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(54) **BUNDLED BANKNOTE DETECTION AND DISTRIBUTION SYSTEM**

(57) A bundled banknote detection and distribution system, comprising: a rotating mechanism (1), configured for receiving and sorting bundled banknotes; a detection mechanism (2), fixed to the upper portion of the rotating mechanism (1) and configured for detecting the received bundled banknotes; and a bundled banknote lifting and distribution mechanism (3), corresponding to the rotating mechanism (1) and configured for distributing the detected qualified bundled banknotes to an external

assembly line. Various functions such as bundled banknote detection, steering and distribution are integrated on one device, which may reduce the overall design complexity of a sorting and distribution assembly line system, and achieve more convenient overall banknote processing.

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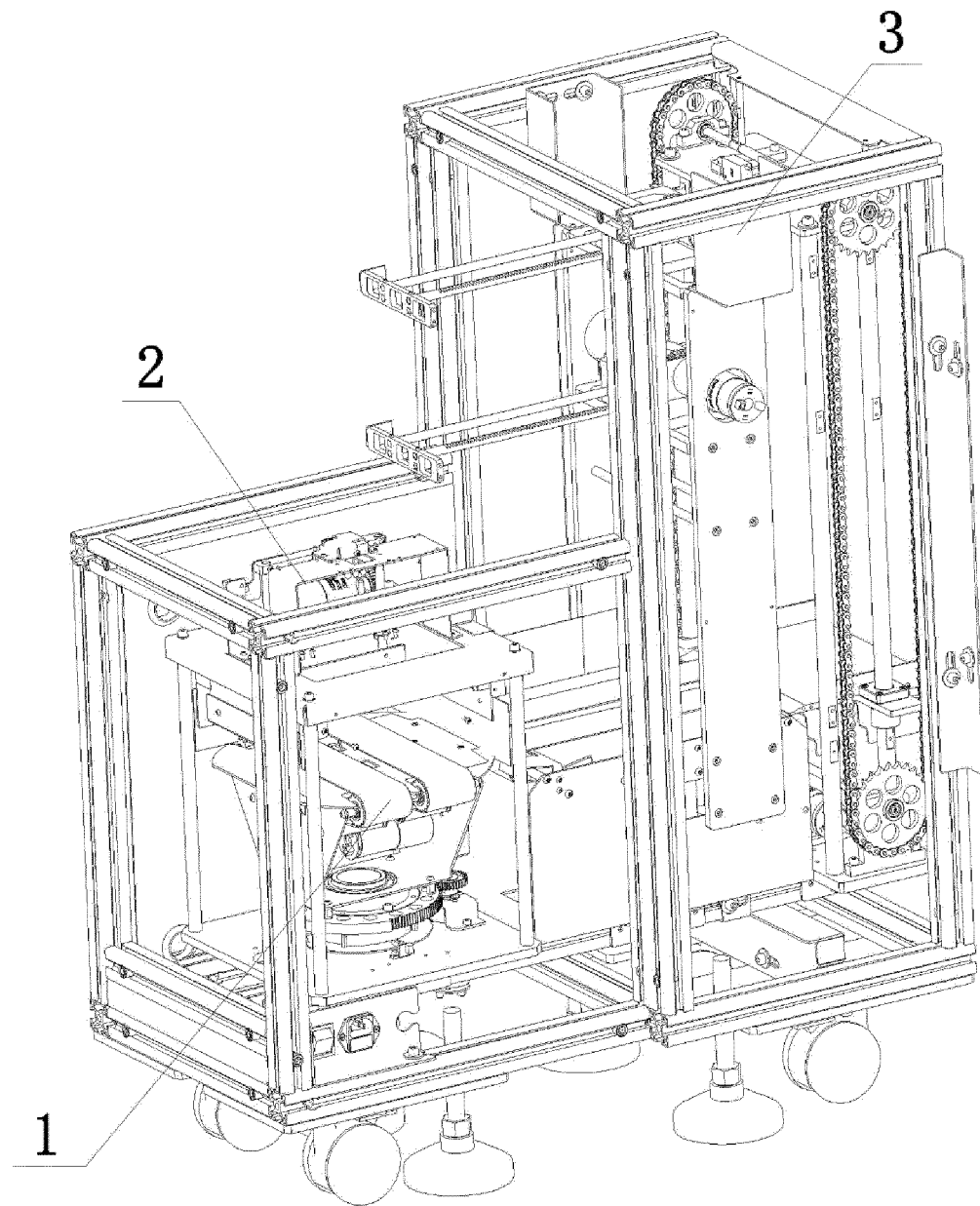


FIG. 1

Description

Cross-reference to Related Application

[0001] The present disclosure claims the priority to the Chinese patent application with the filing number 201710880668.3, filed on September 26, 2017 with the Chinese Patent Office and entitled "Bundled Banknote Detection and Distribution System", which is incorporated herein by reference in entirety.

Technical Field

[0002] The present disclosure pertains to the technical field of bundled banknote distribution and detection, in particular to a system for detecting and distributing bundled banknotes (a bundled banknote detection and distribution system).

Background Art

[0003] With the increasing demand for office automation of financial institutions such as banks, sorting pipeline equipment for handling large-batch banknotes starts to be gradually applied to real life. The current pipeline for sorting, arranging and transporting banknotes has following defects: the bundling quality of bundled banknotes cannot be automatically inspected, so that unqualified bundled banknotes are mixed into the pipeline, so as to cause reduced sorting and arranging quality; flexible and multi-direction steering processing on the bundled banknotes cannot be realized, and sorting and transferring processing on the bundled banknotes according to the bundling state of the bundled banknotes cannot be realized in an arranging and sorting system for banknotes.

[0004] In the current stage of banknote sorting pipeline system, the steering and distributing work for "bundle banknotes" is usually designed to be completed on different devices, different positions and different stages on the sorting pipeline, and such design will complicate the overall design of the sorting pipeline system.

Summary

[0005] In order to overcome the above defects, the present technical solution proposes a system for detecting and distributing bundled banknotes.

[0006] A technical solution therein is as follows: a system for detecting and distributing bundled banknotes, including a rotating mechanism, which is configured to receive and sort bundled banknotes; a detecting mechanism, which is fixed to an upper portion of the rotating mechanism and configured to detect the received bundled banknotes; and a lifting and distributing mechanism for bundled banknotes, which is provided corresponding to the rotating mechanism and configured to distribute the qualified bundled banknotes to an external pipeline; the rotating mechanism includes a rotating disc rotation-

ally fixed on a bracket, a mounting plate is fixed on the rotating disc, the mounting plate is provided thereon with a conveyor belt configured to receive the bundled banknotes, and the conveyor belt is capable of rotating along the rotating disc to steer and push the bundled banknotes to the outside or onto the lifting and distributing mechanism for bundled banknotes;

the bundled banknote detecting mechanism includes a detecting component fixed to the bracket, a banknote blocking plate is mounted at a lower portion of the detecting component, and the banknote blocking plate is correspondingly provided at an upper portion of the conveyor belt to be capable of intercepting the bundled banknotes passing through the conveyor belt; and

the lifting and distributing mechanism for bundled banknotes includes a lifting plate mounted at one side of the conveyor belt, the lifting plate is connected with a transmission component and a guide rod, respectively, and the guide rod is provided thereon with at least one banknote pushing component, which is configured to push the bundled banknotes to the external pipeline.

[0007] The banknote blocking plate is further connected with a lifting rod, a rack is provided on a rod body on one side of the lifting rod, and the rack is connected with a lifting motor through a gear.

[0008] The transmission mechanism includes an upper chain wheel and a lower chain wheel, which are correspondingly fixed at both an upper end and a lower end of the guide rod, the upper chain wheel and the lower chain wheel are in matched connection with a chain, the lower chain wheel is connected with a driving motor, and the lifting plate is correspondingly fixed on the chain and is capable of moving up and down under drive of the chain.

[0009] A detecting light controlling device is further fixed on the guide rod, the detecting light controlling device is electrically connected with a controller, and the controller is electrically connected with the driving motor.

[0010] The banknote pushing component includes a fixing plate fixed on one side of the guide rod, the fixing plate is slidably connected with a push rod corresponding to a direction of the lifting plate, a banknote pushing plate is fixed on a top end of the push rod, a banknote pushing rack is further provided on the push rod, and the banknote pushing rack is arranged to a motor fixed on the fixing plate, through a gear.

[0011] The banknote pushing component further includes a detecting light controlling device fixed above the banknote pushing plate, and the detecting light controlling device is electrically connected with the controller.

[0012] The rotating disc includes a gear disc body and a rotary motor rotationally connected with the gear disc body, the conveyor belt includes a first conveying motor, and the rotary motor and the first conveying motor are respectively electrically connected with the controller.

[0013] The detecting component and the lifting motor are both electrically connected with the controller.

[0014] In the present disclosure, multiple functions

such as detecting, steering and distributing of the "bundled banknotes" can be integrated on one piece of equipment, which can reduce the complexity of the overall design of the sorting pipeline system, and enables the overall processing on the banknotes to be more convenient.

Brief Description of Drawings

[0015]

FIG. 1 is a structural schematic view of an embodiment of the present disclosure;

FIG. 2 is a structural schematic view of an embodiment of a rotating mechanism and a detecting mechanism in the present disclosure;

FIG. 3 is a structural schematic view of an embodiment of a lifting and distributing mechanism for bundled banknotes in the present disclosure; and

FIG. 4 is a structural schematic view of an embodiment of a banknote pushing component in the present disclosure.

Detailed Description of Embodiments

[0016] Technical solutions of the present disclosure will be described clearly and completely below in connection with drawings, and apparently, the embodiments described are only some but not all embodiments of the present disclosure. All of other embodiments obtained by those ordinarily skilled in the art based on the embodiments of the present disclosure without inventive efforts shall fall within the scope of protection of the present disclosure.

[0017] In the description of the present disclosure, it should be noted that orientation or positional relations indicated by terms such as "center", "upper", "lower", "left", "right", "vertical", "horizontal", "inner", "outer" and so on are based on orientation or positional relations as shown in the drawings, merely for facilitating the description of the present disclosure and simplifying the description, rather than indicating or implying that related devices or elements have to be in the specific orientation, or configured or operated in a specific orientation, therefore, they should not be construed as limitation on the present disclosure. Besides, the term "first", "second", or "third" is merely for descriptive purpose, but should not be construed as indicating or implying relatively importance.

[0018] In the description of the present disclosure, it should be noted that unless otherwise specified and defined explicitly, terms "mount", "link" or "connect" should be construed in a broad sense. For example, it may be fixed connection, detachable connection, or integral connection; it may be mechanical connection, and also may be electrical connection; it may be direct linking, indirect linking via an intermediate medium, or inner communi-

cation between two elements. For those ordinarily skilled in the art, specific meanings of the above-mentioned terms in the present disclosure could be understood according to specific circumstances.

[0019] In combination with FIG. 1, in an embodiment of the present disclosure, a system for detecting and distributing bundled banknotes includes a rotating mechanism 1, configured to receive and sort bundled banknotes; a detecting mechanism 2, fixed to an upper portion of the rotating mechanism, and configured to detect the received bundled banknotes; and a lifting and distributing mechanism for bundled banknotes 3, provided corresponding to the rotating mechanism, and configured to distribute the qualified bundled banknotes to an external pipeline.

[0020] Referring to FIG. 2, the rotating mechanism includes a rotating disc 11 rotationally fixed on a bracket, a mounting plate 12 is fixed on the rotating disc, the mounting plate is provided thereon with a conveyor belt 13 configured to receive the bundled banknotes, and the conveyor belt can rotate along the rotating disc to steer and push the bundled banknotes to the outside or onto the lifting and distributing mechanism for bundled banknotes;

[0021] In combination with FIG. 3, the bundled banknote detecting mechanism includes a detecting component 21 fixed to the bracket, a banknote blocking plate 22 is mounted at a lower portion of the detecting component, and the banknote blocking plate is correspondingly provided at an upper portion of the conveyor belt to be capable of intercepting the bundled banknotes passing through the conveyor belt; and

the lifting and distributing mechanism for bundled banknotes includes a lifting plate 31 mounted at one side of the conveyor belt, the lifting plate is connected respectively with a transmission component 34 and a guide rod 32, and the guide rod is provided thereon with at least one banknote pushing component 33 configured to push the bundled banknotes to the external pipeline.

[0022] In the above embodiment, after the rotating mechanism receives the bundled banknotes through the conveyor belt, the bundled banknotes are detected by the detecting mechanism mounted in the upper portion of the rotating mechanism, and if the bundled banknotes are qualified, the rotating mechanism rotates by an angle, to align the conveyor belt with the lifting plate of the lifting and distributing mechanism for bundled banknotes, and convey the bundled banknotes to the lifting plate of lifting and distributing mechanism for bundled banknotes, and the bundled banknotes are pushed by lifting and distributing mechanism for bundled banknotes with the banknote pushing component to the external pipeline according to different banknote types and quantities of the bundled banknotes for next step of processing. When the detecting mechanism detects that problems exist in the bundled banknotes, the rotating mechanism rotates by an angle to push the bundled banknotes to external recycling equipment or a recycling pipeline to be rear-

ranged and rebundled.

[0023] The banknote blocking plate is further connected with a lifting rod, a rack is provided on a rod body on one side of the lifting rod, and the rack is connected with a lifting motor through a gear.

[0024] In the present embodiment, with the manner of matching the rack with the motor, the lifting process for bundled banknotes is more stable, and the operating efficiency is improved.

[0025] The transmission mechanism includes an upper chain wheel 341 and a lower chain wheel 342 which are correspondingly fixed at both an upper end and a lower end of the guide rod, the upper chain wheel and the lower chain wheel are in matched connection with a chain 343, the lower chain wheel is connected with a driving motor 344, and the lifting plate is correspondingly fixed on the chain, and can move up and down under the drive of the chain. In the present technical solution, with the manner of matching by chain, the structural technology is mature, the production is convenient, and meanwhile the chain transmission is synchronous transmission, which facilitates monitoring the position of lifting plate.

[0026] A detecting light controlling device 35 is further fixed on the guide rod, the detecting light controlling device is electrically connected with a controller, and the controller is electrically connected with the driving motor. In the present technical solution, the position of the lifting plate is determined by the detecting light controlling device, and further whether the lifting plate is in place or not is determined, thus the pushing process of the banknote pushing component is more accurate.

[0027] As shown in FIG. 4, the banknote pushing component includes a fixing plate 331 fixed on one side of the guide rod, the fixing plate is slidably connected with a push rod 332 corresponding to the direction of the lifting plate, a banknote pushing plate 333 is fixed on a top end of the push rod, a banknote pushing rack is further provided on the push rod, and the banknote pushing rack is arranged together with a motor fixed on the fixing plate, through a gear. In the present technical solution, the banknote pushing component also adopts the manner of matching the rack with the gear, so that the banknote pushing component is flexible in reaction and has a long service life.

[0028] The banknote pushing component further includes a detecting light controlling device fixed above the banknote pushing plate, and the detecting light controlling device is electrically connected together with the controller. The detecting light controlling device of the banknote pushing component detects whether the banknote pushing component pushes the banknotes in place, and prevents the defect that the bundled banknotes failed to be pushed are left on the lifting plate to affect next distribution.

[0029] The rotating disc includes a gear disc body and a rotary motor rotationally connected with the gear disc body, the conveyor belt includes a first conveying motor,

and the rotary motor and the first conveying motor are respectively electrically connected with the controller.

[0030] The detecting component and the lifting motor are both electrically connected with the controller.

5 **[0031]** In the present disclosure, as long as the controller can realize output of a motion controlling signal and input of a feedback signal of a detecting signal after programming, it can be used, generally PC or PLC is adopted.

10 **[0032]** In the above technical solution, the controller controls the banknote blocking plate to descend to the position of the conveyor belt, and intercept the bundled banknotes transmitted on the conveyor belt just below the detecting mechanism. The detecting mechanism can be a camera or other image detecting device. After detecting the bundled banknotes, whether the bundled banknotes are qualified or not is determined according to the size of the bundled banknotes and a position of a bundling belt, and if qualified, the controller controls the banknote blocking plate to lift, then the rotary motor rotates the rotating disc, and further drives the conveyor belt to rotate the bundled banknotes to the direction towards the lifting plate, then the conveyor belt is switched on to convey the bundled banknotes onto the lifting plate, and then the bundled banknotes are lifted by the lifting plate to the position of the external pipeline. After the lifting plate is lifted to the height of the banknote pushing component, the controller controls the lifting plate to stop moving, and then controls the banknote pushing component to push the bundled banknotes to the external pipeline. There are a plurality of banknote pushing components, which can be arranged longitudinally along the guide rod, and a connecting position between each pushing component and the guide rod is provided with the detecting light controlling device configured to detect a running height of the lifting plate, thus facilitating the coordination of the controller.

35 **[0033]** The above technical solution only embodies a preferred technical solution of the technical solutions of the present disclosure, and some changes that could be made to some parts therein by those skilled in the art reflect the principle of the present disclosure, and fall within the scope of protection of the present disclosure.

45 Claims

1. A system for detecting and distributing bundled banknotes, **characterized by** comprising a rotating mechanism (1), which is configured to receive and sort bundled banknotes; a detecting mechanism (2), which is fixed to an upper portion of the rotating mechanism and configured to detect received bundled banknotes; and a lifting and distributing mechanism for bundled banknotes (3), which is provided corresponding to the rotating mechanism and configured to distribute qualified bundled banknotes to an external pipeline, wherein

the rotating mechanism comprises a rotating disc (11) rotationally fixed on a bracket, a mounting plate (12) is fixed on the rotating disc, the mounting plate is provided thereon with a conveyor belt (13) configured to receive the bundled banknotes, and the conveyor belt is capable of rotating along the rotating disc to steer and push the bundled banknotes to outside or onto the lifting and distributing mechanism for bundled banknotes;

the detecting mechanism for the bundled banknotes comprises a detecting component (21) fixed to the bracket, a banknote blocking plate (22) is mounted at a lower portion of the detecting component, and the banknote blocking plate is correspondingly provided at an upper portion of the conveyor belt so as to intercept the bundled banknotes passing through the conveyor belt; and

the lifting and distributing mechanism for bundled banknotes comprises a lifting plate (31) mounted at one side of the conveyor belt, the lifting plate is connected respectively with a transmission component and a guide rod (32), and the guide rod is provided thereon with at least one banknote pushing component, which is configured to push the bundled banknotes to the external pipeline.

2. The system for detecting and distributing bundled banknotes according to claim 1, wherein the banknote blocking plate is further connected with a lifting rod, a rack is provided on a rod body on one side of the lifting rod, and the rack is connected with a lifting motor through a gear.
3. The system for detecting and distributing bundled banknotes according to claim 2, wherein a transmission mechanism comprises an upper chain wheel (341) and a lower chain wheel (342) which are correspondingly fixed at both an upper end and a lower end of the guide rod, the upper chain wheel and the lower chain wheel are in matched connection with a chain (343), the lower chain wheel is connected with a driving motor (344), and the lifting plate is correspondingly fixed on the chain and is capable of moving up and down under drive of the chain.
4. The system for detecting and distributing bundled banknotes according to claim 3, wherein a detecting light controlling device (35) is further fixed on the guide rod, the detecting light controlling device is electrically connected with a controller, and the controller is electrically connected with the driving motor.
5. The system for detecting and distributing bundled banknotes according to claim 4, wherein the banknote pushing component comprises a fixing plate (331) fixed on one side of the guide rod, the fixing plate is slidably connected with a push rod (332) corresponding to a direction of the lifting plate, and a

banknote pushing plate (333) is fixed on a top end of the push rod.

6. The system for detecting and distributing bundled banknotes according to claim 5, wherein a banknote pushing rack is further provided on the push rod, and the banknote pushing rack is arranged, through a gear, to a motor fixed on the fixing plate.
7. The system for detecting and distributing bundled banknotes according to claim 6, wherein the banknote pushing component further comprises a detecting light controlling device fixed above the banknote pushing plate, and the detecting light controlling device is electrically connected with the controller.
8. The system for detecting and distributing bundled banknotes according to claim 7, wherein the rotating disc further comprises a gear disc body and a rotary motor rotationally connected with the gear disc body.
9. The system for detecting and distributing bundled banknotes according to claim 8, wherein the conveyor belt comprises a first conveying motor, and the rotary motor and the first conveying motor are respectively electrically connected with the controller.
10. The system for detecting and distributing bundled banknotes according to claim 9, wherein the detecting component and the lifting motor are both electrically connected with the controller.

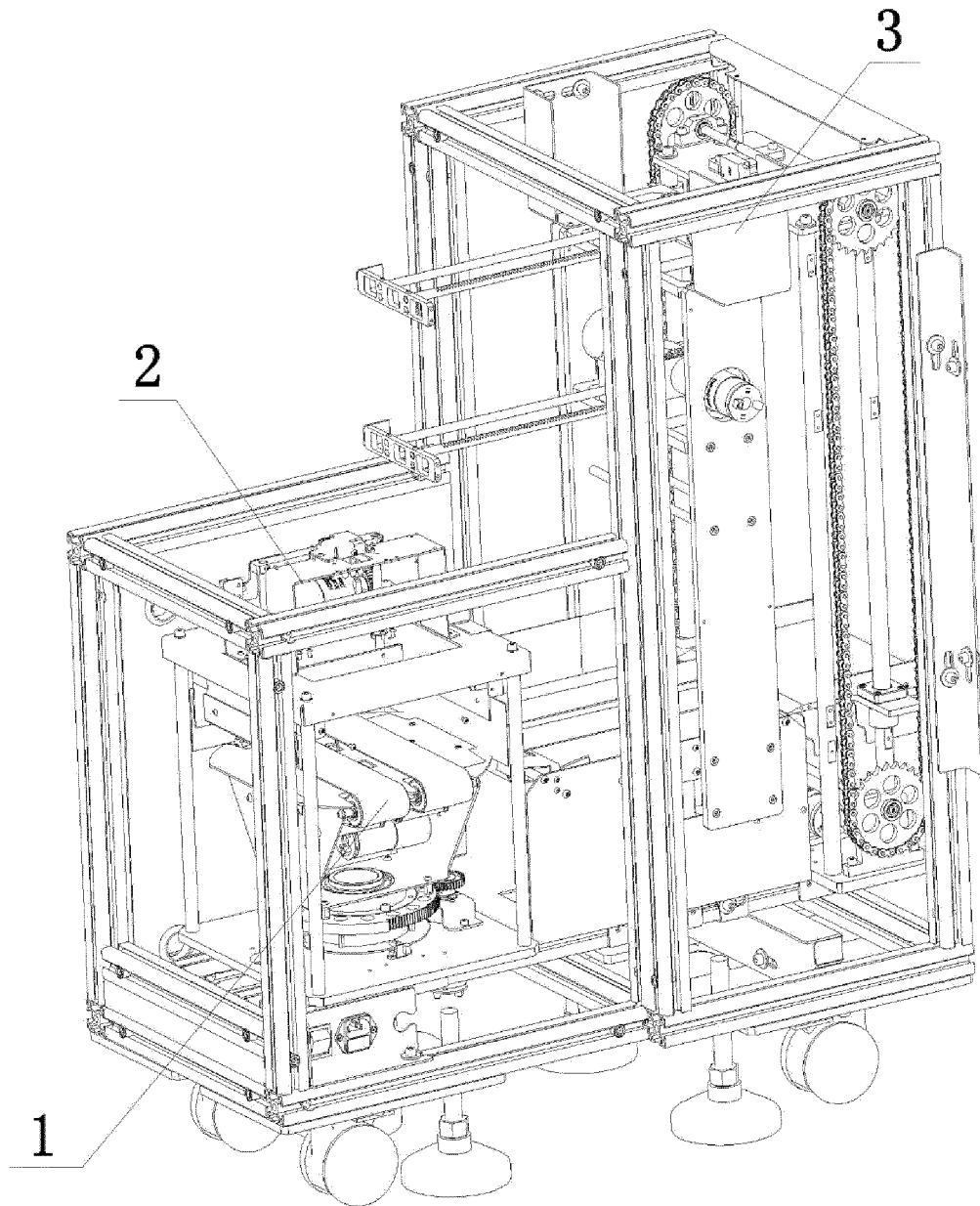


FIG. 1

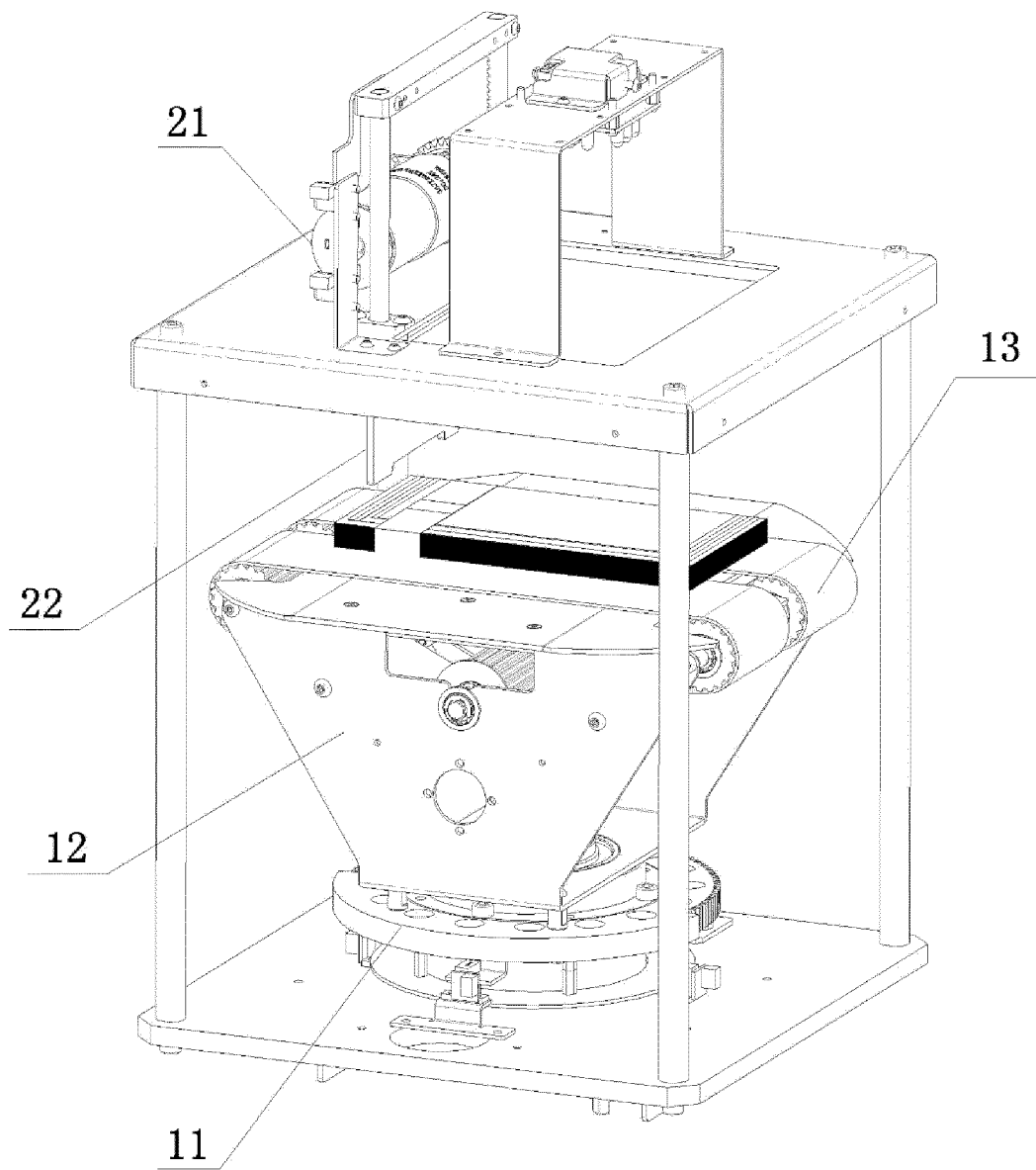


FIG. 2

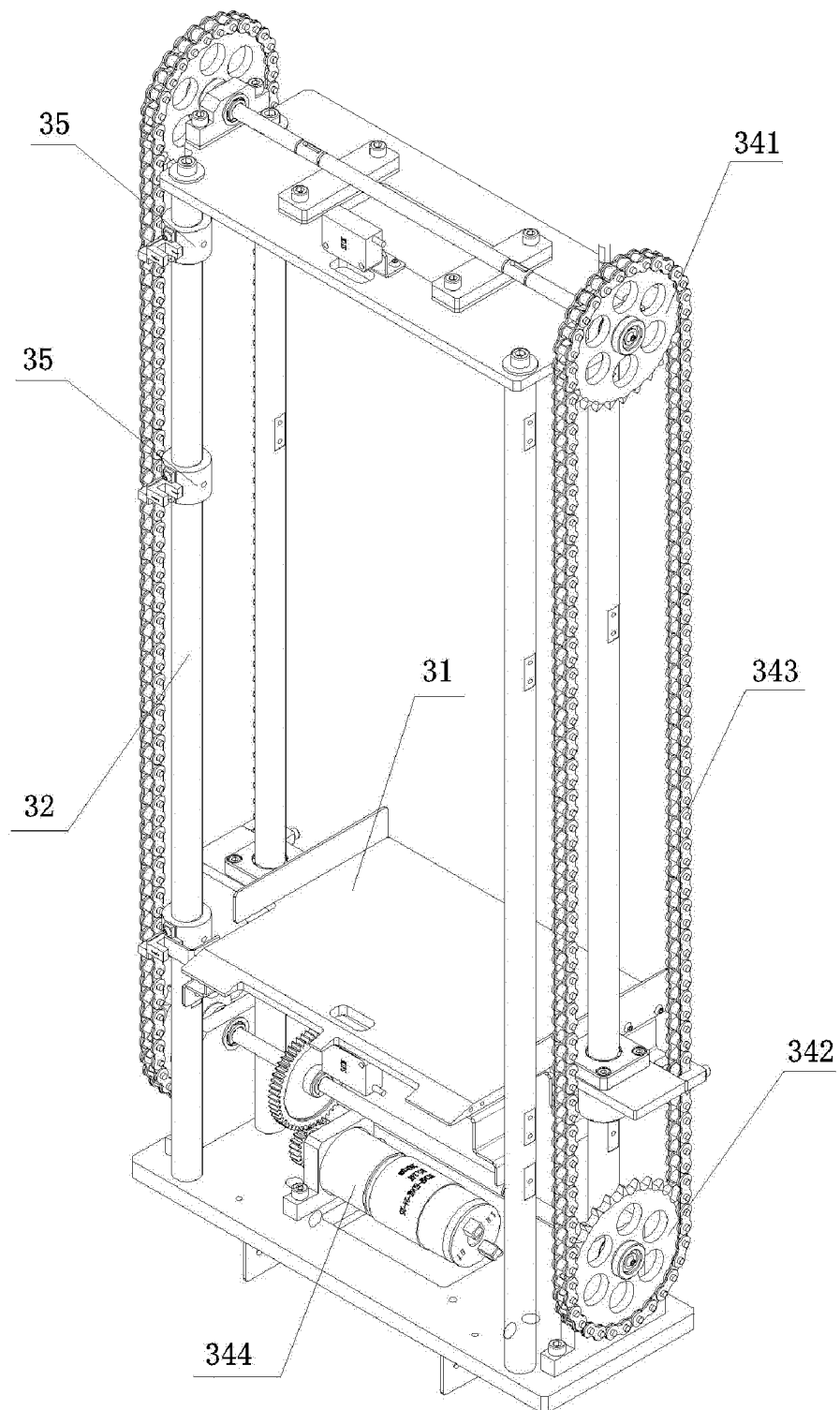


FIG. 3

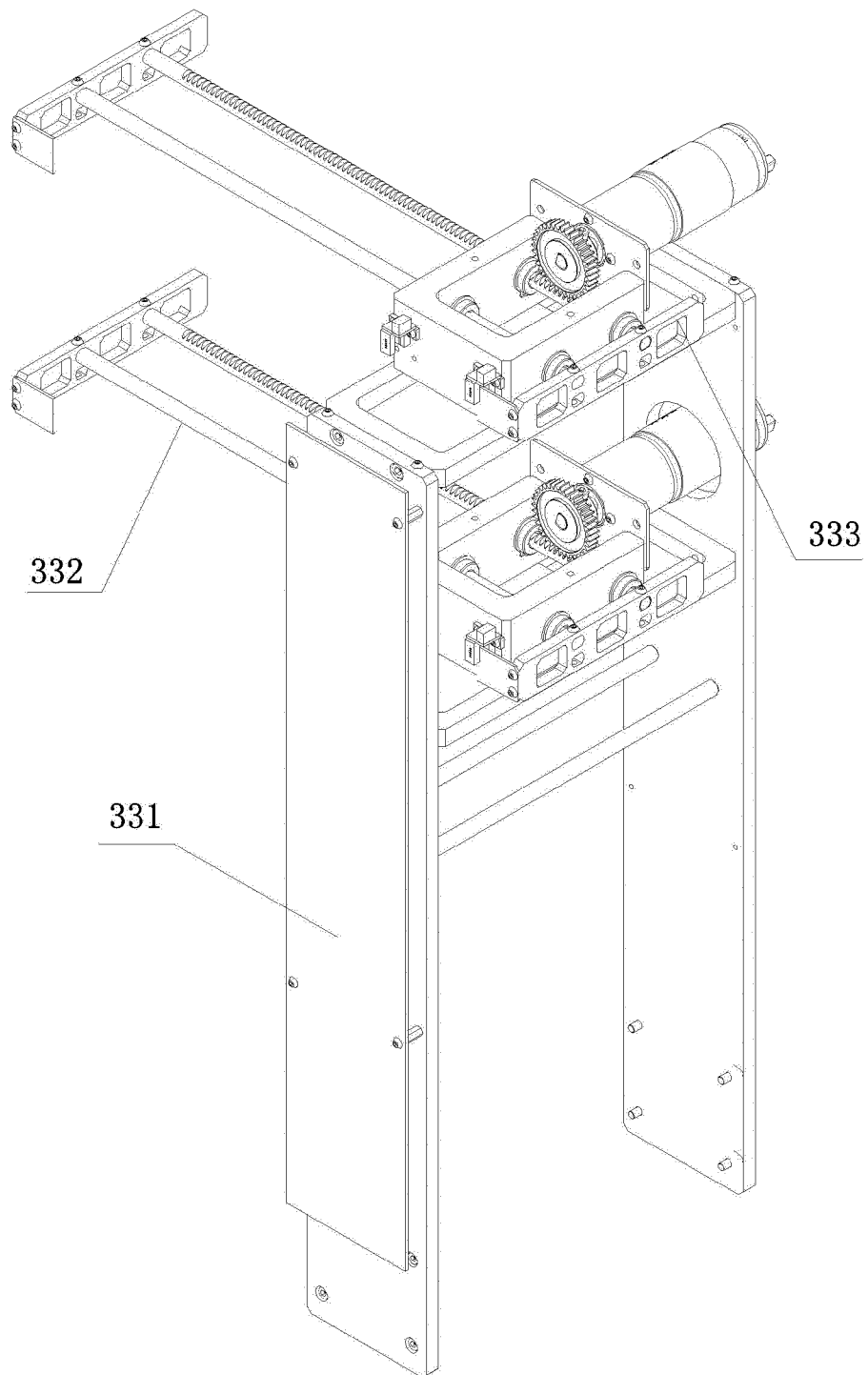


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2018/107743

A. CLASSIFICATION OF SUBJECT MATTER

G07D 11/00(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)

G07D,B65H,B65B,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)

CNABS, CNTXT, VEN: 扎, 把, 捆, 叠, 纸, 币, 钞, 旋转, 转动, 转向, 检测, 检验, 监测, 侦测, 提升, 升高, 升降, bundl+, bank+, note?, bill+, money+, currenc+, coin+, paper, rotat+, roll+, turn+, steer+, detect+, test+, sens+, lift+, wind+, hoist+, rais+, heav+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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PX	CN 107633593 A (JULONG CO., LTD.) 26 January 2018 (2018-01-26) description, paragraphs 0043-0089, and figures 1-7	1-10
PX	CN 207249797 U (JULONG CO., LTD.) 17 April 2018 (2018-04-17) description, paragraphs 0021-0038, and figures 1-4	1-10
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A	CN 205771839 U (GUANGZHOU INTELICASH FINANCIAL TECHNOLOGY CO., LTD. ET AL.) 07 December 2016 (2016-12-07) entire document	1-10
A	CN 205451259 U (HEBEI HUIJIN ELECTROMECHANICAL CO., LTD.) 10 August 2016 (2016-08-10) entire document	1-10

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

* Special categories of cited documents:	"J" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search

12 December 2018

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2018/107743

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
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Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2018/107743

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