inside the conveyor belt **353**. When goods are located at a top of the conveyor belt **353**, the conveyor belt **353** is unlikely to have inwards sunken deformation.

[0045] Internal slots **354** are provided in equal spacing in a surface of the conveyor belt **353** along a path direction. A ball **355** is mounted in any internal slot **354**. A frictional force between the goods and the conveyor belt **353** is further reduced through the balls **355**. A rotating speed of the conveyor belt **353** relative to the two rotating shafts **352** is determined according to the extension and contraction speed of the hydraulic push rod **39**. In a normal state, a driving duration during which the hydraulic push rod **39** is restored from an extended state to an initial state may not be longer than 1.5 s, to meet a high-frequency sorting requirement.

[0046] As shown in FIG. **6** and FIG. **7**, gear plates **322** are symmetrically rotatably mounted on outer walls of the load-bearing shaft rods **321**. A synchronous belt **323** is laterally mounted between two gear plates **322** in the same vertical plane of the two load-bearing shaft rods **321**. A pallet **328** is fixedly mounted on a bottom end surface of the synchronous belt **323**, and a synchronous rope **320** is embedded into an end surface at a top of the pallet **328**. An end of the synchronous rope **320** is fixed at a bottom of the conveyor belt **353**. Drums **324** are concentrically welded on side walls of the gear plates **322**. Annular tooth blocks **325** are arranged on outer rings of the drums **324**. A linkage rack **326** is fixedly mounted on one side of each driving rack **381** via a rectangle pipe, and the linkage racks **326** and the annular tooth blocks **325** are matched with each other. In the initial state, the linkage racks **326** are in no contact with the annular tooth blocks **325** until the hydraulic push rod **39** enters an operating state, so that the driving rod **362** translates towards the corresponding side.

[0047] There are multiple synchronous ropes **320** distributed at equal spacing along a surface of the synchronous belt **323**. The multiple synchronous ropes **320** can simultaneously drive the synchronous belt **323** to move. Damage of a single synchronous belt **323** does not affect normal operation

of the synchronous belt **323**. An upper surface of the synchronous belt **323** is parallel to upper and lower surfaces of the conveyor belt **353**, namely, the synchronous ropes **320** can pull the synchronous belt **323** in a horizontal direction, to reduce deformation of the synchronous belt **323**.

[0048] As shown in FIG. **9**, a shaft sleeve **51** is mounted on each load-bearing shaft rod **321**. Ejector pins **52** are welded in equal spacing on an outer wall of the shaft sleeve **51** in a circumferential direction. Steel balls **53** are embedded into ends of the ejector pins **52**, and outer walls of the steel balls **53** resist against an inner wall of the drum **324**. When the load-bearing shaft rods **321** deflect, the shaft sleeves **51** rotate relative to the load-bearing shaft rods **321**. The axial positions of the shaft sleeves **51** relative to the load-bearing shaft rods **321** remain unchanged. The steel balls **53** at the tops of the ejector pins **52** roll along the inner wall of the drum **324** to support inside of the drum **324**, which can prevent deformation of the drum **324**.

[0049] It should be noted that identical or similar parts in this embodiment and Embodiment I can be referred to each other. The present disclosure will not elaborate this.

Embodiment III

[0050] As another embodiment, Embodiment III provides a method for using the unmanned warehouse-goods sorting operation device based on Embodiment I and Embodiment II:

[0051] Step I: in a goods conveying direction that is a longitudinal direction, the goods feeding conveyor **1**, the tiltable tray assembly **3**, and the goods discharging conveyor **2** are mounted in sequence, and the tiltable tray assembly **3** is laterally arranged; he scanning module **5** and the control system **6** are mounted on the goods feeding conveyor **1**; sorting baskets for two types of goods are respectively arranged on two lateral sides of the tiltable tray assembly **3**. The tiltable tray assembly **3** and the goods discharging conveyor **2** that are adjacent to each other form one sorting unit. Multiple sorting units are arranged in the sorting operation device according to a quantity of goods types to be distinguished.

[0052] Step II: before the goods feeding conveyor **1** conveys goods to the tiltable tray assembly **3**, the types of goods are distinguished by the scanning module **5**. When the goods are in one of the two types of goods corresponding to the sorting unit, a conveying speed of the goods feeding conveyor **1** is reduced, causing the goods to gradually slow down and stop after the goods reach a position above the tiltable tray part **35**. Then, step III is performed.

[0053] Step III: the load-bearing shaft rods **321** and the synchronous belts **323** are controlled to rotate by the control system **6**, so that the tiltable tray part **35** tilts towards one lateral side.

[0054] As shown in FIG. **8**, in this embodiment, the driving rods **362** moving to the left, namely, in an L direction is taken as an example. The end of tiltable tray part **35** in the L direction drops, and the end of tiltable tray part **35** in an R direction rises. The driving gears **33** have equal rotation angles at any time. The rotation angles of the driving gears **33** are determined by extension and contraction of the hydraulic push rod **39**. The extension and contraction of the hydraulic push rod **39** can be precisely controlled by the control system **6**. After the tiltable tray part **35** deflects an angle, the goods at its top position can slide down under their gravities, achieving a sorting effect. The active rotation mode can meet requirements for sorting goods with different shapes and different friction coefficients. The applicability is broader.

[0055] The driving racks **381** on the external blocks **38** on the two sides make the driving gears **33** rotate, thus driving the two load-bearing shaft rods **321** to rotate in an N direction, while the drum **324** also rotates in the N direction, and the bottom of the synchronous belt **323** moves in the R direction to drive the pallet **328** and bottom ends of the synchronous ropes **320** to move in the R direction, so that the conveyor belt **353** moves in the R direction around a portion of a bottom surface of the tiltable tray part **35**, and the conveyor belt **353** at the top of the tiltable tray part **35** moves in the L direction. The goods on the tiltable tray assembly **3** slide down in the L direction from the position above the middle of the tiltable tray part **35** and fall into the sorting basket.

[0056] When the goods do not belong to the two types corresponding to the sorting unit, which means that the goods are not identified by the scanning module **5**, the conveying speed of the goods feeding conveyor **1** does not decrease, but increases, so that after the goods move from the goods feeding conveyor **1** onto the tiltable tray assembly **3**, since the surface of the conveyor belt **353** is smooth and horizontal and is provided with the balls **355**, the goods further move longitudinally to directly slide to a position above the goods discharging conveyor **2** and are conveyed to a farther place, for sorting by a subsequent sorting unit or for direct discharging.

[0057] The various embodiments in this specification are described in a progressive manner, and each embodiment focuses on differences from other embodiments. The same or similar parts between all the embodiments can be referred to each other.

What is claimed is:

1. An unmanned warehouse-goods sorting operation device, comprising a goods feeding conveyor, a tiltable tray assembly, and a goods discharging conveyor which are arranged in sequence in a longitudinal direction, wherein the tiltable tray assembly is configured to perform bidirectional sorting on goods in a lateral direction;

the tiltable tray assembly comprises a tiltable tray part, two load-bearing shaft rods, and a support frame; the two load-bearing shaft rods are respectively arranged below two lateral sides of the tiltable tray part; the support frame is mounted between the two load-bearing shaft rods; the tiltable tray part is mounted at a top of a center of the support frame; when the load-bearing shaft rods rotate, the tiltable tray part is tilted laterally;

a surface of the tiltable tray part comprises a conveyor belt laterally sleeving; a synchronous belt sleeves and is disposed between the two load-bearing shaft rods; and the synchronous belt is pulled and connected to a bottom surface of the conveyor belt via a synchronous rope, to control the conveyor belt to rotate.

2. The unmanned warehouse-goods sorting operation device according to claim **1**, wherein driving gears are arranged at two ends of each of the two load-bearing shaft rods; driving rods are arranged between the two load-bearing shaft rods; two ends of each of the driving rods are connected to driving racks; the driving racks are meshed with the driving gears, one of the driving rods is connected

to a hydraulic push rod; and the hydraulic push rod is configured to: control the one driving rod to laterally translate and drive the two load-bearing shaft rods to rotate.

3. The unmanned warehouse-goods sorting operation device according to claim **2**, wherein a drum is rotatably mounted on each of the two load-bearing shaft rods; a gear plate and annular tooth blocks are arranged on each drum; the driving racks are fixedly connected with linkage racks; the linkage racks are meshed with the annular tooth blocks; and the synchronous belt sleeves the gear plate.

4. The unmanned warehouse-goods sorting operation device according to claim **1**, wherein a bottom of the synchronous belt is fixedly connected with a pallet; a bottom end of the synchronous rope is fixed on the pallet; and a top end of the synchronous rope is fixed at a bottom of the conveyor belt.

5. The unmanned warehouse-goods sorting operation device according to claim **1**, wherein balls are distributed on a surface of the conveyor belt.

6. A method for using the unmanned warehouse-goods sorting operation device according to claim **1**, comprising:

in a goods conveying direction that is a longitudinal direction, mounting the goods feeding conveyor, the tiltable tray assembly, and the goods discharging conveyor in sequence, and laterally arranging the tiltable tray assembly; mounting a scanning module and a control system on the goods feeding conveyor; arranging sorting baskets for two types of goods on two lateral sides of the tiltable tray assembly respectively;

before the goods feeding conveyor conveys the goods to the tiltable tray assembly, distinguishing the types of goods by the scanning module; and

moving the goods onto the conveyor belt; when the goods are in one of the two types of goods, controlling, by the control system, the two load-bearing shaft rods and the synchronous belt to rotate, causing the tiltable tray part to tilt towards a lateral side and the synchronous rope to pull the conveyor belt to rotate, causing the goods to fall into the sorting basket from the lateral side of the tiltable tray part.

7. The method for using the unmanned warehouse-goods sorting operation device according to claim **6**, wherein the tiltable tray assembly and the goods discharging conveyor that are adjacent to each other form a sorting unit, and a plurality of sorting units are arranged in the unmanned warehouse-goods sorting operation device according to a quantity of types of goods to be distinguished.

8. The method for using the unmanned warehouse-goods sorting operation device according to claim **6**, wherein driving gears are arranged at two ends of each of the two load-bearing shaft rods; driving rods are arranged between the two load-bearing shaft rods; two ends of each of the driving rods are connected to driving racks; the driving racks are meshed with the driving gears, one of the driving rods is connected to a hydraulic push rod; and the hydraulic push rod is configured to: control the one driving rod to laterally translate and drive the two load-bearing shaft rods to rotate.

9. The method for using the unmanned warehouse-goods sorting operation device according to claim **8**, wherein a drum is rotatably mounted on each of the two load-bearing shaft rods; a gear plate and annular tooth blocks are arranged on each drum; the driving racks are fixedly connected with linkage racks; the linkage racks are meshed with the annular tooth blocks; and the synchronous belt sleeves the gear plate.

10. The method for using the unmanned warehouse-goods sorting operation device according to claim **6**, wherein a bottom of the synchronous belt is fixedly connected with a pallet; a bottom end of the synchronous rope is fixed on the pallet; and a top end of the synchronous rope is fixed at a bottom of the conveyor belt.

11. The method for using the unmanned warehouse-goods sorting operation device according to claim **6**, wherein balls are distributed on a surface of the conveyor belt.

12. The method for using the unmanned warehouse-goods sorting operation device according to claim **8**, wherein the tiltable tray assembly and the goods discharging conveyor that are adjacent to each other form a sorting unit, and a plurality of sorting units are arranged in the unmanned warehouse-goods sorting operation device according to a quantity of types of goods to be distinguished.

13. The method for using the unmanned warehouse-goods sorting operation device according to claim **9**, wherein the tiltable tray assembly and the goods discharging conveyor that are adjacent to each other form a sorting unit, and a plurality of sorting units are arranged in the unmanned warehouse-goods sorting operation device according to a quantity of types of goods to be distinguished.

14. The method for using the unmanned warehouse-goods sorting operation device according to claim **10**, wherein the tiltable tray assembly and the goods discharging conveyor that are adjacent to each other form a sorting unit, and a plurality of sorting units are arranged in the unmanned warehouse-goods sorting operation device according to a quantity of types of goods to be distinguished.

15. The method for using the unmanned warehouse-goods sorting operation device according to claim **11**, wherein the tiltable tray assembly and the goods discharging conveyor that are adjacent to each other form a sorting unit, and a plurality of sorting units are arranged in the unmanned warehouse-goods sorting operation device according to a quantity of types of goods to be distinguished.

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