



EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.10.2023 Bulletin 2023/43

(51) International Patent Classification (IPC):
G07D 1/00 (2006.01)

(21) Application number: **22169021.7**

(52) Cooperative Patent Classification (CPC):
G07D 1/00

(22) Date of filing: **20.04.2022**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

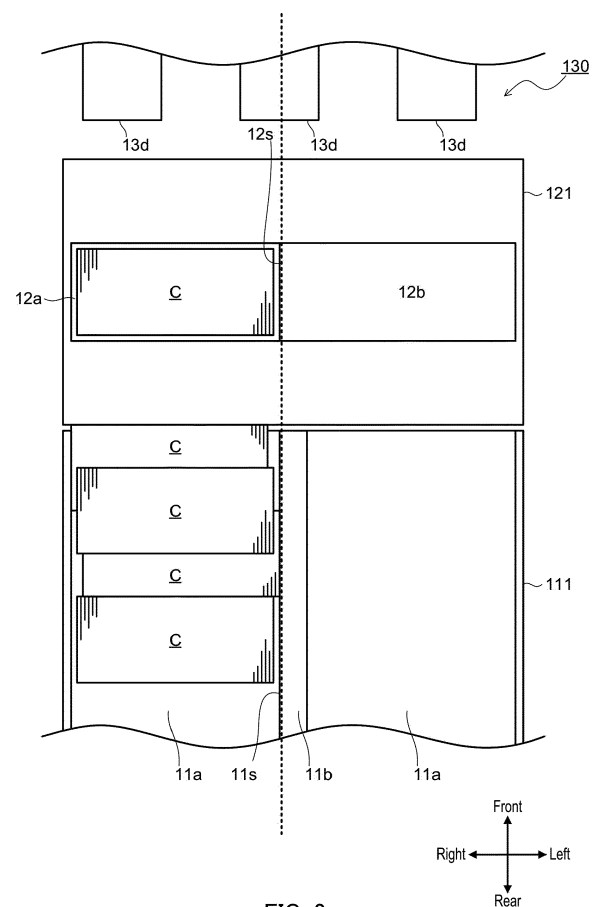
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(54) **COIN ROLL UNIT**

(57) A coin roll unit includes: a stacker that stores a coin roll composed of a plurality of coins piled in a piling direction in a layered manner; a lift that transports the coin roll; and a picker that transfers the coin roll from the stacker to the lift, characterized in that the picker includes an in-picker restriction member that restricts a position of the coin roll in the picker in the piling direction.



Description

Technical Field

[0001] The present disclosure relates to a coin roll unit.

Background Art

[0002] Conventionally, coins are handled in the form of a coin roll. The coin roll is a plurality of coins stacked into a columnar shape. A coin roll unit is used as a device for processing such a coin roll. The coin roll unit is disclosed in, for example, Patent Literature (hereinafter, referred to as "PTL") 1.

Citation List

Patent Literature

[0003] PTL 1
WO2010/035332

Summary of Invention

Technical Problem

[0004] The length of the coin roll (i.e., the height of a column) can be various values depending on the number of coins to be stacked. In order for the coin roll unit to process coin rolls of various lengths, it is necessary to smoothly move the coin rolls inside the coin roll unit in spite of the lengths of the coin rolls.

[0005] An object of the present disclosure is to provide a coin roll unit capable of processing coin rolls of various lengths.

Solution to Problem

[0006] A coin roll unit according to the present disclosure comprises: a stacker that stores a coin roll composed of a plurality of coins piled in a piling direction in a layered manner; a lift that transports the coin roll; and a picker that transfers the coin roll from the stacker to the lift, characterized in that the picker comprises an in-picker restriction member that restricts a position of the coin roll in the picker in the piling direction.

[0007] The picker that the coin roll unit according to the present disclosure comprises may be configured such that the in-picker restriction member is attachable to the picker at any position in the picker in the piling direction.

[0008] The picker that the coin roll unit according to the present disclosure comprises may be configured such that a long in-picker restriction member or a short in-picker restriction member instead of the in-picker restriction member is attachable, the long in-picker restriction member being longer than the in-picker restriction member in the piling direction, the short in-picker restric-

tion member being shorter than the in-picker restriction member in the piling direction.

[0009] The stacker that the coin roll unit according to the present disclosure comprises may comprise an in-stacker restriction member that restricts a position of the coin roll in the stacker in the piling direction.

[0010] The stacker that the coin roll unit according to the present disclosure comprises may be configured such that the in-stacker restriction member is attachable to the stacker at any position in the stacker in the piling direction.

[0011] The stacker that the coin roll unit according to the present disclosure comprises may be configured such that a long in-stacker restriction member or a short in-stacker restriction member instead of the in-stacker restriction member is attachable, the long in-stacker restriction member being longer than the in-stacker restriction member in the piling direction, the short in-stacker restriction member being shorter than the in-stacker restriction member in the piling direction.

[0012] The in-picker restriction member and the in-stacker restriction member that the coin roll unit according to the present disclosure comprises respectively have opposing surfaces facing the coin roll and included in a same plane, and the opposing surface of the in-picker restriction member and the opposing surface of the in-stacker restriction member may be configured to guide the coin roll in a direction orthogonal to the piling direction.

[0013] The coin roll may be composed of a plurality of coins stacked in a columnar shape.

[0014] The picker that the coin roll unit according to the present disclosure comprises may be configured to take in the coin roll from the stacker and transfer the coin roll such that the coin roll taken in is passed to the lift, in a state in which a bottom surface of the coin roll faces sideways.

[0015] The coin roll unit according to the present disclosure may further comprise: a second stacker that stores a second coin roll composed of a plurality of second coins piled in the piling direction, the second coin roll having a length different from a length of the coin roll in the piling direction; and a second picker that transfers the second coin roll from the second stacker to the lift, in which the second picker comprises a second in-picker restriction member that restricts a position of the second coin roll in the second picker in the piling direction, the lift is configured to transport the second coin roll, and the stacker and the second stacker may be disposed to overlap each other in an upper-lower direction.

[0016] The lift that the coin roll unit according to the present disclosure comprises may comprise: a first belt to which a first pawl member for supporting the coin roll is attached, and a second belt to which a second pawl member for supporting the coin roll with the first pawl member is attached, and may be configured to move the first pawl member and the second pawl member in an upper-lower direction in a state in which the first pawl member and the second pawl member are aligned in a

horizontal direction.

[0017] The lift that the coin roll unit according to the present disclosure comprises may further comprise a third belt to which a third pawl member for supporting the coin roll with the first pawl member and the second pawl member is attached, and may be configured to move the first pawl member, the second pawl member, and the third pawl member in the upper-lower direction in a state in which the first pawl member, the second pawl member, and the third pawl member are aligned in the horizontal direction, the second belt is sandwiched between the first belt and the third belt, and the in-picker restriction member may be configured to restrict the position of the coin roll in the picker such that, in plan view, the coin roll being transported by the picker faces the first belt and the second belt and does not face the third belt.

[0018] A spacing between the second belt and the first belt that the coin roll unit according to the present disclosure comprises may be smaller than a spacing between the second belt and the third belt.

[0019] The lift that the coin roll unit according to the present disclosure comprises may further comprise a gap restriction member that prevents a gap between the first pawl member and the second pawl member from widening.

[0020] The gap restriction member that the coin roll unit according to the present disclosure comprises may be configured to be attachable to and detachable from the first belt and the second belt.

[0021] The gap restriction member that the coin roll unit according to the present disclosure comprises may be configured to be not in contact with the coin roll supported by the first pawl member and the second pawl member, and to be engaged with the first pawl member and the second pawl member.

Advantageous Effects of Invention

[0022] According to the present disclosure, it is possible to provide a coin roll unit capable of processing coin rolls of various lengths.

Brief Description of Drawings

[0023]

FIG. 1 is a schematic side view of a coin roll unit according to Embodiment 1;

FIG. 2 is a plan view of a stacker and a picker;

FIG. 3 is a perspective view of an in-picker restriction member, a long in-picker restriction member, and a short in-picker restriction member;

FIG. 4 is a schematic side view of a coin roll unit according to Embodiment 2;

FIG. 5 schematically illustrates one aspect of a lift;

FIG. 6 schematically illustrates one aspect of the lift;

FIG. 7 schematically illustrates one aspect of the lift comprising a gap restriction member; and

FIG. 8 schematically illustrates a medium processing device comprising a coin roll unit.

Description of Embodiments

[0024] Hereinafter, an embodiment of the present disclosure will be described in detail with reference to the accompanying drawings. Note that, in the present specification, components or concepts provided with ordinal numbers such as "first," "second," and the like, e.g., a "first stacker" are described, but these ordinal numbers are merely for convenience and for making it easier to distinguish between a plurality of the same or similar components or concepts. Therefore, in some cases, a component or concept provided with the ordinal number "first" and a component or concept provided with the ordinal number "second" can be read interchangeably.

(Embodiment 1)

[0025] FIG. 1 is a schematic side view of a coin roll unit 10 according to Embodiment 1. In the present embodiment, the front side of the coin roll unit 10 is the side on which a coin roll take-out port is disposed, and the rear side of the coin roll unit 10 is the side on which a stacker 111 to be described later is disposed. Inside the coin roll unit 10, a coin roll moves from the rear side toward the front side. Further, the right side of the coin roll unit 10 is the right side of the coin roll unit 10 seen from the front side, and the left side of the coin roll unit 10 is the left side of the coin roll unit 10 seen from the front side. Further, the lower side of the coin roll unit 10 is a side near the surface at which the coin roll unit 10 is installed, and the upper side of the coin roll unit 10 is a side far from the surface at which the coin roll unit 10 is installed.

[0026] The coin roll unit 10 is a device for processing a coin roll C, and comprises a stacker 111, a picker 121, and a lift 130.

[0027] The coin roll C is composed of a plurality of coins piled in a columnar shape. The coin roll C may be wrapped in a sheet of plastic film, paper, or the like. A plurality of coin rolls C having the same shape are stored in the stacker 111. That is, each of the plurality of coin rolls C stored in the stacker 111 is composed of the same number of stacked coins of the same type (denomination). Naturally, the heights of the plurality of coin rolls C stored in the stacker 111 are equal to one another.

[0028] The stacker 111 is a tray-shaped member for storing a plurality of coin rolls C. The stacker 111 stores the coin rolls C, with the bottom surfaces of the coin rolls C (i.e., the faces or the backs of the coins) facing sideways (the right side or left side). The stacker 111 may be disposed such that its front side is lower and its rear side is higher. With such an arrangement, it is possible to automatically move the coin rolls C stored in the stacker 111 to the front side by gravity. Note that, one coin roll C may be placed on top of another coin roll C.

[0029] The front end of the stacker 111 is configured

to allow the coin rolls C to pass therethrough. For example, an opening is formed in the front end, or the front end is completely open without any wall. After passing through the front end of the stacker 111, the coin rolls in the stacker 111 moves to the picker 121.

[0030] The picker 121 takes in each of the coin rolls C from the stacker 111 and transfers the coin roll such that the coin roll C taken in is passed to the lift 130, in a state in which the bottom surface of the coin roll C faces sideways. The picker 121 is a member that rotates about a rotation axis extending in the left-right direction (specifically, the horizontal direction). The picker 121 is configured to rotate counterclockwise in a right side view by the power of a motor or the like. At least one groove 12a (three grooves in the example of FIG. 1) is formed in the peripheral surface of the picker 121. One coin roll enters one groove 12a. When moving from the stacker 111 to the picker 121, the coin roll C enters the groove 12a.

[0031] The coin roll C that has entered the groove 12a is transferred by the picker 121 to the lift 130 disposed on the front side.

[0032] The lift 130 is a conveyor that takes in the coin roll C from the picker 121 and transports, to the take-out port, the coin roll C taken in, in a state where the bottom surface of the coin roll C faces sideways. The lift 130 comprises a first roller 13a disposed on the upper side, a second roller 13b disposed on the lower side, and an endless belt 13c wound under tension around the first roller 13a and the second roller 13b. A plurality of pawl members 13d are attached to the belt 13c. Further, the lift 130 comprises a pressing plate 13e extending vertically. The pressing plate 13e is disposed to face the belt 13c via a space. Note that the lift 130 does not have to comprise the pressing plate 13e. In this case, a housing of the coin roll unit 10 may be configured to be capable of functioning as the pressing plate 13e.

[0033] At least one of the first roller 13a and the second roller 13b is configured to rotate counterclockwise in the right side view by power of a motor or the like. The belt 13c is configured to move counterclockwise in the right side view by rotation of at least one of the first roller 13a and the second roller 13b. That is, a part of the belt 13c located on the rear side ascends while a part located on the front side descends.

[0034] Pawl members 13d are attached to the belt 13c to be oblique with respect to the belt 13c. Specifically, each of the pawl members 13d is attached to the belt 13c such that the pawl member becomes higher toward the farther side from the belt 13c when ascending with the belt 13c and becomes lower toward the farther side from the belt 13c when descending with the belt 13c.

[0035] The coin roll C taken in from the picker 121 to the lift 130 is received at an upper part of the pawl member 13d, and ascends while being supported by the belt 13c and the pawl member 13d. The coin roll C having ascended falls on an immediately preceding one of the pawl members 13d as the belt 13c turns around the first roller 13a. The coin roll C having fallen moves downward in

the space between the pressing plate 13e and the belt 13c. Then, when having moved down to a position below the pressing plate 13e, the coin roll C is released from being pressed by the pressing plate 13e. Accordingly, the coin roll C moves toward the take-out port for the coin roll C while rolling on the pawl member 13d. Details of the lift 130 will be described later.

[0036] FIG. 2 is a plan view of the stacker 111 and the picker 121. A plurality of coin rolls C are stored in a storage space 11a of the stacker 111. Each of the coin rolls C is composed of a plurality of coins piled in one direction in a layered manner. Inside the coin roll unit 10, the coin piling direction corresponds to the left-right direction of the coin roll unit 10, i.e., a direction that is orthogonal to the direction in which the coin roll C is moved and is parallel to the horizontal direction.

[0037] The length of each of the coin rolls C stored in the stacker 111 is smaller than the length of the stacker 111 along the coin piling direction (i.e., the length in the left-right direction). The greater the difference between the length of the coin roll C and the length of the stacker 111 in the left-right direction, the more likely the coin roll C is to be shifted in the left-right direction in the storage space 11a of the stacker 111. In a case that the in-stacker restriction member 11b having an opposing surface 11s being a flat surface facing the bottom surface of the coin roll C is attached to the storage space 11a, the position of the coin roll C in the stacker 111 in the left-right direction is restricted. That is, by attaching the in-stacker restriction member 11b, it is possible to prevent the coin roll C from shifting in the storage space 11a in the left-right direction. It is thus possible to move the coin roll C straight forward.

[0038] The in-stacker restriction member 11b may be configured to be attachable in the storage space 11a at any position in the left-right direction depending on the length of the coin roll C. In other words, the stacker 111 may be configured such that the in-stacker restriction member 11b is attachable in the storage space 11a at any position. With such a configuration of the stacker 111, it is possible to move the coin roll C forward regardless of the length of the coin roll C without shifting of the coin roll C in the left-right direction.

[0039] Note that, the stacker 111 may be configured such that various in-stacker restriction members of different sizes are attachable to the storage space 11a, instead of being configured such that the in-stacker restriction member 11b is attachable in the storage space 11a at any position in the left-right direction. For example, a block member completely filling the space from the left side wall of the stacker 111 to the opposing surface 11s illustrated in FIG. 2 may be used as the in-stacker restriction member. In addition, in this case, the stacker 111 may be configured such that a block member longer than the in-stacker restriction member in the left-right direction is used as a long in-stacker position restriction member, a block member shorter than the in-stacker position restriction member in the left-right direction is used as a short in-stacker position restriction member, and one se-

lected from these three members is attachable in the storage space 11a. Also with such a configuration of the stacker 111, it is possible to move the coin roll C forward regardless of the length of the coin roll C without shifting of the coin roll C in the left-right direction. The number of in-stacker restriction members having different lengths in the left-right direction may be 2, or may be 4 or more.

[0040] The length of the coin roll C transferred by the picker 121 is less than the length of the picker 121 along the coin piling direction (i.e., the length in the left-right direction). The greater the difference between the length of the coin roll C and the length of the picker 121 in the left-right direction, the more likely the coin roll C is to be shifted in the left-right direction in the groove 12a of the picker 121. In a case that the in-picker restriction member 12b having an opposing surface 12s being a flat surface facing the bottom surface of the coin roll C is attached to the groove 12a, the position of the coin roll C in the picker 121 in the left-right direction is restricted. That is, by attaching the in-picker restriction member 12b, it is possible to prevent the coin roll C from shifting in the groove 12a in the left-right direction. It is thus possible to move the coin roll C straight forward.

[0041] The picker 121 may be configured such that various in-picker restriction members of different sizes are attachable to the groove 12a. FIG. 3 is a perspective view of three in-picker restriction members having different lengths in the coin piling direction. One of the members illustrated on the upper side of FIG. 3 is the in-picker restriction member 12b illustrated in FIG. 2. One of the members illustrated in the middle of FIG. 3 is a long in-picker restriction member 12c that is longer than the in-picker restriction member 12b in the coin piling direction. One of the members illustrated on the lower side of FIG. 3 is a short in-picker restriction member 12d that is shorter than the in-picker restriction member 12b in the coin piling direction. The picker 121 may be configured such that a selected one of the three members is attachable in the groove 12a. With such a configuration of the picker 121, it is possible to move the coin roll C forward regardless of the length of the coin roll C without shifting of the coin roll C in the left-right direction. The number of in-picker restriction members having different lengths in the left-right direction may be 2, or may be 4 or more.

[0042] Note that, the picker 121 may be configured such that one in-picker restriction member is attachable in the groove 12a at any position in the coin piling direction (i.e., in the left-right direction) depending on the length of the coin roll C, instead of being configured such that the various picker restriction members of different sizes are attachable to the groove 12a. For example, in a case that a coin roll shorter than the coin roll C illustrated in FIG. 2 is processed, the in-picker restriction member 12b may be configured to be attachable at a position on the right side of the position illustrated in FIG. 2.

[0043] The coin roll C moves from the stacker 111 to the lift 130 in a state where the positional shift of the coin roll C in the left-right direction is prevented. In other

words, the coin roll C moves from the stacker 111 to the lift 130, with the face or the back of a coin being oriented in the left-right direction. The stacker 111 guides the coin roll C in the front-rear direction with the inner surface of one side wall of the stacker 111 and the opposing surface 11s of the in-stacker restriction member 11b. Thus, the stacker 111 moves the coin roll C from the rear side to the front side in the storage space 11a in a state where the positional shift of the coin roll C in the left-right direction is prevented. The picker 121 surrounds the coin roll C with the opposing surface 12s of the in-picker restriction member 12b and the inner surface of the groove 12a, so as to prevent the coin roll C from shifting in the left-right direction in the groove 12a. Thus, the picker 121 transfers the coin roll C in a state where the positional shift of the coin roll C in the left-right direction is prevented. The lift 130 supports the coin roll C as if to hold the coin roll C at a sharp angle portion formed by the belt 13c and the upper surface of the pawl member 13d. Thus, the lift 130 transports the coin roll C in a state where the positional shift of the coin roll C in the left-right direction is prevented.

[0044] The opposing surface 11s of the in-stacker restriction member 11b and the opposing surface 12s of the in-picker restriction member 12b guides the coin roll C in a direction orthogonal to the piling direction of the coin roll C (i.e., the front-rear direction). By disposing the in-stacker restriction member 11b and the in-picker restriction member 12b such that their opposing surfaces 11s and 12s are included in a single plane, it is possible to smoothly move the coin roll C from the stacker 111 to the picker 121. In other words, it is possible to prevent the coin roll C from being caught by the stacker 111, the in-stacker restriction member 11b, the picker 121, or the in-picker restriction member 12b when the picker 121 takes in the coin roll C.

[0045] In the example of FIG. 2, the opposing surface 11s of the in-stacker restriction member 11b and the opposing surface 12s of the in-picker restriction member 12b are present at a position corresponding in the left-right direction to one of the pawl members 13d receiving the coin roll C (see the dotted line). That is, the coin roll C is moved from the stacker 111 to the lift 130 along the position corresponding to the opposing surface 11s of the in-stacker restriction member 11b, the opposing surface 12s of the in-picker restriction member 12b, and the pawl member 13d. In other words, when the coin roll C in the stacker 111 is moved to the lift 130, the coin roll C is moved while the in-stacker restriction member 11b and the in-picker restriction member 12b prevent an increase in spacing between, on one hand, one end (right end) of the stacker 111 and one end (right end) of the picker 121 and, on the other hand, the coin roll C. Consequently, the coin roll C can be appropriately moved from the stacker 111 to the two pawl members 13d of the lift 130 on the right side.

[0046] FIG. 2 illustrates a state in which the coin roll C is kept to the left by the in-stacker restriction member 11b

and the in-picker restriction member 12b in the stacker 111 and the picker 121. However, in the stacker 111 and the picker 121, the coin roll C may be kept to the right by the in-stacker restriction member 11b and the in-picker restriction member 12b.

(Embodiment 2)

[0047] FIG. 4 is a schematic side view of the coin roll unit 10 according to Embodiment 2. Hereinafter, the description of the contents common to Embodiments 1 and 2 may be omitted.

[0048] The coin roll unit 10 according to the present embodiment comprises a recognition section 140, a reject section 150, and a dispensing section 160.

[0049] The recognition section 140 is disposed in the middle of the transport path for transportation of the coin roll by the lift 130, and recognizes the coin roll being transported by the lift 130. The reject section 150 is disposed to face the lift 130. In a case that the result of recognition by the recognition section 140 indicates that the recognized coin roll is not to be dispensed, the coin roll is passed from the lift 130 to the reject section 150 and stored in the reject section 150. In a case that the result of recognition by the recognition section 140 indicates that the recognized coin roll is to be dispensed, the coin roll is transported by the lift 130 to the dispensing section 160.

[0050] The coin roll unit 10 according to Embodiment 2 comprises a plurality of sets of stackers and pickers (six sets in the example illustrated in FIG. 4).

[0051] Specifically, the coin roll unit 10 comprises the stacker 111, a second stacker 112, a third stacker 113, a fourth stacker 114, a fifth stacker 115, and a sixth stacker 116 that are disposed to overlap one another in the upper-lower direction. Each of the stacker 111 and the second to the sixth stackers 112 to 116 is configured the same as the stacker 111 in Embodiment 1. That is, each of the stackers comprises an in-stacker restriction member configured the same as the in-stacker restriction member 11b in Embodiment 1. It is, however, needless to say that in each of the stackers, each in-stacker restriction member is attached to a position different depending on the length of the coin roll C to be stored in the stacker.

[0052] The coin roll unit 10 comprises the picker 121, a second picker 122, a third picker 123, a fourth picker 124, a fifth picker 125, and a sixth picker 126. Each of the picker 121 and the second to the sixth pickers 122 to 126 is configured the same as the picker 121 in Embodiment 1. That is, each of the pickers comprises an in-picker restriction member configured the same as the in-picker restriction member 12b in Embodiment 1. It is, however, needless to say that in each of the pickers, each in-picker restriction member is attached to a position different depending on the length of the coin roll C to be transferred by the picker.

[0053] Each of the stackers stores coin rolls of a type

different between the stackers (e.g., different in denomination of piled coins and/or in length of a coin roll). The second stacker 112 stores a second coin roll. The second coin roll differs from the coin roll stored in the stacker 111 in length along the coin piling direction. The second picker 122 transfers the second coin roll from the second stacker 112 to the lift 130. Coin rolls stored in the other stackers are similarly transferred to the lift 130.

[0054] The in-stacker restriction member that the second stacker 112 comprises (hereinafter, referred to as a second in-stacker restriction member) restricts the position of the second coin roll in the left-right direction (coin piling direction) in the second stacker 112. The in-picker restriction member that the second picker 122 comprises (hereinafter, referred to as a second in-picker restriction member) restricts the position of the second coin roll in the left-right direction (coin piling direction) in the second picker 122.

[0055] Thus, the coin roll unit 10 according to the present embodiment is capable of transferring the coin roll from the stacker 111 to the lift 130 via the picker 121 without the coin roll being shifted in the coin piling direction. In addition, the coin roll unit 10 according to the present embodiment is capable of transferring the second coin roll, which is different from the coin roll in length in the coin piling direction, from the second stacker 112 to the lift 130 via the second picker 122 without the second coin roll being shifted in the coin piling direction. Likewise, the coin roll unit 10 according to the present embodiment is capable of transferring the third to the sixth coin rolls, which are different from the coin roll and the second coin roll in length in the coin piling direction, to the lift 130 without the coin rolls being shifted in the coin piling direction. That is, the coin roll unit 10 according to the present embodiment is capable of smoothly processing various coin rolls without clogging in course of movement of the coin rolls.

(One Aspect of Lift)

[0056] Next, the configuration of the lift 130 common to Embodiment 1 and Embodiment 2 will be described in detail.

[0057] FIG. 5 schematically illustrates one aspect of the lift 130. In the aspect illustrated in FIG. 5, the lift 130 comprises two belts as belts 13c, that is, a first belt 131 and a second belt 132. A plurality of first pawl members 131a for supporting the coin roll C are attached to the first belt 131. A plurality of second pawl members 132a for supporting the coin roll C are attached to the second belt 132. The first pawl members 131a and the second pawl members 132a are disposed at substantially the same heights. The lift 130 is configured such that the first pawl members 131a and the second pawl members 132a move in the upper-lower direction while aligned in the horizontal direction (that is, in the left-right direction).

[0058] FIG. 6 schematically illustrates another aspect of the lift 130. In the aspect illustrated in FIG. 6, the lift

130 comprises three belts as belts 13c, that is, the first belt 131, the second belt 132, and a third belt 133. The second belt 132 is disposed to be sandwiched between the first belt 131 and the third belt 133. A plurality of third pawl members 133a for supporting the coin roll C are attached to the third belt 133. The lift 130 is configured such that the first pawl members 131a, the second pawl members 132a, and the third pawl members 133a move in the upper-lower direction while aligned in the horizontal direction (that is, in the left-right direction).

[0059] In the aspect illustrated in FIGS. 5 and 6, the first belt 131 is disposed such that the first pawl members 131a are aligned with the right end of the picker 121 substantially in the front-rear direction. The second belt 132 is disposed such that the second pawl members 132a are aligned with the opposing surface 12s of the in-picker restriction member 12b substantially in the front-rear direction. Note that, this state is illustrated in FIG. 2. The three pawl members 13d illustrated in FIG. 2 correspond to one of the first pawl members 131a, one of the second pawl members 132a, and one of the third pawl members 133a, respectively.

[0060] Therefore, the picker 121 is capable of transporting the coin roll C such that the right end side of the coin roll C is placed reliably on the first pawl member 131a and the left end side of the coin roll C is placed reliably on the second pawl member 132a, while restricting the position of the coin roll C by the in-picker restriction member 12b.

[0061] Further, in the aspect illustrated in FIG. 6, the lift 130 comprises the third belt 133. Therefore, even in a case that the left end of the coin roll C protrudes by a long distance from the left end of the second pawl member 132a in a state where the right side portion of the coin roll C is placed on the first pawl member 131a, the protruding portion can be placed on the third pawl member 133a. Therefore, the lift 130 is capable of reliably transporting a long coin roll C by the three pawl members without dropping the long coin roll C. In the case of processing such a long coin roll C, the in-picker restriction member 12b or the short in-picker restriction member 12d is attached to the picker 121 such that the opposing surface 12s is aligned with the third pawl member 133a substantially in the longitudinal direction, or is positioned on the left side of the third pawl member 133a.

[0062] A spacing between the second belt 132 and the first belt 131 may be narrowed to some extent. For example, the spacing between the second belt 132 and the first belt 131 may be smaller than a spacing between the second belt 132 and the third belt 133. Alternatively, the spacing between the second belt 132 and the first belt 131 may be shorter than half of the length of the coin roll C that is the longest of the lengths of the various coin rolls C that can be processed by the coin roll unit 10 (in other words, may be shorter than half of the length of the groove 12a of the picker 12). The effect will be described below.

[0063] If the left end of the coin roll C is positioned near

the right end of the second pawl member 132a while the coin roll C is being transported by the lift 130, there is a possibility that the coin roll C is shifted rightward by some vibration and the left end of the coin roll C comes off the second pawl member 132a. In this case, the coin roll C drops between the first pawl member 131a and the second pawl member 132a. Further, when the left end of the coin roll C is positioned between the right end of the second pawl member 132a and the middle of the second pawl member 132a in the left-right direction, there is a possibility that the second pawl member 132a is inclined such that its right side is lowered due to the weight of the coin roll C, because the second belt 132 has flexibility. When such inclination occurs, there is a possibility that the gap between the first pawl member 131a and the second pawl member 132a widens and the left end of the coin roll C slides on the second pawl member 132a, and consequently, the coin roll C drops between the first pawl member 131a and the second pawl member 132a.

[0064] However, by reducing the spacing between the second belt 132 and the first belt 131, it is possible to position the left end of the coin roll C closer to the left end of the second pawl member 132a than to the right end of the second pawl member 132a. That is, the left end portion of the coin roll C can be supported in a wider range of the second pawl member 132a. Therefore, the left end of the coin roll C does not come off the second pawl member 132a. The second pawl member 132a does not incline such that its right side is lowered. So, it is possible to prevent the coin roll C from dropping between the first pawl member 131a and the second pawl member 132a.

[0065] FIG. 7 is a perspective view illustrating a still another aspect of the lift 130. The lift 130 illustrated in FIG. 7 differs from the lift 130 illustrated in FIG. 6 in that the lift 130 illustrated in FIG. 7 comprises gap restriction members 135.

[0066] Each of the gap restriction members 135 is a member for preventing the attitudes of the first pawl member 131a and the second pawl member from changing. There are no particular limitations on the material and shape of the member as long as it has such a function. In the example illustrated in FIG. 7, the gap restriction member 135 is a platelike member comprising a through hole through which the first pawl member 131a can pass and a through hole through which the second pawl member 132a can pass. The gap restriction member 135 is configured to be engaged with the bases of the first pawl member 131a and the second pawl member 132a. The gap restriction member 135 has a shape that does not make contact with the coin roll C supported by the first pawl member 131a and the second pawl member 132a when the gap restriction member 135 is positioned at the bases of the first pawl member 131a and the second pawl member 132a. Therefore, the gap restriction member 135 does not adversely affect the transportation of the coin roll C by the lift 130.

[0067] When the lift 130 comprises the gap restriction

member 135, it is possible to prevent the attitudes of the first pawl member 131a and the second pawl member from changing. Therefore, even when the left end of the coin roll C is positioned between the right end of the second pawl member 132a and the middle of the second pawl member 132a in the left-right direction, it is possible to prevent the second pawl member 132a from being inclined such that its right side is lowered due to the weight of the coin roll C, and to prevent the gap between the first pawl member 131a and the second pawl member 132a from being widened. It is thus possible to reliably prevent the coin roll C from dropping between the first pawl member 131a and the second pawl member 132a.

[0068] The gap restriction member 135 may be configured to be attachable to and detachable from the first belt 131 and the second belt 132. With this configuration, it is possible to attach the gap restriction member 135 to a place where the gap restriction member is required and when necessary (for example, when a short coin roll C is processed by the coin roll unit 10). Further, when performing maintenance of the lift 130, it is possible to remove the gap restriction member 135. Therefore, it is not necessary to treat the first belt 131 and the second belt 132 integrally. Accordingly, maintainability is improved.

[0069] FIG. 8 schematically illustrates a medium processing device 1, which is one of applications of the coin roll unit 10. The medium processing device 1 comprises the coin roll unit 10, a bill unit 20, a check unit 30, a loose coin unit 40, a controller 50, and a peripheral unit 60.

[0070] The coin roll unit 10 is configured the same as described above. The coin roll unit 10 comprises the dispensing section 160 on the front surface. The bill unit 20 processes bills. The check unit 30 processes checks. The loose coin unit 40 processes loose coins. The controller 50 controls the coin roll unit 10, the bill unit 20, the check unit 30, and the loose coin unit 40. The peripheral unit 60 comprises a card reader, a printer, a display that provides information to a user of the medium processing device 1, an Encrypting PIN Pad (EPP) that receives an operation from the user, and the like. The peripheral unit 60 transmits, to the controller 50, a signal based on the operation received from the user. The controller 50 controls the coin roll unit 10, the bill unit 20, the check unit 30, the loose coin unit 40, and the peripheral unit 60 based on the signal received from the peripheral unit 60.

[0071] For example, the user inputs the type of needed coin roll (e.g., the denomination and number of coins constituting the coin roll) and the number of coin rolls via the peripheral unit 60. The controller 50 controls the coin roll unit 10 based on the input information. Specifically, the stacker 111 storing the coin roll of the type requested by the user, the picker 121 constituting a set with the stacker 111, and the lift 130 are actuated to move the coin roll C from the stacker 111 to the dispensing section 160. By such an operation, the medium processing device 1, in particular, the coin roll unit 10 is capable of dispensing the requested number of coin rolls of the requested type

as requested by the user.

Industrial Applicability

5 **[0072]** The present disclosure is utilizable as a coin roll unit used in various industrial fields such as distribution, finance, and the like.

Reference Signs List

10 **[0073]**

10 Coin roll unit

111 Stacker

15 11a Storage space

11b In-stacker restriction member

11s Opposing surface

112 Second stacker

113 Third stacker

20 114 Fourth stacker

115 Fifth stacker

116 Sixth stacker

121 Picker

12a Groove

25 12b In-picker restriction member

12c Long in-picker restriction member

12d Short in-picker restriction member

12s Opposing surface

122 Second picker

30 123 Third picker

124 Fourth picker

125 Fifth picker

126 Sixth picker

130 Lift

35 13a First roller

13b Second roller

13c Belt

13d Pawl member

13e Pressing plate

40 131 First belt

132 Second belt

133 Third belt

131a First pawl member

132a Second pawl member

45 133a Third pawl member

134 Belt support member

135 Gap restriction member

140 Recognition section

150 Reject section

50 160 Dispensing section

1 Medium processing device

20 Bill unit

30 Check unit

40 Loose coin unit

55 50 Controller

60 Peripheral unit

C Coin roll

Claims

1. A coin roll unit, comprising:

a stacker that stores a coin roll composed of a plurality of coins piled in a piling direction in a layered manner;
a lift that transports the coin roll; and
a picker that transfers the coin roll from the stacker to the lift, **characterized in that** the picker comprises an in-picker restriction member that restricts a position of the coin roll in the picker in the piling direction.

2. The coin roll unit according to claim 1, wherein the picker is configured such that the in-picker restriction member is attachable to the picker at any position in the picker in the piling direction.

3. The coin roll unit according to claim 1 or 2, wherein the picker is configured such that a long in-picker restriction member or a short in-picker restriction member instead of the in-picker restriction member is attachable, the long in-picker restriction member being longer than the in-picker restriction member in the piling direction, the short in-picker restriction member being shorter than the in-picker restriction member in the piling direction.

4. The coin roll unit according to any one of claims 1 to 3, wherein the stacker comprises an in-stacker restriction member that restricts a position of the coin roll in the stacker in the piling direction.

5. The coin roll unit according to claim 4, wherein the stacker is configured such that the in-stacker restriction member is attachable to the stacker at any position in the stacker in the piling direction.

6. The coin roll unit according to claim 4 or 5, wherein the stacker is configured such that a long in-stacker restriction member or a short in-stacker restriction member instead of the in-stacker restriction member is attachable, the long in-stacker restriction member being longer than the in-stacker restriction member in the piling direction, the short in-stacker restriction member being shorter than the in-stacker restriction member in the piling direction.

7. The coin roll unit according to any one of claims 4 to 6, wherein:

the in-picker restriction member has an opposing surface facing the coin roll in the picker, the in-stacker restriction member has an opposing surface facing the coin roll in the stacker, and the opposing surface of the in-picker restriction

member and the opposing surface of the in-stacker restriction member are configured to be located in a same plane and are configured to guide the coin roll in a direction orthogonal to the piling direction.

8. The coin roll unit according to any one of claims 1 to 7, wherein:

the coin roll is composed of a plurality of coins stacked in a columnar shape, and the picker takes in the coin roll from the stacker and transfers the coin roll such that the coin roll taken in is passed to the lift, in a state in which a bottom surface of the coin roll faces sideways.

9. The coin roll unit according to any one of claims 1 to 8, further comprising:

a second stacker that stores a second coin roll composed of a plurality of second coins piled in the piling direction, the second coin roll having a length different from a length of the coin roll in the piling direction; and
a second picker that transfers the second coin roll from the second stacker to the lift, wherein the second picker comprises a second in-picker restriction member that restricts a position of the second coin roll in the second picker in the piling direction, the lift is configured to transport the second coin roll, and the stacker and the second stacker are disposed to overlap each other in an upper-lower direction.

10. The coin roll unit according to any one of claims 1 to 9, wherein:

the lift comprises:

a first belt to which a first pawl member for supporting the coin roll is attached, and
a second belt to which a second pawl member for supporting the coin roll with the first pawl member is attached, and

the lift is configured to move the first pawl member and the second pawl member in an upper-lower direction in a state in which the first pawl member and the second pawl member are aligned in a horizontal direction.

11. The coin roll unit according to claim 10, wherein:

the lift further comprises a third belt to which a third pawl member for supporting the coin roll with the first pawl member and the second pawl

member is attached,
the lift is configured to move the first pawl member, the second pawl member, and the third pawl member in the upper-lower direction in a state in which the first pawl member, the second pawl member, and the third pawl member are aligned in the horizontal direction,
the second belt is sandwiched between the first belt and the third belt, and
the in-picker restriction member restricts the position of the coin roll in the picker such that, in plan view, the coin roll being transported by the picker faces the first belt and the second belt and does not face the third belt.

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12. The coin roll unit according to claim 11, wherein a spacing between the second belt and the first belt is smaller than a spacing between the second belt and the third belt.

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13. The coin roll unit according to any one of claims 10 to 12, wherein
the lift further comprises a gap restriction member that prevents a gap between the first pawl member and the second pawl member from widening.

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14. The coin roll unit according to claim 13, wherein the gap restriction member is configured to be attachable to and detachable from the first belt and the second belt,

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15. The coin roll unit according to claim 13 or 14, wherein the gap restriction member is configured to be not in contact with the coin roll supported by the first pawl member and the second pawl member, and to be engaged with the first pawl member and the second pawl member.

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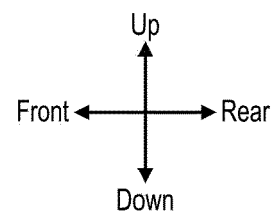
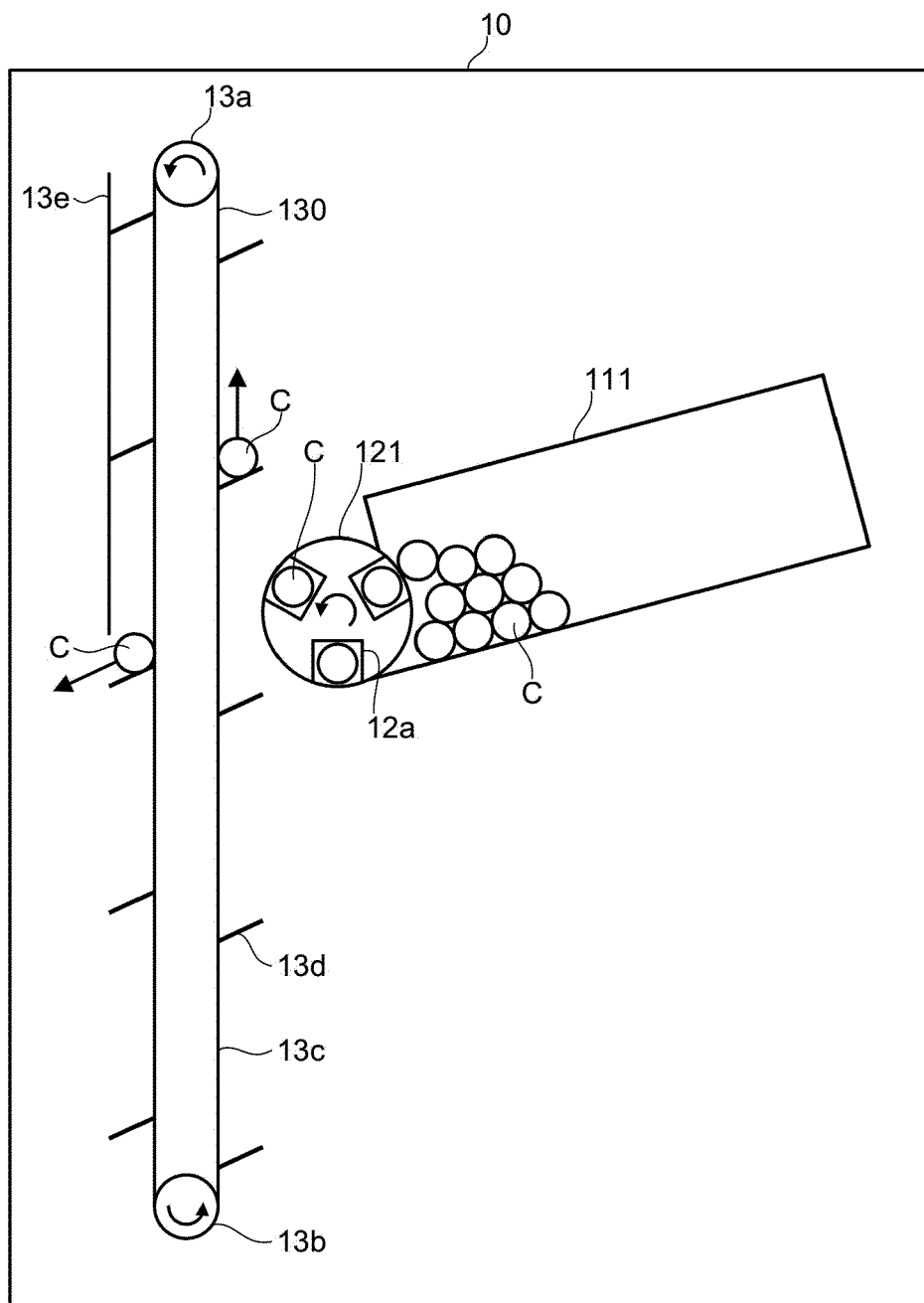


FIG. 1

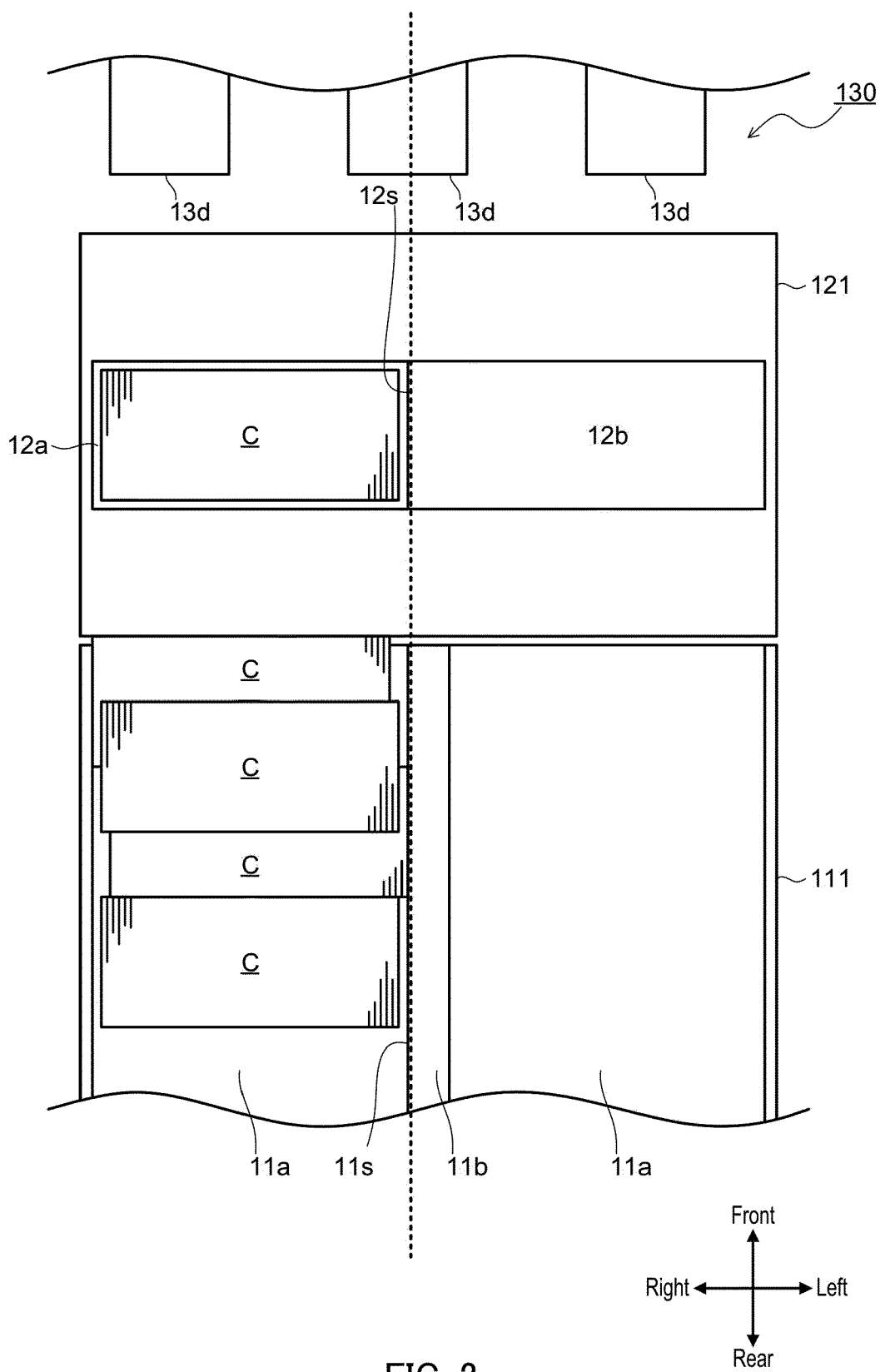


FIG. 2

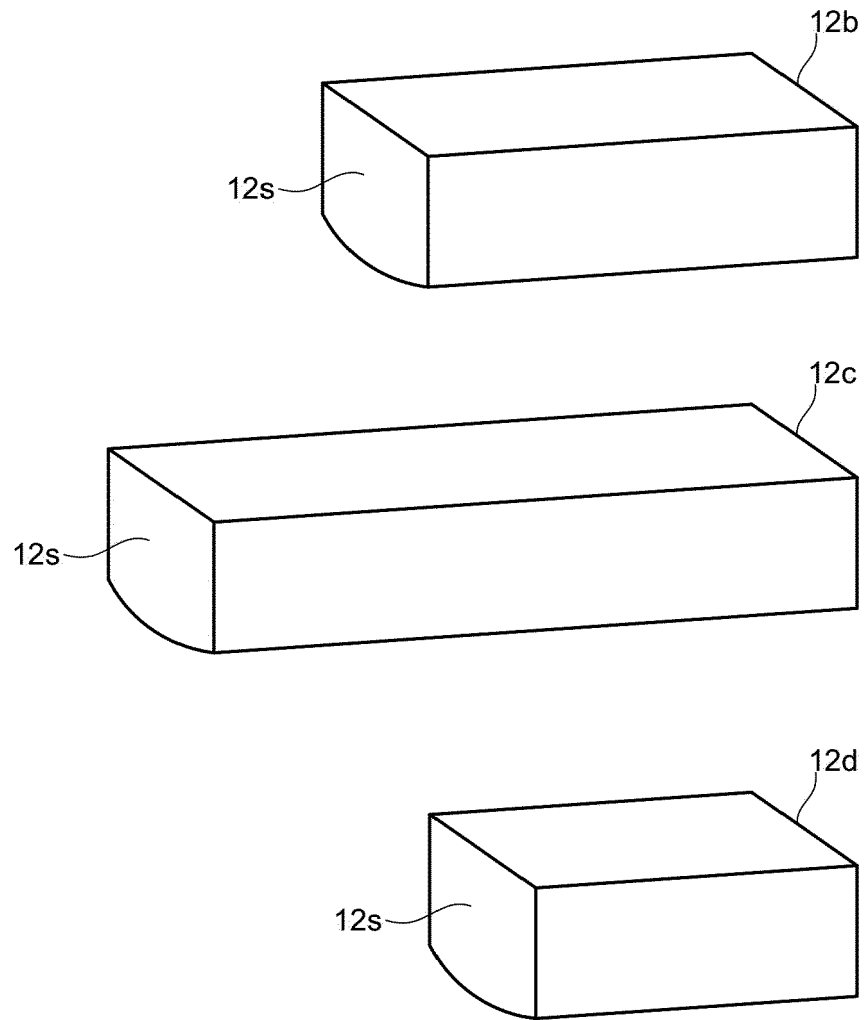


FIG. 3

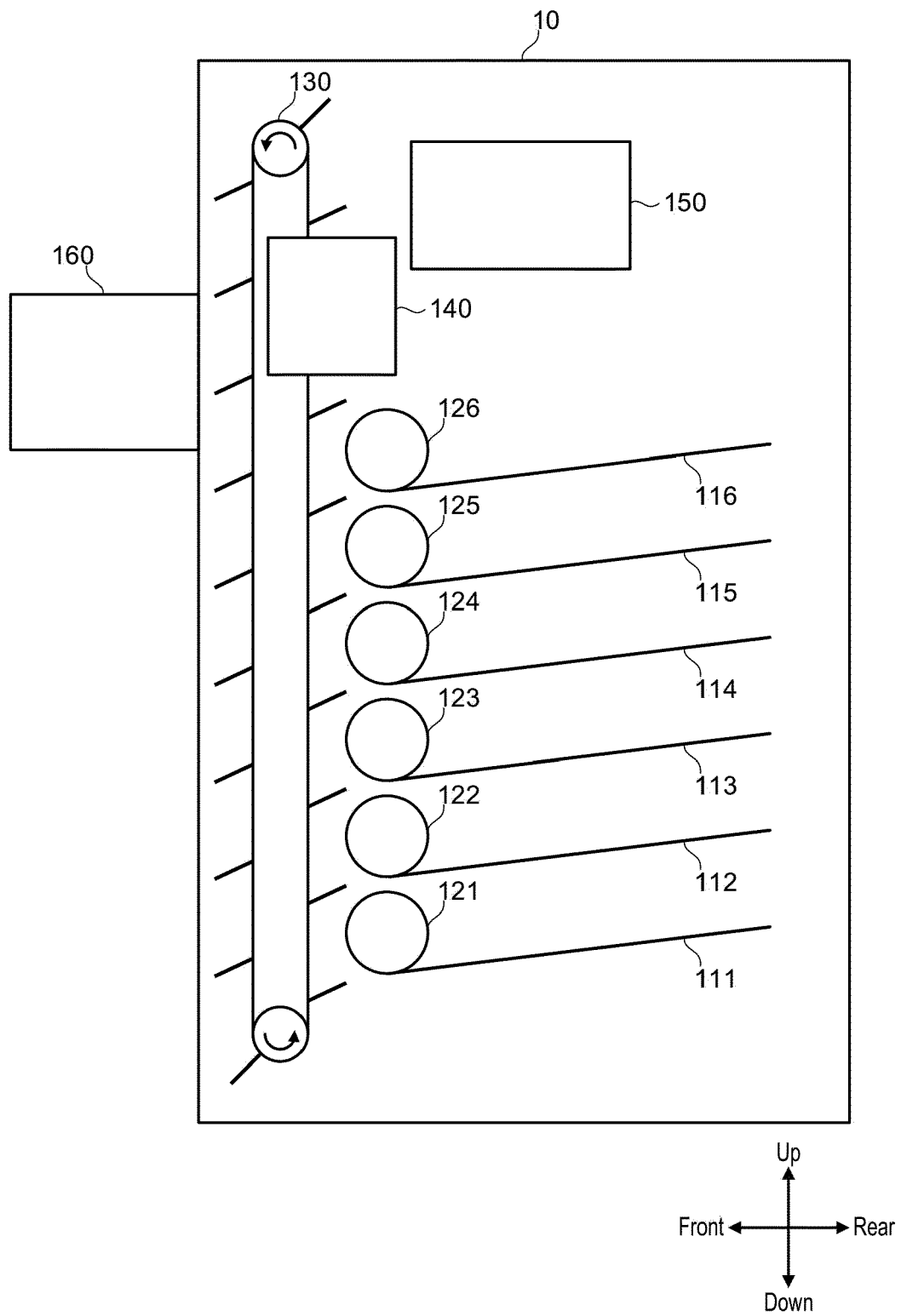


FIG. 4

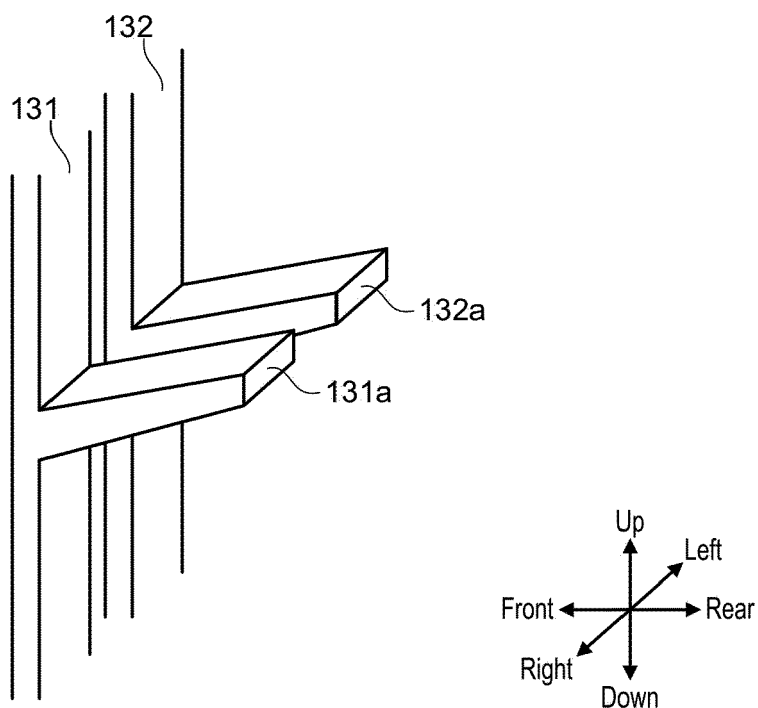


FIG. 5

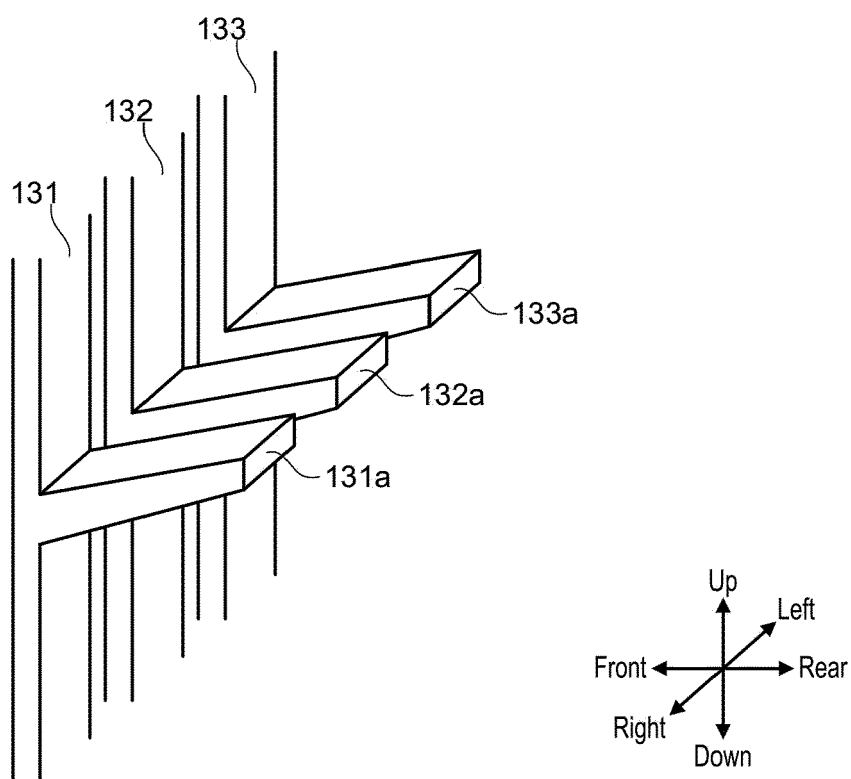


FIG. 6

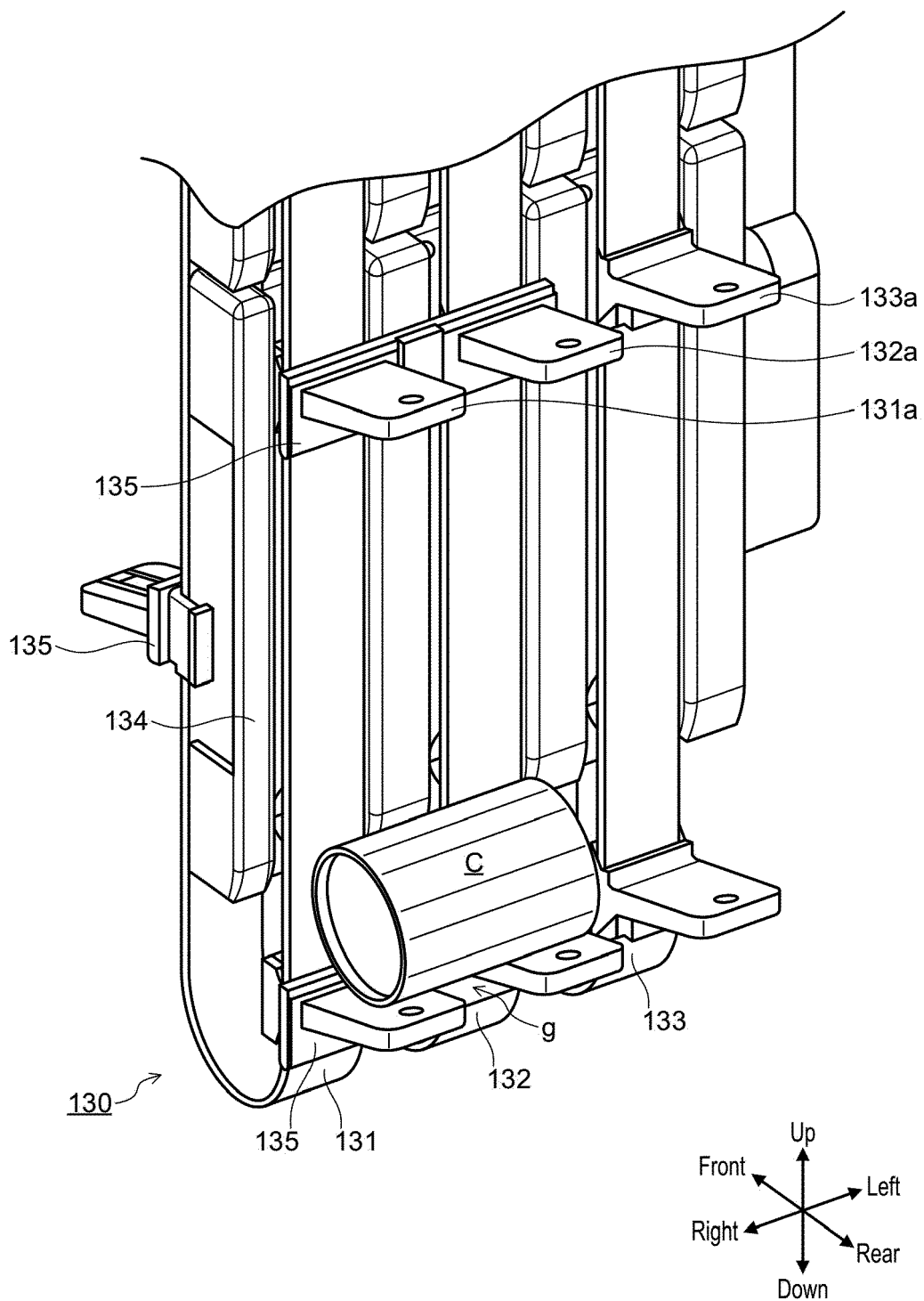


FIG. 7

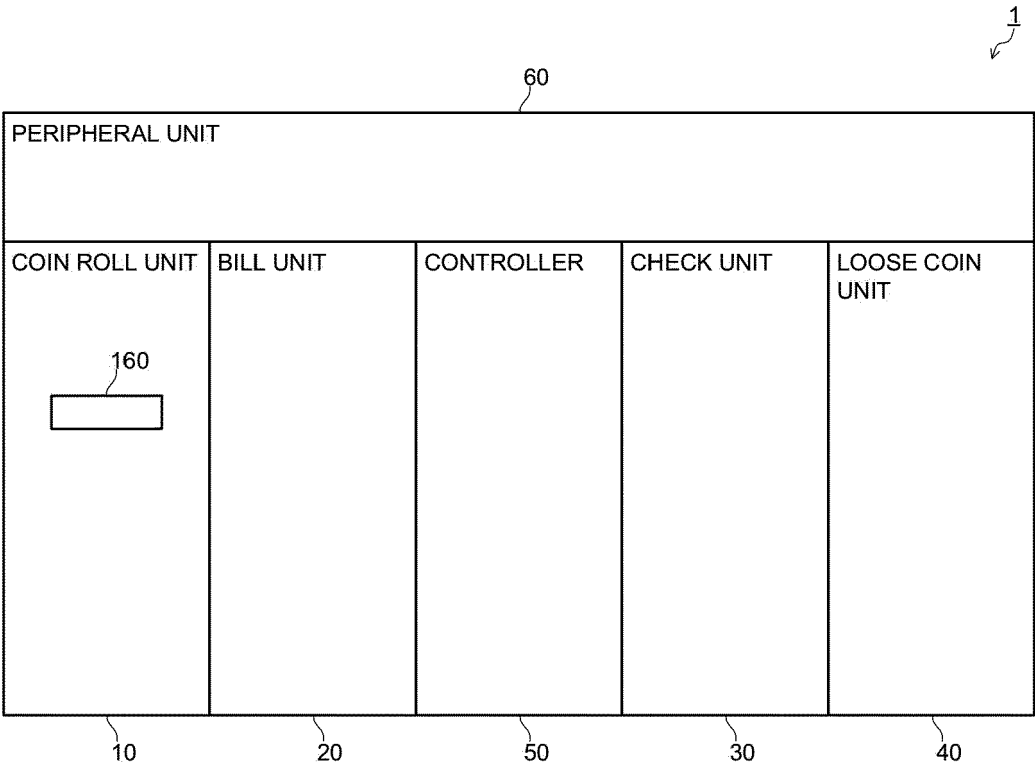


FIG. 8



EUROPEAN SEARCH REPORT

Application Number

EP 22 16 9021

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EPO FORM 1503 03.82 (P04C01)

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X	US 2017/076529 A1 (KAMADA YOUHEI [JP] ET AL) 16 March 2017 (2017-03-16)	1, 4-9	INV. G07D1/00
A	* paragraphs [0037] - [0092] *	2, 3	
	* figures 1-9 *		

X	US 2016/284151 A1 (FUJIMURA TAKASHI [JP] ET AL) 29 September 2016 (2016-09-29)	1, 4-9	
A	* paragraphs [0196] - [0246] *	2, 3	
	* figures 14-29 *		

A	SE 517 441 C2 (AXLON INT AB [SE]) 4 June 2002 (2002-06-04)	1-9	
	* paragraphs [0018] - [0026] *		
	* figures 1-7 *		

A	DE 90 02 363 U1 (HESS-SB-AUTOMATENBAU GMBH) 17 May 1990 (1990-05-17)	1-9	
	* paragraphs [0033] - [0049] *		
	* figures 1-3 *		

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			G07D
Place of search		Date of completion of the search	Examiner
The Hague		11 October 2022	Bauer, Sebastian
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			



Application Number

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-9

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 22 16 9021

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-9**Alignment of coin rolls**

2. claims: 10-15**Implementation of a coin roll lift**

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 16 9021

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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