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(71) Applicant: **International Currency Technologies Corporation**
Taipei (TW)

(72) Inventor: **CHANG, Chia-Min**
Taipei City (TW)

(74) Representative: **Karakatsanis, Georgios**
Haft Karakatsanis Patent Law Office
Stadtplatz 11
94209 Regen (DE)

(54) DELIVERY DEVICE STRUCTURE OF VENDING MACHINE

(57) A delivery device structure of a vending machine is provided. A base body has a driving motor and a microswitch disposed on a driving device, and a driving shaft is disposed a side of the driving motor, and the microswitch can stop the driving shaft rotating. A rotary shaft of a delivery assembly is pivotally connected to the base body, and the rotary shaft has a swingarm located inside an accommodation space of the base body to push and move a product, and a gear set is engaged between the driving shaft and the rotary shaft. The gear set performs more smooth and accurate transmission between the driving shaft and the rotary shaft, so that the delivery device structure can have better durability, and overcome severe climate, and implement a higher transmission ratio, thereby preventing the products from being delivered continuously.

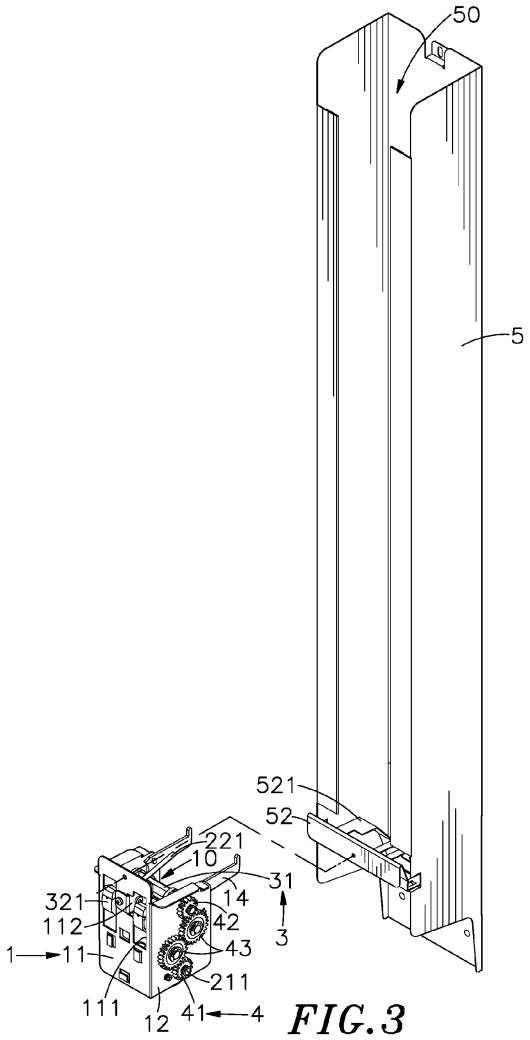

FIG.3

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a delivery device structure of a vending machine, more particularly to a delivery device structure in which a gear set is used to perform transmission between a driving shaft of a driving motor and a rotary shaft of a delivery assembly, to make the transmission process more smooth and accurate, so that the delivery device structure can have better durability, overcome severe climate, and implement a higher transmission ratio to indeed deliver the product, thereby preventing the product from being delivered continuously.

2. Description of the Related Art

[0002] With advanced development of social civilization and technology, it accelerates the pace of people's lives, so compact and busy scenes in the city are ubiquitous, and people gradually require life to be more convenient and fast. Therefore, in consideration of the convenience and speed of life to which the people pay attention, vending machines are equipped in many public places. The vending machines can greatly reduce cost of personnel employment and provide convenience for modern people. For example, a smart unmanned store combining three advantages of technology intelligence, diversified services and rapid checkout can break through conventional sale models, and the vending machines can be applied to vend beverages, cigarettes, tickets, ice cream, admission tickets, commemorative coins, and key rings, and even some special types of vending machines can vend hamburger fries and ramen. As the vending machines can vend more and more types of products, many unmanned stores are set up. The unmanned management and self-checkout method can bring people more convenient and comfortable shopping environment, and provide people with different shopping experiences.

[0003] The general vending machine includes a plurality of delivery devices, and each delivery device is driven by a driving motor to rotate at least one swingarm, so that the delivery arm can be rotated to hit and move a product to a dispense opening, and the product is then available for a consumer to take out. In a conventional vending machine, the driving motor and the delivery arm are driven by a belt pulley. Subject to the limited space available for the delivery device, the transmission manner of using the belt pulley has following disadvantages. For example, because the transmission manner of using the belt pulley is unable to ensure an accurate transmission ratio, and has a lower transmission efficiency due to elastic sliding and slipping conditions, and it causes that the swingarm often fails to indeed hit and move the product to the dispense opening; furthermore, subject to the transmission ratio with lower accuracy, the swingarm often fails to stop immediately and accurately, and it causes two products to be delivered continuously and also make property damage. Moreover, since the belts are mostly made of rubber material, and in cold, hot climate, or other severe climate with a high temperature difference, the belts crack or break easily, the vending machine usually fails to deliver the object, and it causes inconvenience and disputes for the consumer.

[0004] Therefore, what is needed is to develop a delivery device structure of a vending machine to solve above-mentioned problems.

SUMMARY OF THE INVENTION

[0005] In order to solve the above-mentioned problems, the inventors develop a delivery device structure of a vending machine according to collected data, multiple tests and modifications, and years of experience in the industry.

[0006] An objective of the present invention is that a delivery device structure includes a driving motor and a microswitch of a driving device disposed on a base body thereof, a driving shaft disposed on a side of the driving motor and configured to rotate, and the microswitch is electrically connected to the driving motor and configured to stop rotation of the driving shaft, and a rotary shaft of the delivery assembly is pivotally connected to the base body, and the rotary shaft comprises a swingarm disposed thereon and configured to rotate inside the accommodation space of the base body to push and move a product, and a gear set is engaged between the driving shaft and the rotary shaft, a channel is formed in a hollow interior space of a product channel, which is disposed in the base body, and in communication with an accommodation space of the base body and configured to accommodate a plurality of products, and a delivery port is disposed on a side of the channel, the gear set is used to perform transmission between the driving shaft of the driving motor and the rotary shaft of the delivery assembly, and the transmission manner of using the gear set can provide more smooth and accurate transmission process, so that the delivery device structure can have better durability, overcome severe climate, and implement higher transmission ratio through the transmission of the gear set, thereby indeed hitting and moving one of the plurality of products to deliver and using the accurate transmission ratio to prevent the multiple products from being delivered continuously.

[0007] An objective of the present invention is that at least one counterweight can be placed on the plurality of products in the channel of the product channel, so as to increase the weight applied on the plurality of products, and indeed press a spring clip of the microswitch to output an electrical signal, thereby preventing the multiple products from being delivered continuously.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The structure, operating principle and effects of the present invention will be described in detail by way of various embodiments which are illustrated in the accompanying drawings.

FIG. 1 is an elevational view of a delivery device structure of a vending machine of the present invention.

FIG. 2 is an elevational view of a delivery device structure of a vending machine of the present invention, when viewed from another angle.

FIG. 3 is a perspective exploded view of a delivery device structure of a vending machine of the present invention.

FIG. 4 is a perspective exploded view of a delivery device structure of a vending machine of the present invention, when viewed from another angle.

FIG. 5 is a sectional side view of a delivery device structure of a vending machine of the present invention, before use.

FIG. 6 is a sectional side view (a) of a delivery device structure of a vending machine of the present invention, when in use.

FIG. 7 is a sectional side view (b) of a delivery device structure of a vending machine of the present invention, when in use.

FIG. 8 is a sectional side view of a delivery device structure of a vending machine of the present invention, after use.

FIG. 9 is a sectional side view of another embodiment of a delivery device structure of a vending machine of the present invention, before use.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0009] The following embodiments of the present invention are herein described in detail with reference to the accompanying drawings. These drawings show specific examples of the embodiments of the present invention. These embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. It is to be acknowledged that these embodiments are exemplary implementations and are not to be construed as limiting the scope of the present invention in any way. Further modifications to the disclosed embodiments, as well as other embodiments, are also included within the scope of the appended claims. These embodiments are provided so that this disclosure is thorough and complete, and fully conveys the inventive concept to those skilled in the art. Regarding the drawings, the relative proportions and ratios of elements in the drawings may be exaggerated or diminished in size for the sake of clarity and convenience. Such arbitrary proportions are only illustrative and not limiting in any way. The same reference numbers are used in the drawings and description to refer to the same or like parts.

[0010] Please refer to FIGS. 1 to 5, which are elevational views and perspective exploded views of a delivery device structure of a vending machine of the present invention when viewed from different angles, and a sectional side view of the delivery device structure of the present invention before use. As shown in FIGS. 1 to 5, the delivery device structure of the present invention includes a base body 1, a driving device 2, a delivery assembly 3, a gear set 4 and a product channel 5.

[0011] The base body 1 includes a base plate 11, and the base plate 11 has two side plates 12 bent from two opposite sides thereof in the same direction. One of the side plates 12 has a bottom plate 13 bent from a bottom thereof and connected to another side plate 12. An accommodation space 10 is formed between the base plate 11, the two side plates 12, and the bottom plate 13. The base plate 11 has at least one through hole 111 cut through a surface thereof, and a plate 112 vertically disposed between the two through holes 111 and extended into the inside of the accommodation space 10. The two side plates 12 are pivoted to two support components 14 respectively, and each support component 14 is extended to the outside of the accommodation space 10 and swingable longitudinally. Each support component 14 has a curved guide surface 141 formed on a side surface thereof in the accommodation space 10 and recessed inwardly, and a support corner 142 formed on a lower part of the curved guide surface 141.

[0012] The driving device 2 includes a driving motor 21 and a microswitch 22. The driving motor 21 is combined on the base plate 11 and disposed under the bottom plate 13, and has a driving shaft 211 disposed on a side thereof and inserted through the side plate 12. The microswitch 22 is mounted on the plate 112 of the base plate 11 and electrically connected to the driving motor 21, and the microswitch 22 has a spring clip 221 disposed on other end thereof and obliquely extended towards the accommodation space 10.

[0013] The delivery assembly 3 includes a rotary shaft 31 pivotally connected to the two side plates 12, and the rotary shaft 31 has at least one swingarm 32 disposed thereon and located inside the accommodation space 10. The at least one swingarm 32 can be driven to rotate by the rotary shaft 31, and has a hitting block 321 protruded on a side of the swingarm 32 and located inside the through hole 111 of the base plate 11. The rotary shaft 31 has two abutting blocks 33 protruded on other side thereof opposite to the two swingarms 32 and in semiarc-shaped shapes. Each of the abutting blocks 33 has an abutting corner 331 disposed on an end thereof and configured to abut against the support corner 142 of the support component 14 to keep the support component 14 in a horizontal state. Each of the abutting blocks 33 also has a push corner 332 disposed on other end thereof and configured to push the curved guide surface 141 of the support component 14 to support the support

component 14 in the horizontal state.

[0014] The gear set 4 includes a first gear 41 and a second gear 42 fixed on the driving shaft 211 and the rotary shaft 31 respectively, and at least one transmission wheel 43 engaged between the first gear 41 and the second gear 42.

[0015] The product channel 5 is disposed on the base body 1, and has a channel 50 formed in a hollow interior space thereof and in communication with to the accommodation space 10, and a delivery port 51 cut therethrough a lower part of the channel 50. A guide component 52 is disposed inside the channel 50 and includes a carry plate 521 disposed inside the channel 50, and an inclined guide plate 522 disposed on a side of the carry plate 521 and extended towards the delivery port 51.

[0016] Please refer to FIGS. 5 to 8, which are sectional side views of a delivery device structure of a vending machine of the present invention, before use, when in use, and after use, respectively. As shown in FIGS. 5 to 8, in a practical use, the delivery device structure can be applied in a vending machine, such as a cigarette vending machine, a drink vending machine, or a food vending machine, and the vending machine can accommodate a plurality of products 6 placed in the channel 50 of the product channel 5, and the product 6 can be cigarette, drink or food. The plurality of products 6 can be stacked on the carry plate 521 of the guide component 52 longitudinally in a sequential order, and the lowermost product 6 can press the spring clip 221 of the microswitch 22 by a bottom thereof. When the consumer selects a desired product 6, presses a button (not shown in figures) corresponding to the desired product 6 on the vending machine, and then completes payment through a payment device (not shown in figures) of the vending machine, such as a coin slot, a cash insertion slot or a credit card machine, the vending machine can output an electrical signal to activate the driving motor 21 of the driving device 2, so that the driving shaft 211 of the driving motor 21 can be rotated, and the first gear 41 of the gear set 4 fixed on the driving shaft 211 can be rotated simultaneously, thereby driving at least one transmission wheel 43 of the gear set 4 and the second gear 42 engaged with the transmission wheel 43 to rotate simultaneously. However, when the second gear 42 rotates, the rotary shaft 31 of the delivery assembly 3 is also driven to rotate simultaneously, so that the two swingarms 32 and two abutting blocks 33 of the rotary shaft 31 are rotated simultaneously.

[0017] While the two swingarms 32 and the two abutting blocks 33 of the delivery assembly 3 are being rotated, the lowermost product 6 can be hit and moved outwardly by the hitting blocks 321 of the two swingarms 32 rotating inside the accommodation space 10 of the base body 1, and in this case, the abutting corners 331 of the two abutting blocks 33 can stop abutting against the support corners 142 of the two support components 14, so that the two support components 14 rotate downwardly to prevent from interfering delivery of the lowermost product 6. Next, the lowermost product 6 is guided to slide along the guide plate 522 of the guide component 52, to leave from the spring clip 221 of the microswitch 22, so that the spring clip 221 of the microswitch 22 can elastically recover upwardly, and in this case, the products 6 stacked inside the channel 50 of the product channel 5 downwardly fall, and the tops of the two swingarms 32 can support the products 6, so as to prevent the bottom surface of another product 6 from contacting the spring clip 221 of the microswitch 22.

[0018] At the same time, the two swingarms 32 of the delivery assembly 3 are continuously rotating, the product 6 is hit to move outwardly to pass through the delivery port 51 of the product channel 5 and then falls into a dispense opening (not shown in figures) of the vending machine, so that the consumer can take the selected product out of the dispense opening; at this time, the tops of the two swingarms 32 can be located under the spring clip 221 of the microswitch 22, and the push corners 332 of the two abutting blocks 33 can enter and push the curved guide surface 141 of the support component 14, so as to support the support component 14 upwardly, and the two abutting corners 331 of the abutting blocks 33 can support the support corner 142 of the support component 14 in the horizontal state, thereby preventing another product 6 from falling to the outside. At the same time, the product 6 above the microswitch 22 can fall to press the spring clip 221 of the microswitch 22, to trigger the electrical signal to the driving motor 21 of the driving device 2 again, so that the driving motor 21 of the driving device 2 stops rotating, to prevent two products 6 from being delivered continuously. The operation of the delivery device structure of the vending machine of the present invention is completed.

[0019] It should be noted that how to mount and fix the delivery device structure in the vending machine, and how to supply the driving device 2 with power, are conventional technologies well known to a person having ordinary skill in the art, so the details are not repeated herein.

[0020] Please refer to FIG. 9, which is a sectional side view of another embodiment of the delivery device structure of the vending machine of the present invention before use. As shown in FIG. 9, in the another embodiment of the vending machine of the present invention, at least one counterweight 7 is placed on the plurality of products 6 in the channel 50 of the product channel 5, to increase the weight applied on the plurality of products 6. When most of the plurality of products 6 are delivered already and only one product 6 remains in the vending machine, the spring clip 221 of the microswitch 22 can be indeed pressed because of the at least one counterweight 7 placed on the product 6, so as to output the electrical signal, thereby preventing the continuous delivery of the products.

[0021] According to above-mentioned content, the delivery device structure of the vending machine of the present invention has advantages below.

[0022] First, compared with conventional transmission process of using the belt pulley, the gear set 4 is used to perform transmission between the driving shaft 211 of the driving motor 21 of the driving device 2 and the rotary shaft 31 of the delivery assembly 3, and the transmission manner of using the gear set 4 can provide more smooth and accurate transmission and better durability, and overcome severe climate; furthermore, the transmission manner of using the gear set 4 can implement the higher transmission ratio, to ensure the product 6 to be hit for delivery, so that the accurate transmission ratio can be used to prevent the product 6 from being delivered continuously.

[0023] Secondly, the at least one counterweight 7 can be placed on the plurality of products 6 in the channel 50 of the product channel 5, to increase the weight applied on the plurality of products 6, so that the spring clip 221 of the microswitch 22 can be indeed pressed to output the electrical signal, thereby preventing the undesired continuous delivery condition.

[0024] The present invention disclosed herein has been described by means of specific embodiments. However, numerous modifications, variations and enhancements can be made thereto by those skilled in the art without departing from the spirit and scope of the disclosure set forth in the claims.

Claims

1. A delivery device structure of a vending machine, comprising:

   a base body (1) comprising an accommodation space (10) formed inside thereof;
   a driving device (2) comprising a driving motor (21) and a microswitch (22) disposed on the base body (1), and a driving shaft (211) disposed on a side of the driving motor (21) and configured to rotate, wherein the microswitch (22) is electrically connected to the driving motor (21) and configured to stop the driving shaft (211) rotating;
   a delivery assembly (3) comprising a rotary shaft (31) pivotally connected on the base body (1), and at least one swingarm (32) disposed on the rotary shaft (31) and being driven by the rotary shaft (31) to rotate within the accommodation space (10) to push and move a preset product (6);
   a gear set (4) comprising a first gear (41) and a second gear (42) fixed with the driving shaft (211) and the rotary shaft (31) respectively, and the at least one transmission wheel (43) engaged between the first gear (41) and the second gear (42);
   a product channel (5) formed in the base body (1), and comprising a channel (50) formed in a hollow interior space of the product channel (5) and in communication with the accommodation space (10) and configured to accommodate the preset product (6), wherein the channel (50) has a delivery port (51) cut therethrough a lower part thereof and configured to pass the preset product (6).

2. The delivery device structure according to claim 1, wherein the base body (1) comprises a base plate (11), and side plates (12) bent from two opposite sides of the base plate (11) in the same direction, and one of the side plates (12) has a bottom plate (13) bent from a bottom thereof and connected to another of the side plates (12), and the accommodation space (10) is formed between the base plate (11), the side plates (12), and the bottom plate (13).

3. The delivery device structure according to claim 2, wherein the base plate (11) of the base body (1) has at least one through hole (111) cut through a surface thereof, and at least one swingarm (32) of a delivery assembly (3) has a hitting block (321) protruded a side thereof and disposed inside the through hole (111).

4. The delivery device structure according to claim 3, wherein the base plate (11) of the base body (1) has a plate (112) disposed between two through holes (111), vertically extended to the accommodation space (10), and configured to fix a microswitch (22).

5. The delivery device structure according to claim 2, wherein the base body (1) comprises two support components (14) pivoted to the two side plates (12) thereof respectively, extended to the outside of the accommodation space (10), and swingable longitudinally, and each of the support components (14) has a curved guide surface (141) disposed on a side surface of the accommodation space (10) and recessed inwardly, and a support corner (142) formed on a lower part of the curved guide surface (141), and a rotary shaft (31) has two abutting blocks (33) protruded on other side thereof opposite to the at least one swingarm (32) and in semiarc shapes, and each of the abutting blocks (33) has an abutting corner (331) disposed on an end thereof and configured to abut against the support corner (142) to keep the support component (14) in a horizontal state, and a push corner (332) disposed on other end thereof and configured to push against the curved guide surface (141) to support the support component (14) in the horizontal state.

6. The delivery device structure of according to claim 1, wherein the microswitch (22) of the driving device (2) has a spring clip (221) disposed on a side thereof, obliquely extended towards the inside of the accom-

modation space (10), and configured to press the preset product (6).

7. The delivery device structure according to claim 1, wherein the product channel (5) comprises a guide component (52) disposed inside the channel (50) thereof, and a carry plate (521) disposed on the guide component (52), located inside the channel (50) and configured to accommodate the plurality of preset products (6), and the carry plate (521) has a guide plate (522) disposed on a side thereof and extended towards the delivery port (51), and configured to guide one of the plurality of preset products (6) to the delivery port (51).

8. A delivery device structure of a vending machine, comprising:

a base body (1) comprising an accommodation space (10) formed inside thereof;
a driving device (2) comprising a driving motor (21) and a microswitch (22) disposed on the base body (1), wherein the driving motor (21) comprises a driving shaft (211) disposed on a side thereof and configured to rotate, and the microswitch (22) is electrically connected to the driving motor (21) and configured to stop the driving shaft (211) rotating;
a delivery assembly (3) comprising a rotary shaft (31) pivotally connected to the base body (1), and at least one swingarm (32) disposed on the rotary shaft (31) and being driven by the rotary shaft (31), to rotate inside the accommodation space (10) to push and move one of a plurality of preset products (6);
a gear set (4) comprising a first gear (41) and a second gear (42) fixed on the driving shaft (211) and the rotary shaft (31) respectively, and at least one transmission wheel (43) engaged between the first gear (41) and the second gear (42);
a product channel (5) disposed on the base body (1), and comprising a channel (50) formed in a hollow interior space thereof, in communication with the accommodation space (10) and configured to accommodate the preset product (6), wherein the at least one swingarm (32) rotates inside the channel (50), and the channel (50) comprises a delivery port (51) cut through a lower part thereof and configured to pass one of the plurality of preset products (6); and
a counterweight (7) disposed inside the channel (50) of the product channel (5) and on the plurality of preset products (6).

9. The delivery device structure according to claim 8, wherein the base body (1) comprises a base plate (11), and the base plate (11) has two side plates (12) bent from two opposite sides thereof in the same direction, and the base body (1) comprises two support components (14) pivoted to the two side plates (12) thereof respectively, extended to the outside of the accommodation space (10), and swingable longitudinally.

10. The delivery device structure according to claim 8, wherein the product channel (5) comprises a guide component (52) disposed inside the channel (50) thereof, and a carry plate (521) disposed on the guide component (52) and located inside the channel (50), and configured to accommodate the plurality of preset products (6), and the carry plate (521) has a guide plate (522) disposed on a side thereof and extended towards the delivery port (51), and configured to guide one of the plurality of preset products (6) to the delivery port (51).

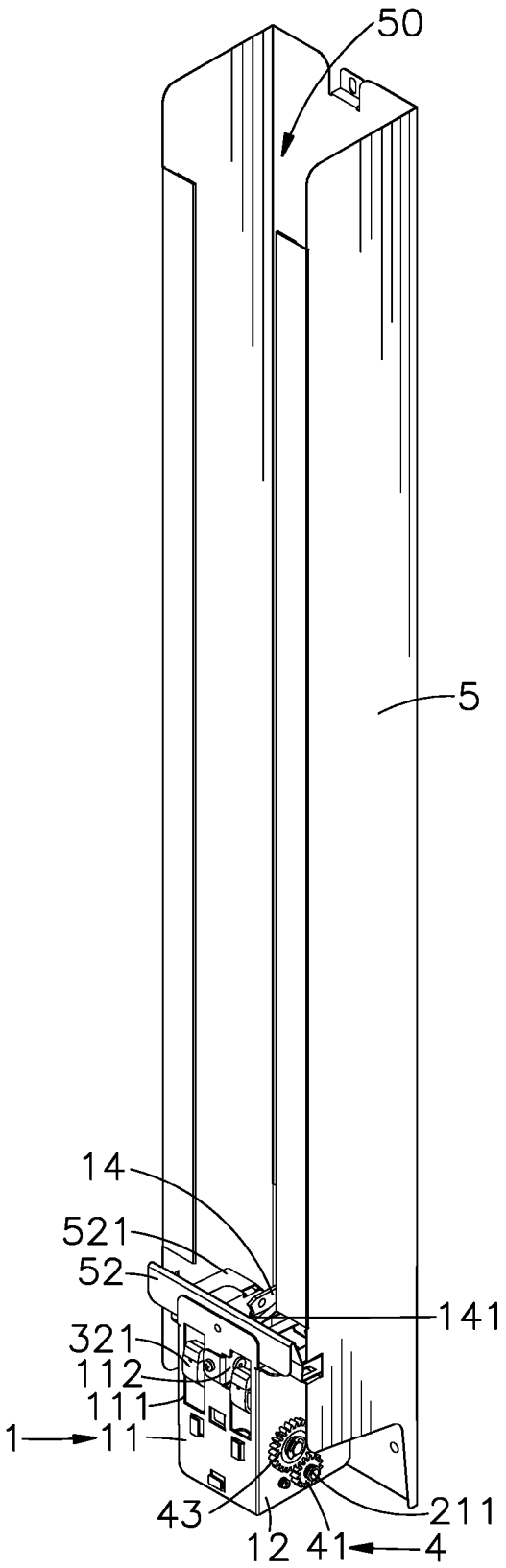

FIG. 1

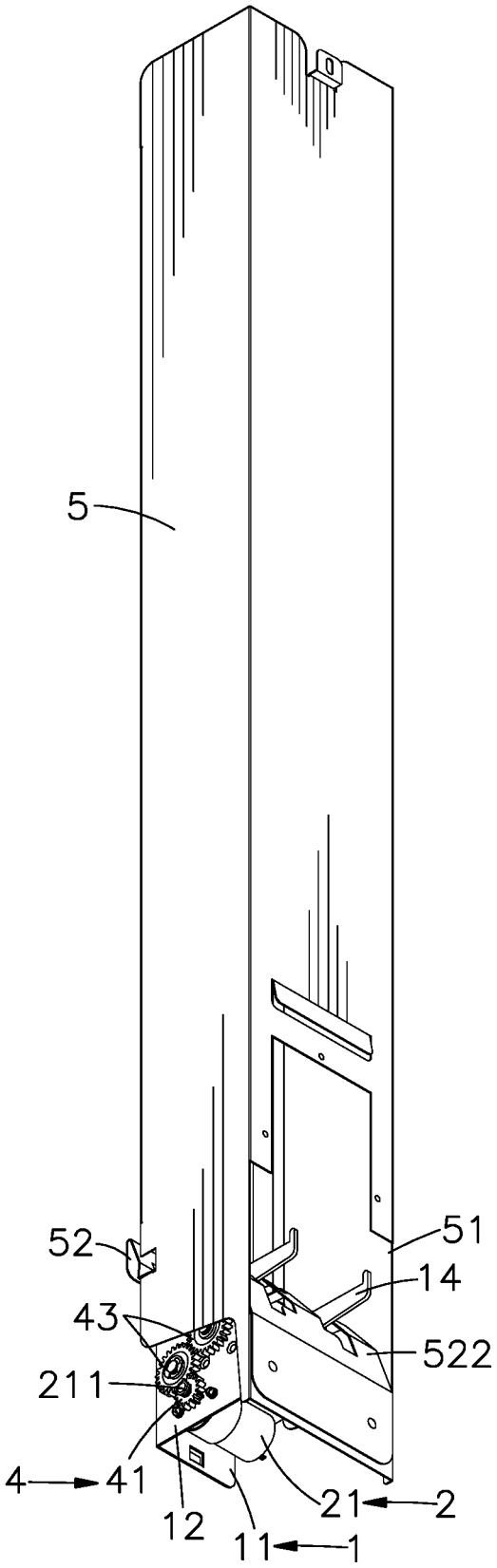

FIG.2

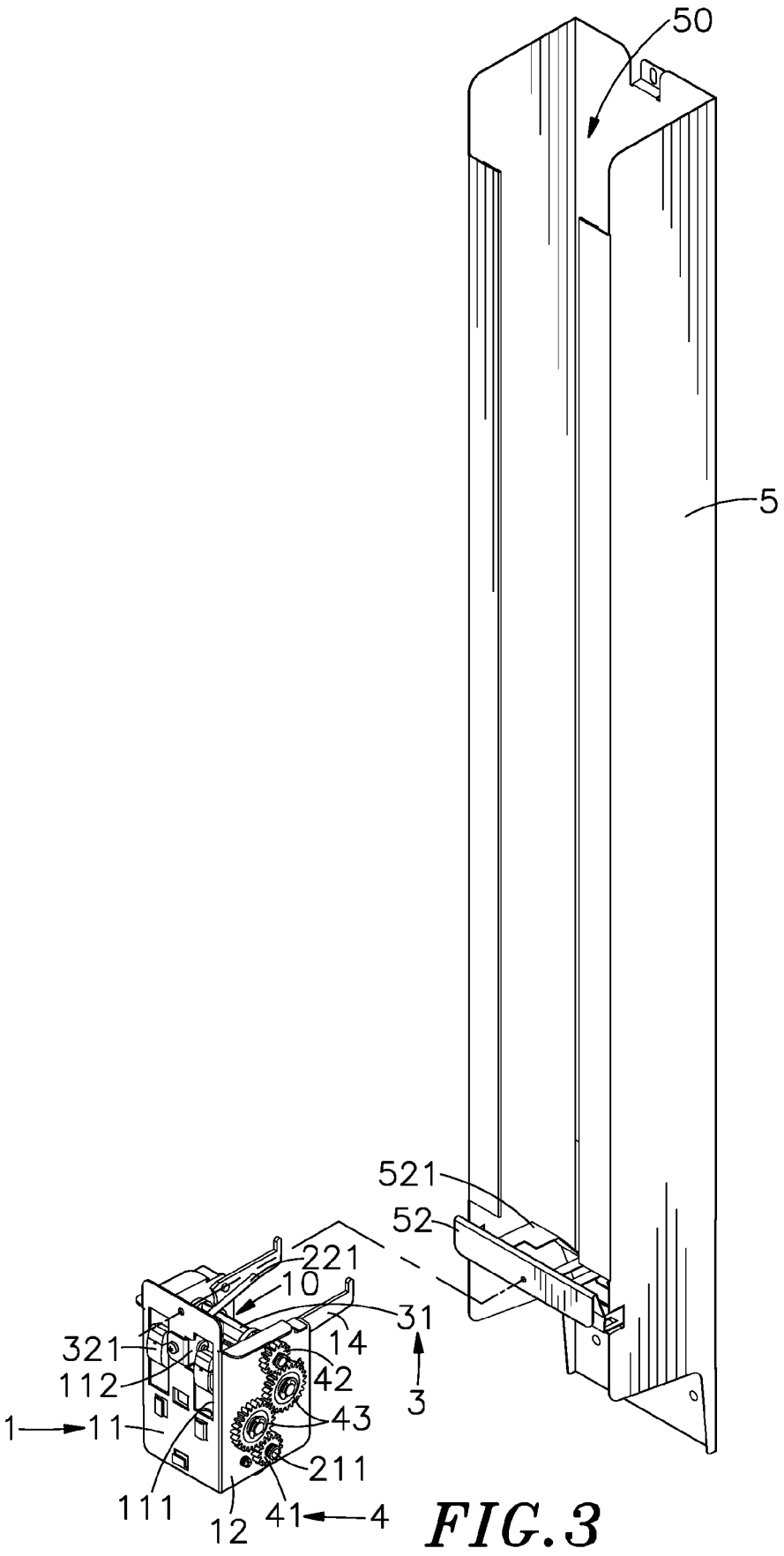

FIG.3

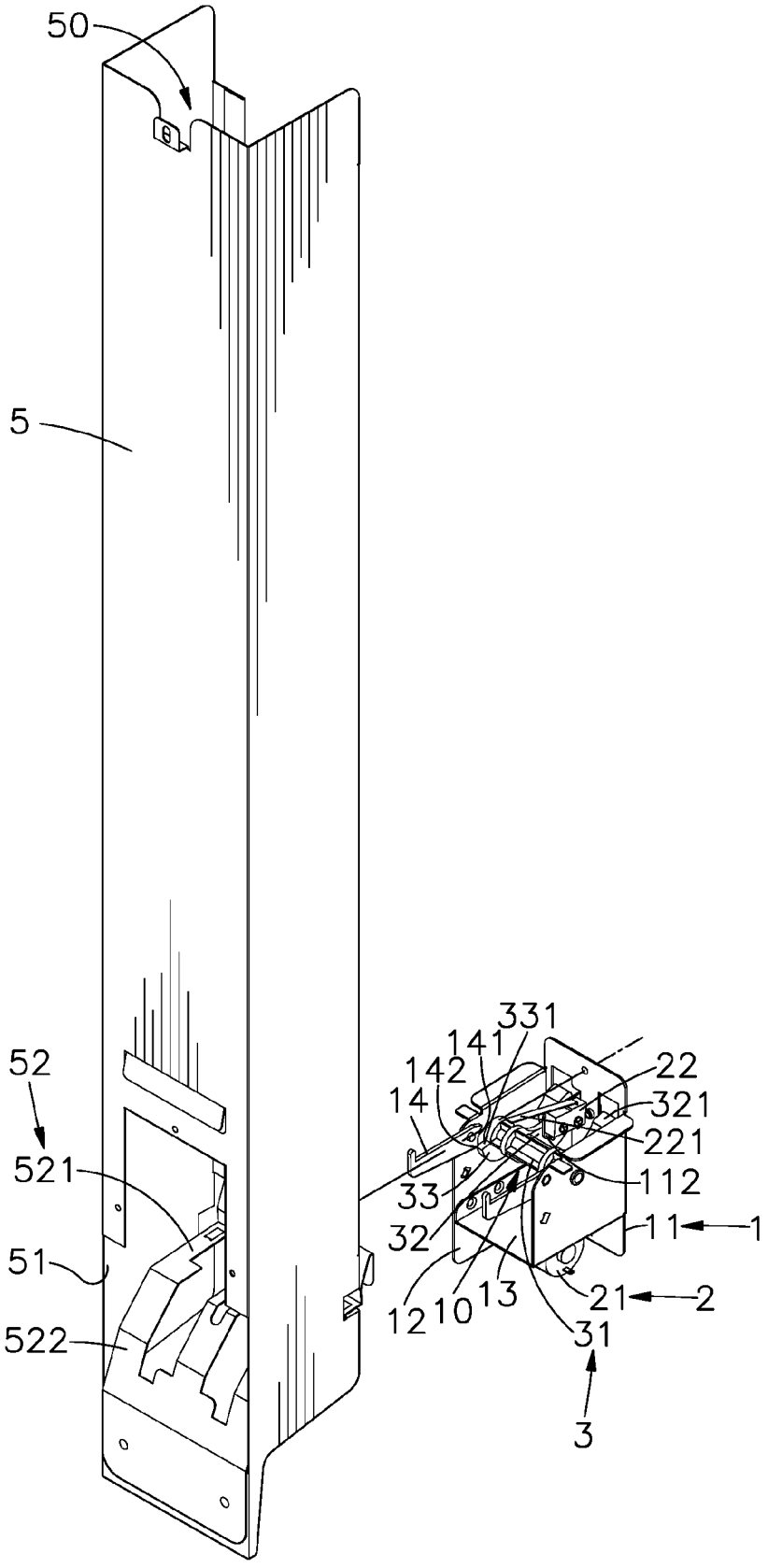
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FIG. 4

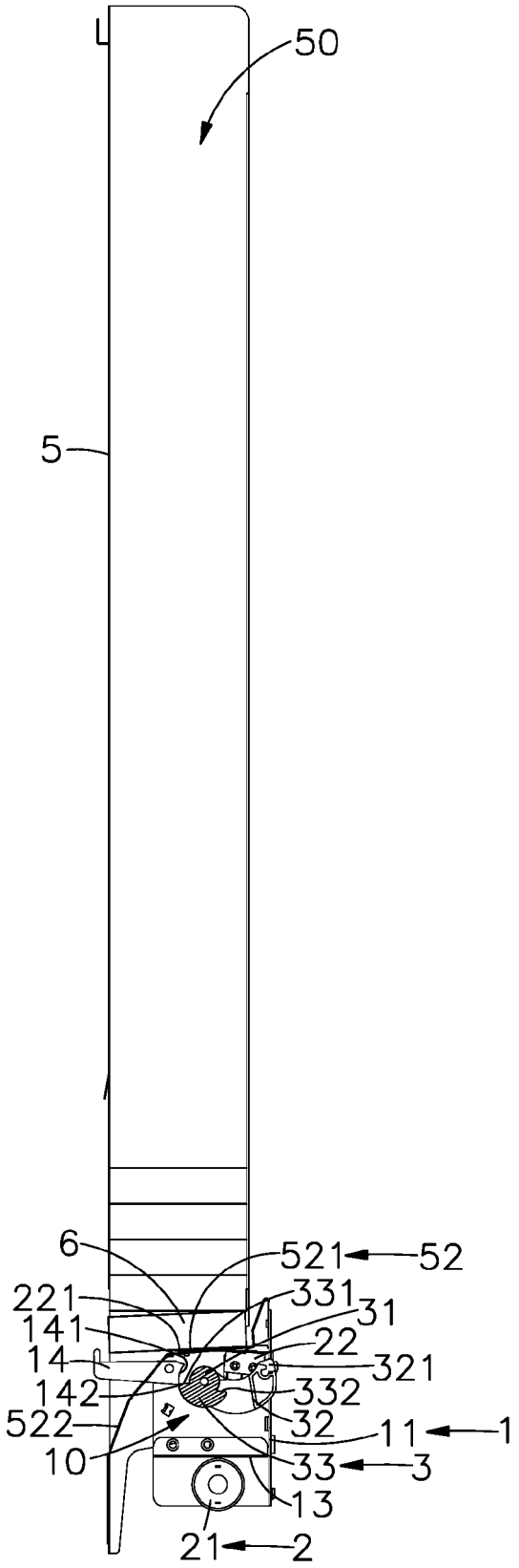
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FIG.5

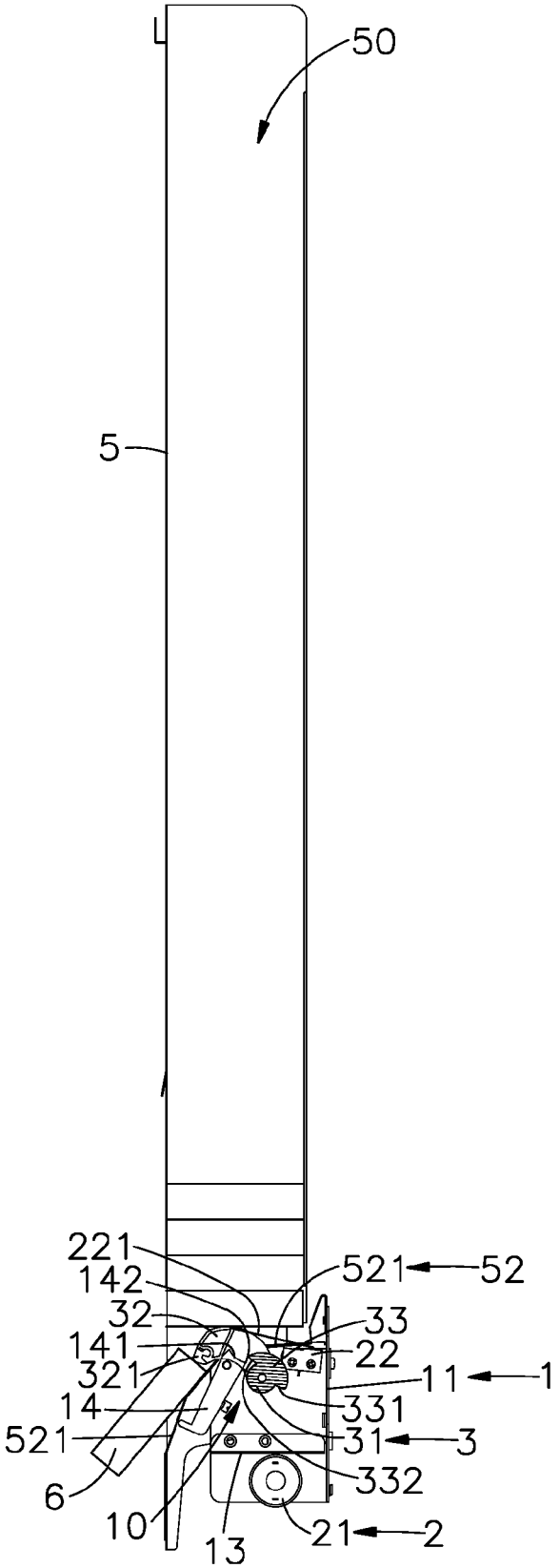
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FIG. 6

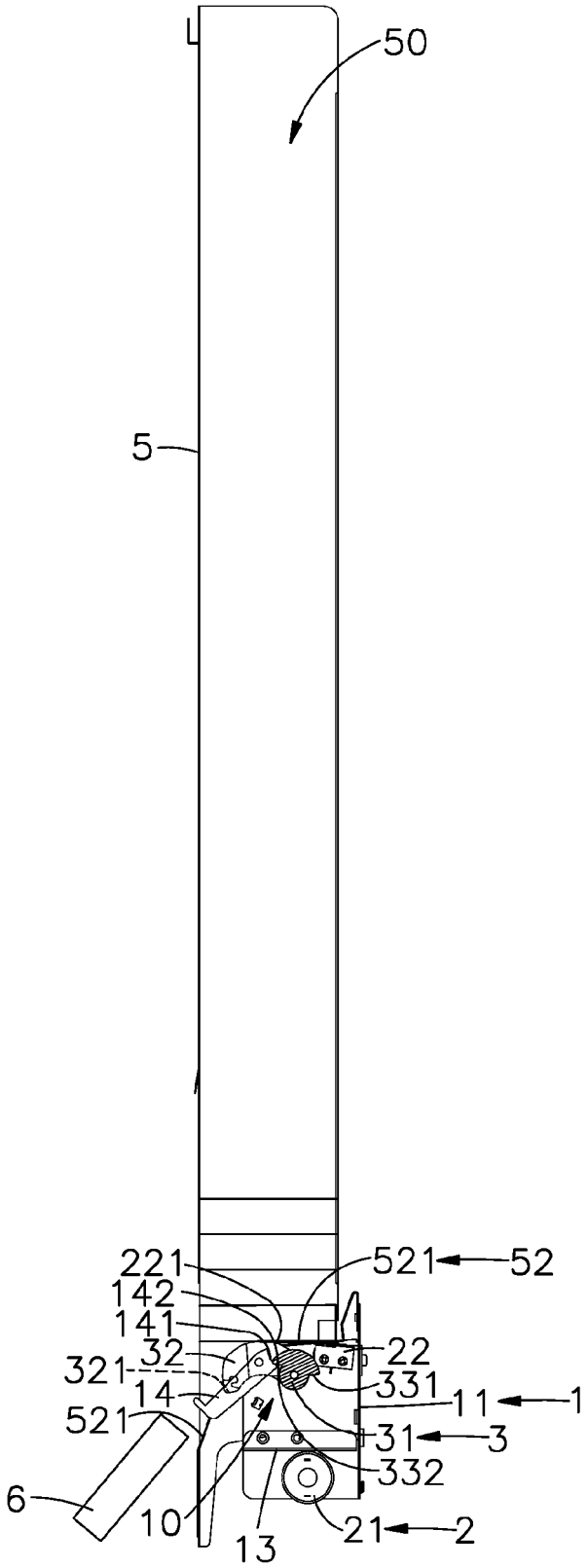
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FIG. 7

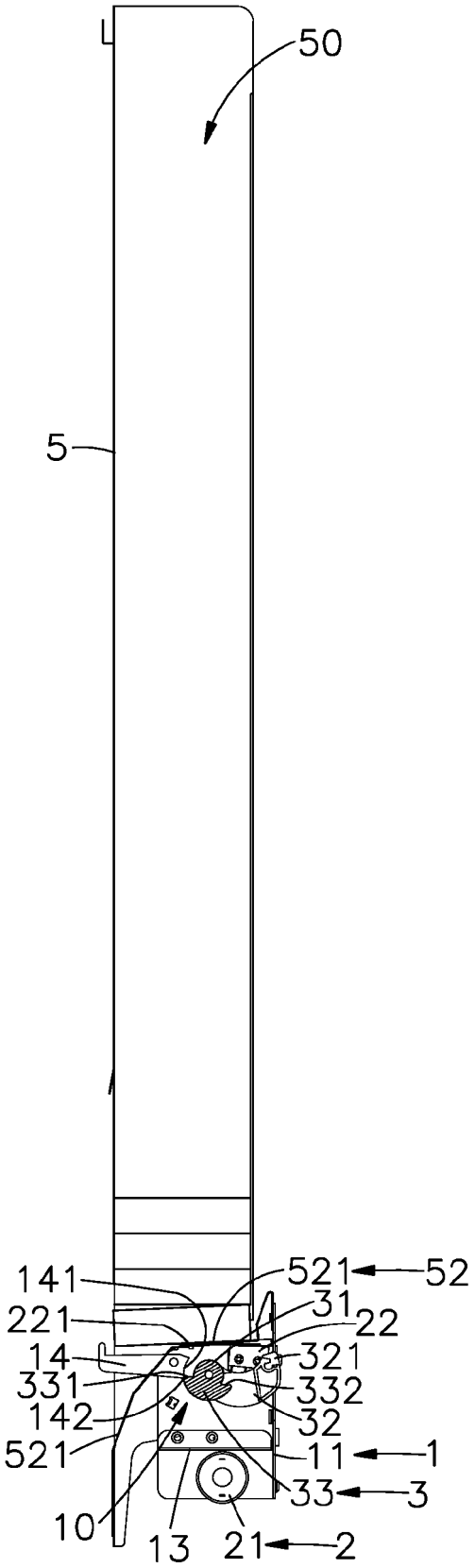
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FIG. 8

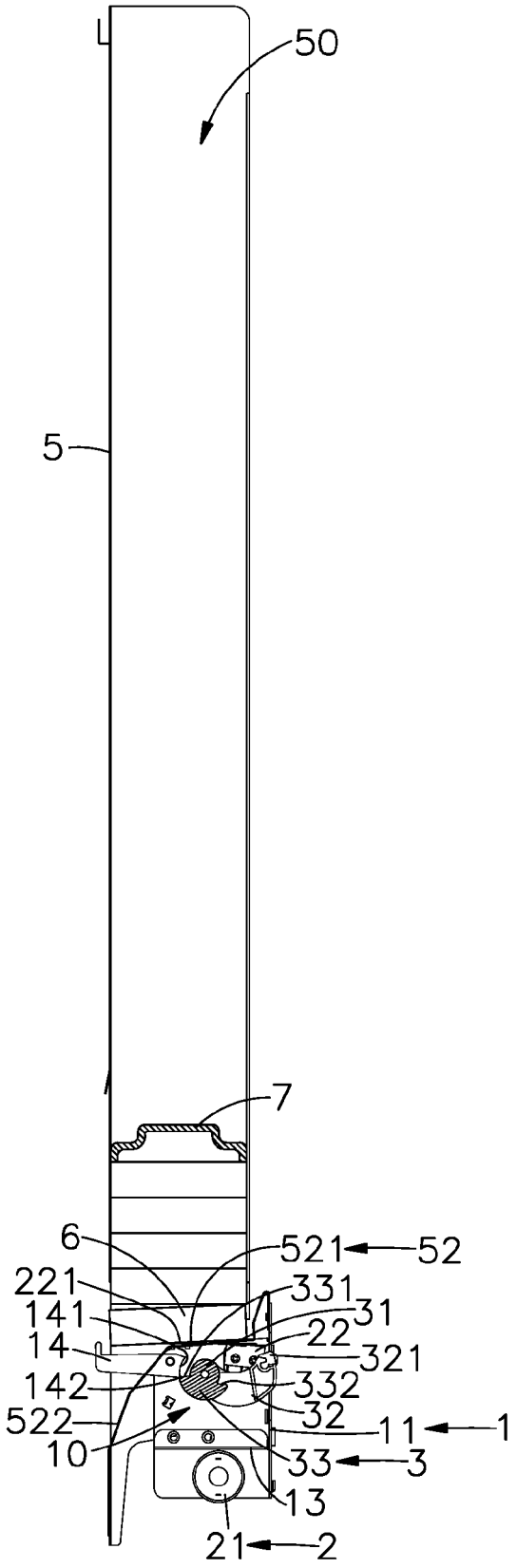
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FIG. 9

Europäisches Patentamt
European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 23 15 9318

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	TW M 587 333 U (INTERNATIONAL CURRENCY TECH CORPORATION [TW]) 1 December 2019 (2019-12-01) * the whole document *	1-10	INV. G07F11/16 G07F11/00 G07F11/24
X	US 2012/123587 A1 (MOCKUS DARRELL SCOTT [US] ET AL) 17 May 2012 (2012-05-17) * the whole document *	1-10	
A	US 2004/104239 A1 (BLACK TALBERT JAMES [US] ET AL) 3 June 2004 (2004-06-03) * the whole document *	1-10	
A	US 3 362 579 A (NEWBERRY MEIGS W) 9 January 1968 (1968-01-09) * the whole document *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			G07F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21 June 2023	Guenov, Mihail

CATEGORY OF CITED DOCUMENTS

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P : intermediate document

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