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Remarks:
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(54) Coin delivery device and coin delivery device of coin processing apparatus

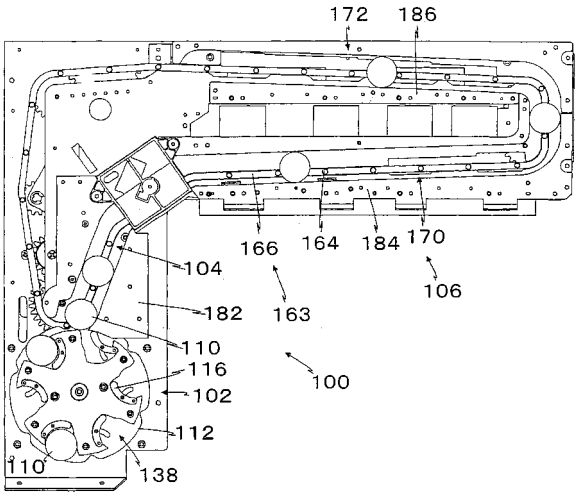
(57) A first object of the present invention is to provide a coin delivery device which, even when coins of a plurality of denominations having a large difference in diameter are mixed, can sort the coins one by one for delivery.

A second object of the present invention is to provide a coin delivery device in which a dispensing position of a coin can be freely set.

A third object of the present invention is to provide a small coin delivery device.

In a coin delivery device which holds coins in sorting concave portions arranged in an upper surface of a rotary disk where only one coin can be positioned and which sorts the coins one by one and then transfers them to a coin conveyer, the concave portion is provided with a moving member movable in a diametrical direction of the rotary disk, and the moving member is moved in the diametrical direction when the coin is transferred to the coin conveyer.

Fig.1



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Description

[0001] The present invention relates to a coin delivery device which sorts coins of a plurality of denominations having different diameters one by one for delivery to a subsequent process.

[0002] The present invention also relates to a coin delivery device of a coin processing apparatus which sorts coins having different diameters one by one for transfer to a conveyer of the coins.

[0003] It is to be noted that the "coin" used in the present specification includes a monetary coin, a token, a medal and the like, and includes circular and polygonal shapes.

[0004] A first known prior art includes hooking coins by pins fixed to an upper surface of a rotary disk to sort the coins one by one, and transferring the coins to a conveyer for a subsequent process (e.g., refer to Patent document 1).

[0005] A second known prior art includes receiving coins one by one into fan-shaped concave portions opening on an upper surface side and peripheral surface side of a rotary disk, and transferring the coins to a conveyer for a subsequent process (e.g., refer to Patent document 2).

[Patent document 1] Japanese Patent Publication Laid-open No. 8-171666 (FIG. 1, page 2)

[Patent document 2] Japanese Utility Model Publication Laid-open No. 57-50776 (FIG. 4, page 2 to page 7)

[0006] In the first prior art, the one-by-one sorting of the coins is regulated only by the space between the pins.

[0007] Thus, when a difference between the diameters of a maximum diameter coin and a minimum diameter coin is great, the maximum diameter is 28.5 mm of a two-pound coin and the minimum diameter is 18 mm of a five-pence coin, for example, in the case of English currency.

[0008] As the pin space is set considering enough room for accommodation, two minimum diameter coins can slip between a pair of pins, which causes a problem that they are not sorted one by one.

[0009] In the second prior art, since the coin is received in the fan-shaped concave portion, two minimum diameter coins do not enter the concave portion.

[0010] However, gravity is utilized for the transfer to the conveyer for the subsequent process, so that the position of a coin dispensing slot cannot be freely set, leading to a problem of limitation in layout.

[0011] A first object of the present invention is to provide a coin delivery device which, even when coins of a plurality of denominations having a large difference in diameter are mixed, can sort the coins one by one for delivery.

[0012] A second object of the present invention is to provide a coin delivery device in which a dispensing position of a coin can be freely set.

[0013] A third object of the present invention is to provide a small coin delivery device.

[0014] To attain these objects, a coin delivery device according to claim 1 or claim 4 is provided.

[0015] In a coin delivery device of a coin processing apparatus which holds coins in sorting concave portions arranged in an upper surface of a rotary disk to sort the coins one by one, and then transfers the coins to a coin conveyer, a moving member is provided which forms the concave portion and which is movable in a diametrical direction of the rotary disk, and wherein the moving member is moved in the diametrical direction of the rotary disk when the coin is transferred to the coin conveyer.

[0016] In this configuration, the coins are received in the concave portions and thus sorted one by one.

[0017] That is, only one coin can be positioned in the concave portion, so that two minimum diameter coins are not together held in the sorting concave portion.

[0018] When the concave portion moves to a position for transfer to the coin conveyer, the moving member forming a concave portion moves in the diametrical direction of the rotary disk.

[0019] This movement causes the coin held in the concave portion to actively move in the diametrical direction of the rotary disk, so that the coin can be transferred to the coin conveyer at its moving portion.

[0020] In other words, there is an advantage that the dispensing position is not limited since the dispensing position of the coin can be controlled by the moving position of the moving member.

[0021] The invention according to claim 2 concerns, in the invention according to claim 1, the coin delivery device of the coin processing apparatus characterized in that the concave portion of the rotary disk is fan-shaped so as to be free on an upper surface side of the rotary disk and to be open on a peripheral surface side of the rotary disk, and has a coin pushing portion at one part thereof, and in that the moving member is positioned at a side of the pushing portion when the coin is received, and moved to the peripheral surface opening side when the coin is transferred.

[0022] In this configuration, since the concave portion is open on the upper side and peripheral surface side of the rotary disk, the coins in a retention bowl at which the disk is positioned are stirred by the rotation of the rotary disk, such that one coin is received in the concave portion.

[0023] In other words, the fan-shaped concave portion is sectioned by its edge and a retention ring so as not to hold two minimum diameter coins.

[0024] Furthermore, the coin is moved by the concave coin pushing portion.

[0025] The moving member then moves toward the peripheral surface opening side at a predetermined position, and pushes out the coin from the lateral side to the peripheral surface opening side.

[0026] The pushed-out coin is received by the coin conveyer, and conveyed to a subsequent process.

[0027] As the pushing portion to push the coin is formed in the rotary disk, it can be made of a material having durability.

[0028] Furthermore, the moving member pushes the coin from the lateral side and thus no great force is required, thereby allowing a size reduction.

[0029] Therefore, there is an advantage that the coin delivery device can be reduced in size.

[0030] The invention according to claim 3 concerns, in the invention according to claim 2, the coin delivery device of the coin processing apparatus wherein the moving member is arc-shaped and attached to the rotary disk so as to be able to pivot on one end, and a moved member attached to the moving member is inserted in a groove cam located under the rotary disk.

[0031] In this configuration, because the moving member is arc-shaped, its concave portion accepts a circular peripheral edge of the coin.

[0032] The moving member and the moved member move together with the rotary disk, and the moved member is guided by the fixed groove cam, thus providing an advantage that no extra driver is needed.

[0033] Furthermore, by properly setting the shape of the groove cam, the moving member can be moved at the predetermined position in the diametrical direction of the rotary disk, so that the coin retained in the concave portion can be delivered at the predetermined position.

[0034] Therefore, the coin delivery device can be reduced in size and is inexpensive.

[0035] The invention according to claim 4 concerns a coin delivery device including: a rotary disk whose axis line is inclined at a predetermined angle; a sorting concave portion whose upper side and peripheral surface side are open in an upward surface of the rotary disk and in which at least one minimum diameter coin is positioned and two minimum diameter coins are unacceptable; a moving member which is attached to the concave portion of the rotary disk in a manner to be able to pivot and which is movable between a receiving position to form the sorting concave portion and a moving position where the moving member is moved to the opening side; a moved member attached to the moving member; and a groove cam disposed under the rotary disk and receiving the moved member.

[0036] In this configuration, the moving member is located at the receiving position except when the coin is dispensed, so that the coins are received in the sorting concave portions and held one by one.

[0037] That is, at least one minimum diameter coin can be only positioned in the concave portion, and therefore, two minimum diameter coins are not positioned together.

[0038] When the coin is dispensed, the moving member moves to the moving position, and the coin held in the concave portion is thus moved by the moving member in the diametrical direction of the rotary disk.

[0039] This movement causes the coin held in the concave portion to actively move toward the peripheral surface of the rotary disk, so that the coin can be delivered from the rotary disk at the predetermined portion.

[0040] In other words, there is an advantage that the dispensing position is not limited since the dispensing position of the coin can be controlled by the position of the moving member.

[0041] The invention according to claim 5 concerns, in the invention according to claim 4, the coin delivery device characterized in that the moving member is attached to a pivot shaft located closer to a peripheral edge side of the rotary disk than the moved member.

[0042] In this configuration, since a pivot shaft of the moving member is attached to the pivot shaft located closer to the peripheral edge side of the rotary disk than the moved member, the moved member is positioned in the groove cam after the rotary disk has been rotated.

[0043] In other words, the pivot shaft moves prior to the moved member, and the moved member is moved by the groove cam at such a position as to trail the pivot shaft.

[0044] Therefore, great force is not applied to the moved member, and there is thus an advantage that the coin delivery device can be reduced in size and can be made inexpensively.

[0045] A coin delivery device which holds coins in sorting concave portions arranged in an upper surface of a rotary disk where at least one minimum diameter coin can only be positioned, so as to sort the coins one by one, and then transfers the coins to a coin conveyer, the coin delivery device including: the rotary disk whose axis line is inclined at a predetermined angle; the sorting concave portion whose upper side and peripheral surface side are open in an upward surface of the rotary disk and in which at least one minimum diameter coin is positioned and two minimum diameter coins are unacceptable; a moving member which is attached in a manner to be able to pivot to form the concave portion of the rotary disk and which is movable between a receiving position located at a side portion of the sorting concave portion and a moving position where the moving member is moved to the opening side; a moved member attached to the moving member; and a groove cam disposed under the rotary disk and receiving the moved member, wherein the moving member is moved in a peripheral surface direction when the coin is transferred to the coin conveyer.

[0046] FIG. 1 is a schematic front view of a coin delivery device in an embodiment of the present invention.

[0047] FIG. 2 is a schematic view of a conveyer of the coin delivery device in the embodiment of the present invention.

[0048] FIG. 3 is a front view of the coin delivery device in the embodiment of the present invention.

[0049] FIG. 4 is a sectional view along the line A - A in FIG. 3.

[0050] FIG. 5 is a front view to explain the operation in the embodiment of the invention.

[0051] The present embodiment concerns a coin delivery device of a coin processing apparatus which processes coins of eight denominations in English currency:

2 pounds, 1 pound, 50 pence, 20 pence, 10 pence, 5 pence, 2 pence and 1 penny.

[0052] In FIG. 1, a coin processing apparatus 100 includes a coin delivery device 102, a coin conveyer 104 and a coin screening device 106.

[0053] That is, the coin delivery device 102 sorts and delivers coins 110 one by one to transfer them to the coin conveyer 104, and the coin screening device 106 separates the coins by denomination while they are being conveyed on a predetermined path by the coin conveyer 104.

[0054] First, the coin delivery device 102 will be described referring to FIG. 3 and FIG. 4.

[0055] The coin delivery device 102 has a function to sort mixed coins of a plurality of denominations one by one for delivery.

[0056] The coin delivery device 102 includes a rotary disk 112, a concave portion 114 formed between protruding portions 122, a moving member 116 to move the coin 110, and a driver 117 for the moving member.

[0057] First, the rotary disk 112 will be described.

[0058] The rotary disk 112 has a function to stir a large number of coins and to receive the coins 110 in concave portions 138 described later one by one for sorting.

[0059] The rotary disk 112 has a shape of a circular plate, is disposed such that its rotation axis line 118 is inclined at a predetermined angle, and has an upward surface 120.

[0060] It has six radially extending protruding portions 122 in the upward surface 120, and a push-out disk 126 is fixed in which the concave portions 114 are formed between the protruding portions 122.

[0061] A slightly concave coin pushing portion 128 is formed on a front surface of the protruding portion 122 in a rotation direction of the rotary disk 112.

[0062] A concave moving member receiving portion 130 is formed in a rear surface, in the rotation direction, of the protruding portions 122, where the arc-shaped moving member 116 is disposed.

[0063] The rotary disk 112 and the push-out disk 126 can be integrally molded by a sintered metal or a resin having antifriction properties.

[0064] Next, the moving member 116 will be described.

[0065] The moving member 116 has a function to move, at a predetermined position, the coin 110 held in the sorting concave portion 138 in the diametrical direction of the rotary disk 112.

[0066] Therefore, the moving member 116 can have an alternative configuration as long as this function is satisfied.

[0067] The moving member 116 is attached, in a manner to be able to pivot, to a pivot shaft 134 protruding at the moving member receiving portion 130 on a peripheral edge side of the rotary disk 112.

[0068] This moving member 116 is preferably made of a metal or a resin in view of antifriction properties and mechanical strength.

[0069] The concave portion 114 and an internal edge 136 of the moving member 116 constitute the fan-shaped sorting concave portion 138.

[0070] The concave portion 138 is a flat ditch opening on an upper surface and peripheral surface sides.

[0071] The depth of the concave portion 138, in other words, the thickness of the push-out disk 126 is formed to be slightly smaller than the thickness of the thinnest coin among those of eight denominations described above.

[0072] This is intended that two coins are not held on top of the other.

[0073] Furthermore, the concave portion 138 is fan-shaped and the distance between an internal surface 140 of a retention ring 140 described later and a deepest portion of the concave portion 138 is twice or less than the diameter of a minimum diameter coin, such that two minimum diameter coins are not held side by side in the concave portion 138.

[0074] This is because the length in the circumferential and diametrical direction of the concave portion 138 is less than twice the minimum diameter coin.

[0075] When the moving member 116 is positioned in the receiving portion 130, it is positioned at a receiving position RP.

[0076] The rotary disk 112 is disposed at the bottom of the cylindrical retention ring 140 to retain the coin.

[0077] An opening 142 is provided at a portion of the retention ring 140 for transfer to the conveyer 104 so that the coin 110 can pass through.

[0078] A retention bowl 144 is further attached to the retention ring 140, and a retention portion 146 is provided opposite to the rotary disk 112.

[0079] Therefore, the coin 110 thrown in this retention portion 146 is guided toward the rotary disk 112.

[0080] Next, the driver 117 of the moving member 116 will be described.

[0081] The driver 117 has a function to move, at a predetermined position, the moving member 116 from the receiving position RP to a moving position MP.

[0082] Therefore, the configuration of the driver 117 can be changed to configurations other than that in the embodiment as long as this function is satisfied.

[0083] The driver 117 includes a moved member 154 and a cam 157.

[0084] First, the moved member 154 will be described.

[0085] An arc-shaped through-hole 148 is formed around the pivot shaft 134 in the rotary disk 112, through which a pin 150 fixed at the midpoint of the moving member 116 is penetrated.

[0086] A roller 152 is rotatably attached to a lower end of the pin 150.

[0087] This roller 152 is the moved member 154.

[0088] Next, the cam 157 will be described.

[0089] The moved member 154 is movably inserted in a groove cam 158 formed in an upper surface of an inward flange 156 formed in a ring shape from the inner peripheral surface toward the center of the retention ring 140.

[0090] In the groove cam 158, there are formed a circular receiving groove 160 around a rotation center of

the rotary disk 112; a moving groove 162 which has a larger diameter than that of the receiving groove 160 and which holds the moving member 116 at the moving position MP; a deliver process groove 164 in the process of moving from the receiving groove 160 to the moving groove 162; and a return process groove 166 returning from the moving groove 162 to the receiving groove 160.

[0091] Therefore, when the moved member 154 is positioned in the receiving groove 160, the moving member 116 is held in the receiving portion 130, and is at the receiving position RP.

[0092] Thus, the moving member 116 forms the fan-shaped sorting concave portion 138 together with the concave portion 114.

[0093] As shown in FIG. 5, the sorting concave portion 138 is such that a bottom B (in the embodiment, the tip of the moving member 116) closest to a rotation shaft 180 is located slightly farther away from the internal surface of the retention ring 140 than the diameter of a maximum diameter coin 110L.

[0094] Furthermore, this distance is less than double the diameter of a minimum diameter coin 110S.

[0095] Therefore, two minimum diameter coins 110S are not received side by side in the sorting concave portion 138, in other words, between the retention ring 140 and the bottom B, in the diametrical direction of the rotary disk 112.

[0096] Furthermore, the sorting concave portion 138 is fan-shaped, so that two minimum diameter coins 110S are not received side by side in the circumferential direction of the rotary disk 112.

[0097] When the moved member 154 is positioned in the deliver process groove 164, the moving member 116 is caused to pivot clockwise on the pivot shaft 134.

[0098] Then, when the moved member 154 is positioned in the moving groove 162, the moving member 116 moves to the moving position MP.

[0099] Subsequently, the moved member 154 is positioned at the return process groove 166, and the moving member 116 is thus rotated counterclockwise on the pivot shaft 134 and returned to the receiving position RP.

[0100] Thus, the cam 157 is not limited to the groove cam 158, but when the groove cam 158 is used, an auxiliary device is not needed to move the moved member 154 along the cam 157, thereby providing advantages such as structural simplification, possible size reduction and low costs.

[0101] Next, the coin conveyer 104 will be described.

[0102] The coin conveyer 104 has a function to receive the coins 110 delivered one by one from the coin delivery device 102, and convey them to a predetermined coin processing apparatus, such as the coin screening device.

[0103] The coin conveyer 104 includes an endless proceed member 163, and pins 164 attached at predetermined intervals to the endless proceed member 163.

[0104] The endless proceed member 163 is a flexible loop member, and is a chain 166 having a predetermined length in the embodiment.

[0105] However, the endless proceed member 163 can be changed to a belt.

[0106] The endless proceed member 163 is guided by a plurality of sprockets, and circulates on an L-shaped loop path.

[0107] That is, the path of the endless proceed member 163 comes closest to the top of the rotary disk 112 at the lowest sprocket 168 portion, and then goes upward at a steep angle, and thus proceeds in a first screening portion 170 which is a gentle upward slope. Next, it proceeds substantially vertically, and then proceeds in a second screening portion 172 which is located above the first screening portion 170 and which is a gentle upward slope, and thus returns to the sprocket 168 portion.

[0108] The pins 164 are fixed at predetermined intervals to a side surface of the endless proceed member 162 so as to hook the coins 110, one by one, delivered from the coin delivery device 102.

[0109] Therefore, the sprocket 168 rotates in conjunction with the rotary disk 112.

[0110] That is, a gear 174 to which the sprocket 168 is fixed engages with a gear 176 disposed under the rotary disk 112.

[0111] In other words, the gear 176 is rotatably attached to the shaft 180 fixed to a base 178, and the rotary disk 112 is fixed to the gear 176.

[0112] The gear 174 engages with a gear 182 on its side, and the gear 182 is driven by an unshown electric motor at a predetermined velocity.

[0113] Therefore, the rotary disk 112 and the sprocket 168 rotate and move at a predetermined velocity ratio.

[0114] In other words, the sorting concave portion 138 moves in a corresponding manner to the pins 164.

[0115] It is to be noted that a notch 181 is formed at an outer peripheral edge of the protruding portion 122 of the rotary disk 112 so that the transfer from the moving member 116 to the pin 164 is smoothly performed, and the pin 164 can enter the notch 181.

[0116] The first plate-shaped coin guide 182 is disposed along the endless proceed member 163 in the vicinity of the sprocket 168, and a second coin guide 184 is disposed along the first screening portion 170, and a third coin guide 186 is disposed along the second screening portion 172.

[0117] Thus, the coin 110 hooked by the pin 164 is moved to a predetermined position by the endless proceed member 163 while being guided by these coin guides 182, 184, 186.

[0118] Next, the operation of the present embodiment will be described also referring to FIG. 5.

[0119] When the coin 110 is thrown into the retention portion 146, it is moved to the rotary disk 112 side due to the inclination of the bowl 144, and contacts the rotary disk 112 and the push-out disk 126.

[0120] The rotary disk 112 is automatically rotated by detecting the throwing of the coin, or is constantly rotating.

[0121] The rotation of the rotary disk 112 causes the

coins 110 to be stirred by the protruding portion 122 and to enter the sorting concave portions 138.

[0122] At positions other than the position in the vicinity of the coin conveyer 104, the moving member 116 is positioned in the receiving portion 130, and is thus at the receiving position RP.

[0123] In other words, the concave portion 138 is fan-shaped.

[0124] Therefore, only one coin 110 is held in the sorting concave portion 138 defined by the pushing portion 128 of the protruding portion 122 and by the arc-shaped surface of the moving member 116.

[0125] That is, the outer periphery of the coin 110 is guided by the retention ring 140, so that only one maximum diameter coin 110 is held in the concave portion 138 which is formed slightly more deeply than the diameter of the maximum diameter coin 110L.

[0126] Furthermore, as its depth is less than double the diameter of the minimum diameter coin 110S, two minimum diameter coins 110S cannot enter in the diametrical direction of the rotary disk 112.

[0127] Moreover, the concave portion 138 is fan-shaped, so that two minimum diameter coins 110S cannot be arranged side by side in the circumferential direction of the rotary disk 112.

[0128] Therefore, only one minimum diameter coin 110S is held in the sorting concave portions 138.

[0129] The rotation of the rotary disk 112 causes the coin 110 held in the concave portion 138 to move to the conveyer 104 side.

[0130] In other words, the coin 110 is moved upward.

[0131] At this point, the coin 110 is pushed and moved by the pushing portion 128, and almost no force is applied to the moving member 116.

[0132] When the moving member 116 has moved near the coin conveyer 104, the moved member 154 moves the deliver process member 164, so that the moved member 154 is moved in the diametrical direction of the rotary disk 112.

[0133] Thus, the moving member 116 is caused to pivot clockwise on the pivot shaft 134.

[0134] Therefore, the moving member 116 pushes the coin 110 positioned in the receiving concave portion 138 from the lateral side in the diametrical direction of the rotary disk 112, thereby pushing out the coin 110 from the receiving concave portion 138.

[0135] Then, when the moved member 154 is positioned in the moving groove 162, the moving member 116 moves to the moving position MP, so that the coin 110 passes through the opening 142 and is pushed out to the moving path of the pin 164.

[0136] Immediately after being pushed out, the coin 110 is pushed by the pin 164, and guided by the first coin guide 182, the second coin guide 184, the third coin guide 186 and the like, thus being conveyed to the subsequent process.

[0137] The present invention can be used for a coin delivery device which moves, at a predetermined position, a coin to a predetermined position.

[0138] Therefore, it has been used to transfer the coin to a coin conveyer in the embodiment described above, but the present invention can also be employed for the coin delivery device to dispense the coins one by one at a predetermined position, a so-called coin hopper.

Claims

1. A coin delivery device (102) including:

a rotary disk (112) whose axis line (118) is inclined at a predetermined angle,
said rotary disk having at least one sorting concave portion (138, 158), said concave portion being open in an upward surface for accepting coins (110) and being open towards the periphery of the disk so as to enable dispensing of the coins, **characterized in that**
the dimension of said concave portions are such that two minimum diameter coins cannot be held side by side in one said concave portion,
and **in that** said coin delivery device further comprises for each said concave portion
a moving member (116) attached to said concave portion so as to be able to pivot from a first receiving position located at a side of said sorting concave portion closest to the center of the rotary disk to a second moving position towards said opening of said concave portion at the periphery of said rotary disk, such that said moving member (116) is adapted to move a coin (110) to dispense it.

2. The coin delivery device of the coin processing apparatus according to claim 1, wherein the rotary disk comprises a plurality of the concave portions, where the concave portions are disposed in a fan-shaped manner.

3. The coin delivery device of the coin processing apparatus according to claim 1, wherein the rotary disk (112) has a coin pushing portion (128), extending from each said concave portions towards the periphery of said rotary disk and
wherein the moving member (116) moves a coin from the concave portion towards the pushing portion of the rotary disk.

4. The coin delivery device of the coin processing apparatus according to claim 1 or 2, wherein the moving member is arc-shaped and attached to the rotary disk (112) so as to be able to pivot on one end, and wherein a moved member (154) is attached to the moving member and is inserted in a groove cam (158) located under the rotary disk (112).

5. The coin delivery device according to claim 4, wherein a pivot shaft (134) of the moving member (116) is attached to a pivot shaft located closer to a peripheral edge side of the rotary disk than the moved member (154).

Fig.1

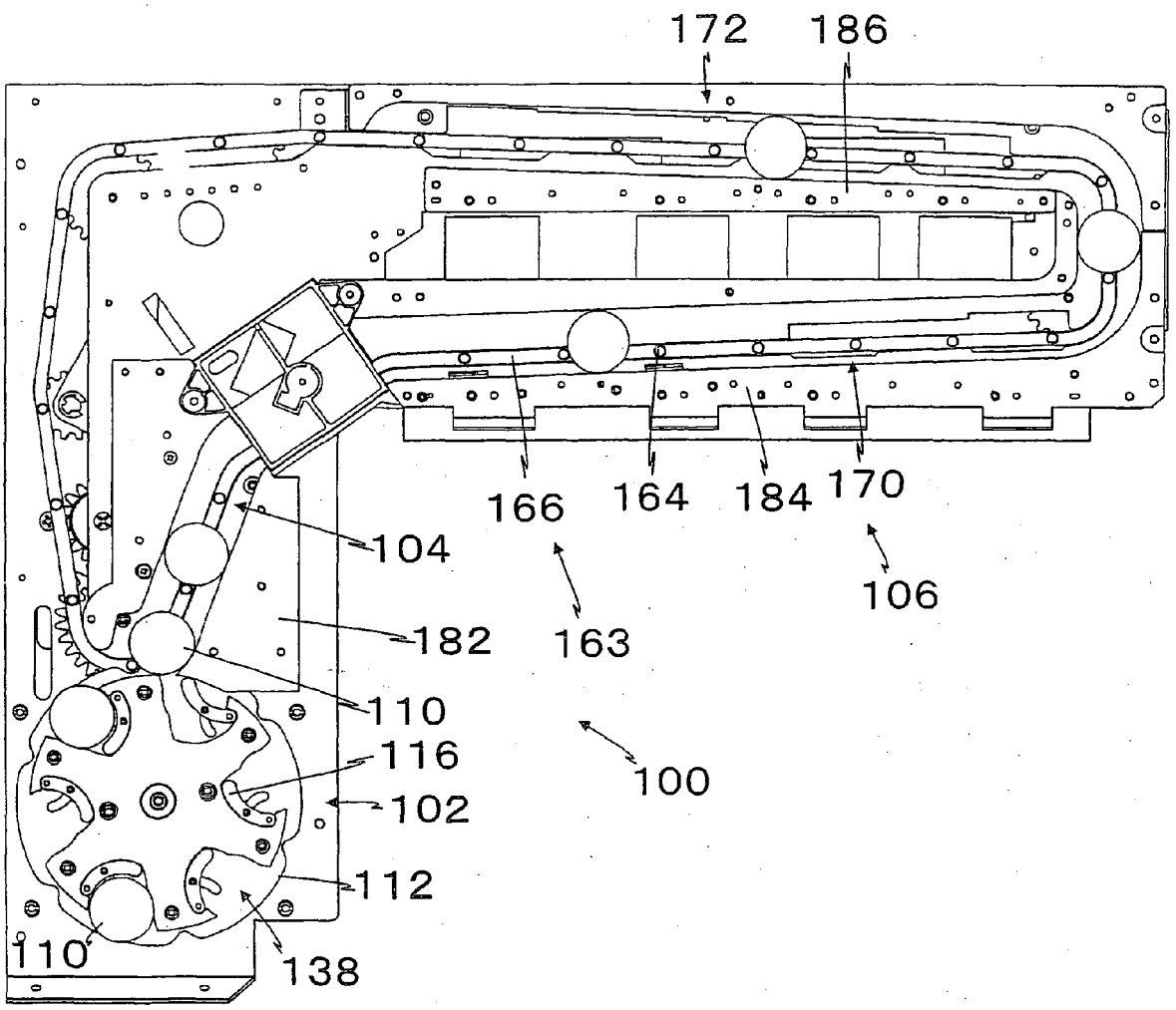
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Fig.2

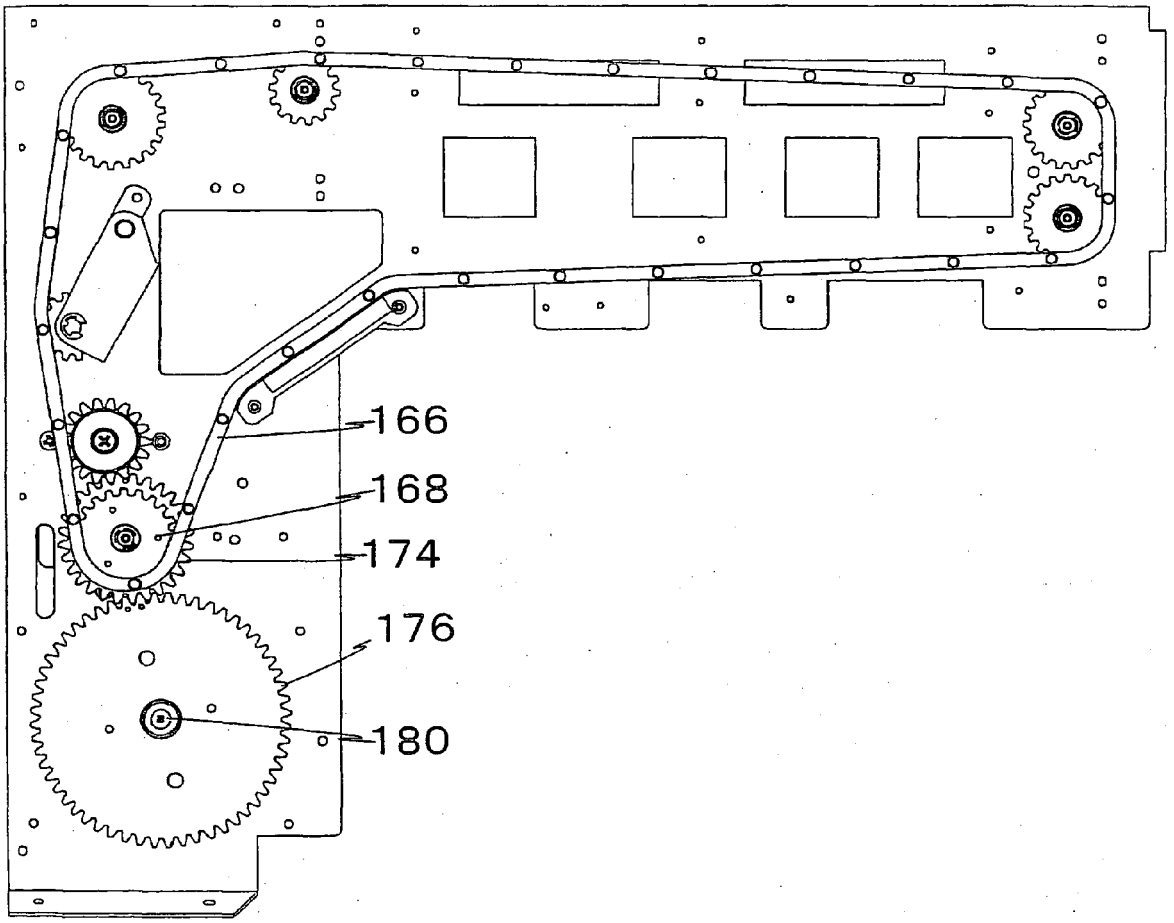

Fig.3

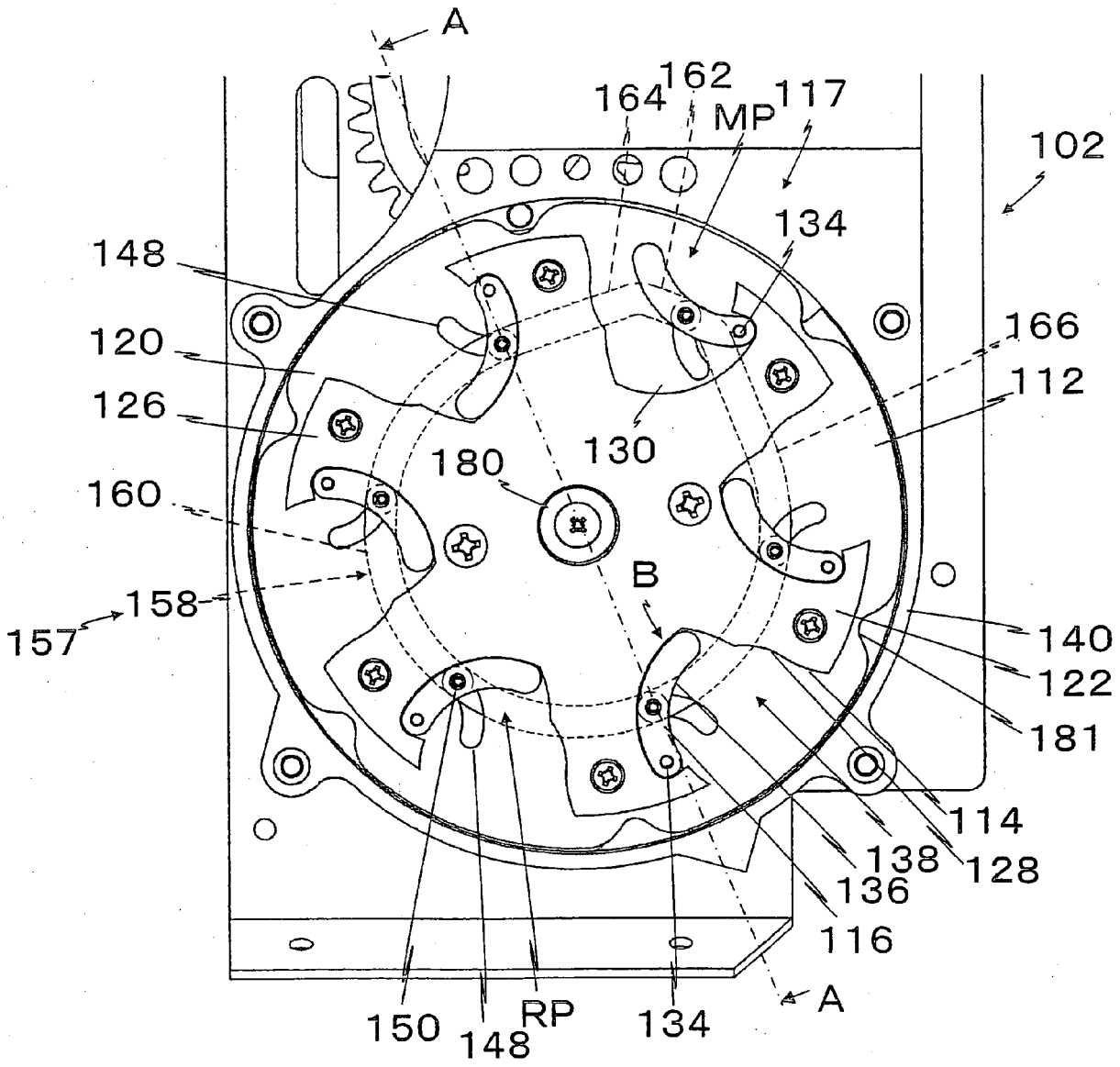
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Fig.4

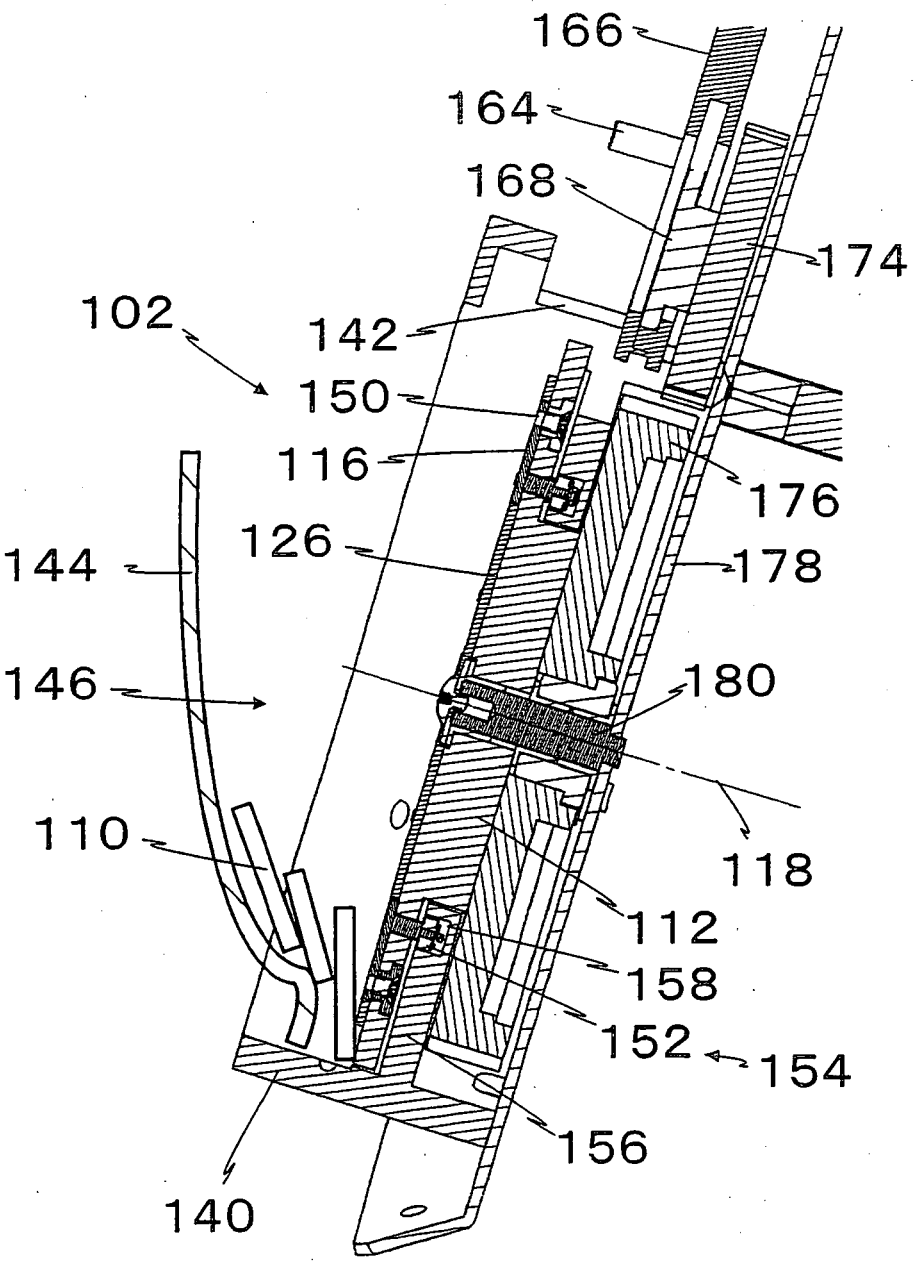
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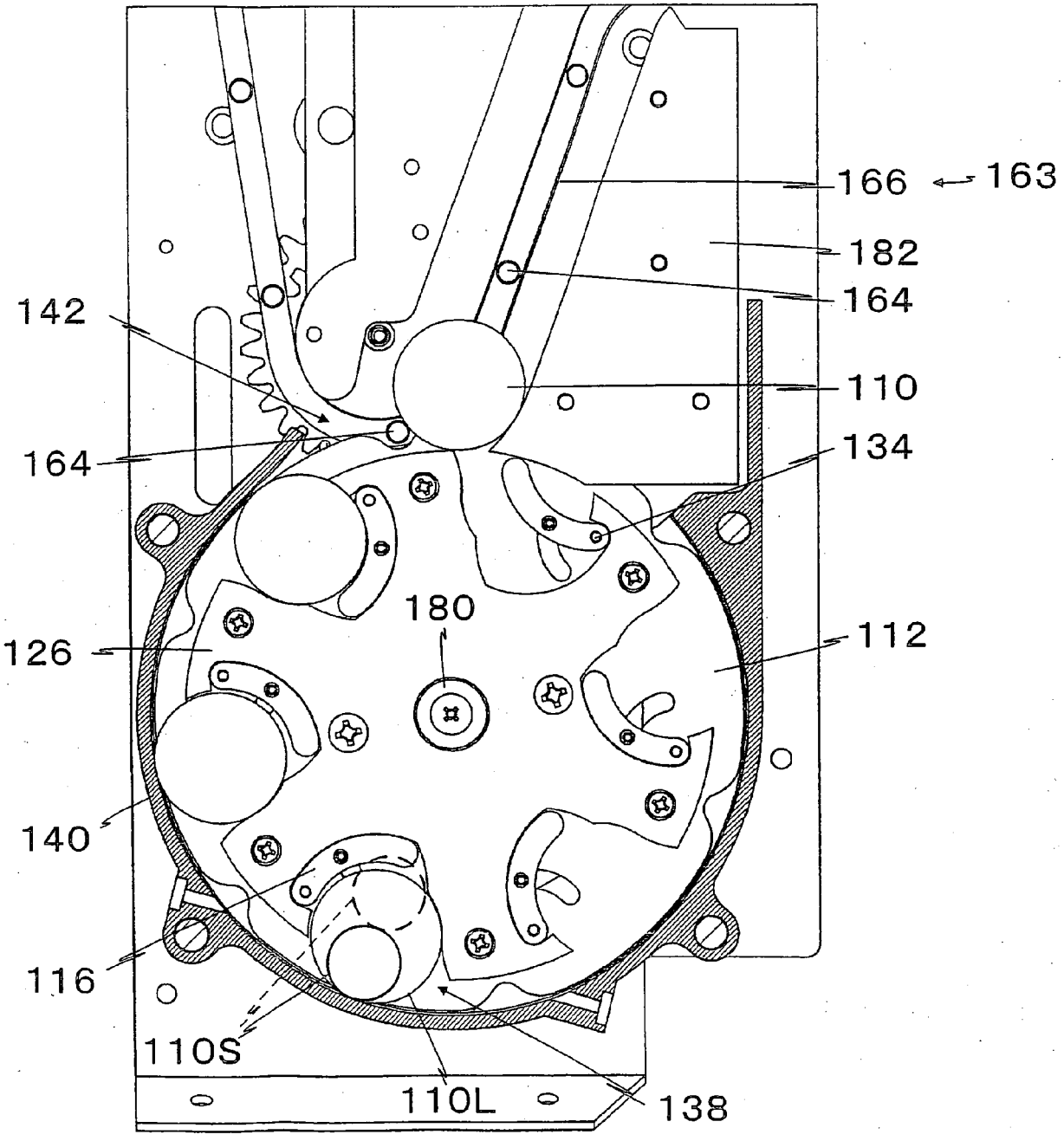
Fig.5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REFERENCES CITED IN THE DESCRIPTION

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