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(54) **SHEET HANDLING METHOD AND SHEET HANDLING APPARATUS**

(57) Provided is a sheet handling method performed by a sheet handling apparatus. The sheet handling apparatus includes: a first transport unit; a reception unit; a second transport unit; a first storage unit; a second storage unit; and a posture changing unit that rotates a sheet in a first direction between the first transport unit and the second transport unit to change a posture of the sheet to a first posture or a second posture. The sheet handling method includes alternatively performing, by the sheet handling apparatus, based on a storage state in the first storage unit: first storage processing of storing

the sheet in the first storage unit without passing the sheet through the posture changing unit and the second storage unit, where the sheet has been guided from the reception unit to the first transport unit; or second storage processing of storing the sheet in the first storage unit by storing the sheet in the second storage unit via the posture changing unit and passing the sheet through the posture changing unit from the second storage unit to thereby rotate the sheet in the first direction, where the sheet has been guided from the reception unit to the first transport unit.

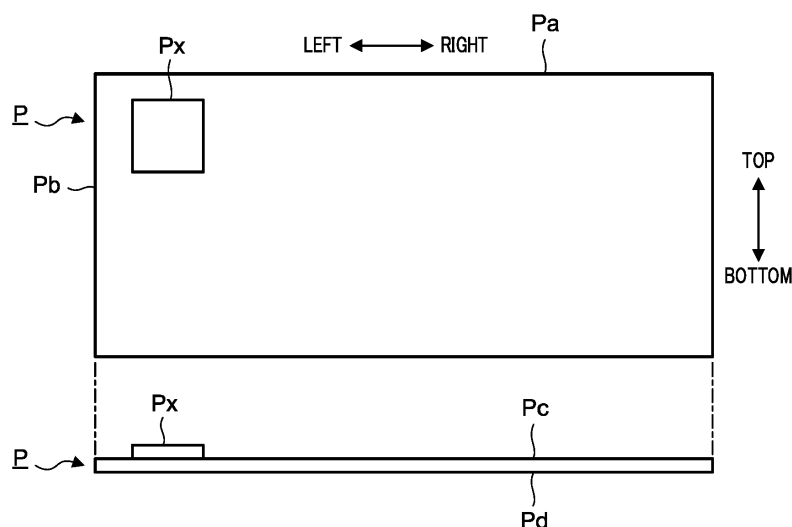


FIG. 1

Description

[0001] The present disclosure relates to a sheet handling method and a sheet handling apparatus.

Background

[0002] In the related art, there is known a sheet handling apparatus comprising: a long edge storage unit that allows a sheet in a short edge feed posture to be stored therein or taken out therefrom; a short edge storage unit that allows a sheet in a long edge feed posture to be stored therein or taken out therefrom; and a posture changing unit that changes a posture of a sheet transported between the long edge storage unit and the short edge storage unit (see, for example, Patent Literature (hereinafter referred to as "PTL") 1).

Citation List

Patent Literature

PTL 1

[0003] Japanese Patent Application Laid-Open No. 2021-149754

Summary of Invention

Technical Problem

[0004] Incidentally, though, sheets comprise kinds of sheets that are processed for the purpose of counterfeit prevention or the like to thereby comprise a predetermined portion whose thickness differs from the thickness of the other portion. When such sheets are stored in a long edge storage unit or a short edge storage unit such that thick parts thereof, which are thick, overlap, the height of a bundle of the sheets may differ in the plane of the bundle.

[0005] An object of the present disclosure is to provide a sheet handling method and a sheet handling apparatus each capable of appropriately storing a sheet in a first storage unit that stores a sheet in a short edge feed posture or a long edge feed posture.

Solution to Problem

[0006] A sheet handling method according to the present disclosure is a sheet handling method performed by a sheet handling apparatus. The sheet handling apparatus comprises: a first transport unit that transports a sheet in a first posture that is one posture of a short edge feed posture and a long edge feed posture; a reception unit that receives a sheet in the first posture and guides the sheet to the first transport unit; a second transport unit that transports a sheet in a second posture that is the other posture of the short edge feed posture and the

long edge feed posture; a first storage unit that stores the sheet in the first posture transported by the first transport unit; a second storage unit that allows the sheet in the second posture to be stored therein and taken out therefrom, where the sheet in the second posture is transported by the second transport unit; and a posture changing unit that rotates a sheet in a first direction between the first transport unit and the second transport unit to change a posture of the sheet to the first posture or the second posture. The sheet handling method comprises alternatively performing, by the sheet handling apparatus, based on a storage state in the first storage unit: first storage processing of storing the sheet in the first storage unit without passing the sheet through the posture changing unit and the second storage unit, where the sheet has been guided from the reception unit to the first transport unit; or second storage processing of storing the sheet in the first storage unit by storing the sheet in the second storage unit via the posture changing unit and passing the sheet through the posture changing unit from the second storage unit to thereby rotate the sheet in the first direction, where the sheet has been guided from the reception unit to the first transport unit.

[0007] In the sheet handling method according to the present disclosure, in a case where a difference in thickness between a portion comprising a thick part of the sheet and a portion not comprising the thick part in a storage body formed of a plurality of the sheets within the first storage unit is equal to or less than a threshold value, the sheet handling apparatus may perform the first storage processing, and in a case where the difference exceeds the threshold value, the sheet handling apparatus may perform the second storage processing. In the sheet handling method according to the present disclosure, in a case where a difference in thickness between a thickest part, which is the thickest, and a thinnest part, which is the thinnest, in the storage body formed of the plurality of sheets within the first storage unit is equal to or less than the threshold value, the sheet handling apparatus may perform the first storage processing, and in a case where the difference exceeds the threshold value, the sheet handling apparatus may perform the second storage processing.

[0008] In the sheet handling method according to the present disclosure, the sheet handling apparatus may detect an orientation of the sheet in the first posture during transport by the first transport unit. In a case where the second storage processing is performed, the sheet handling apparatus may determine, as a determination criterion orientation, a most detected orientation during the transport with respect to the plurality of sheets stored in the first storage unit, the sheet handling apparatus may store the sheet in the first storage unit via the posture changing unit, the second storage unit, and the posture changing unit, where the sheet is a sheet whose orientation during the transport detected after determining the determination criterion orientation is the determination criterion orientation, and the sheet handling apparatus

may store the sheet in the first storage unit without passing the sheet through the posture changing unit and the second storage unit, where the sheet is a sheet whose orientation during the transport detected after determining the determination criterion orientation is not the determination criterion orientation.

[0009] In the sheet handling method according to the present disclosure, the sheet handling apparatus may further comprise a temporary storage unit that temporarily stores the sheet in the first posture, where the sheet is transported by the first transport unit. In a case where the second storage processing is performed, the sheet handling apparatus may temporarily store the sheet in the determination criterion orientation in the temporary storage unit, and may store the sheet not in the determination criterion orientation in the first storage unit without passing the sheet not in the determination criterion orientation through the posture changing unit and the second storage unit, and the sheet handling apparatus may store, after every sheet having been guided from the reception unit to the first transport unit is stored in the temporary storage unit or the first storage unit, the sheet having been stored in the temporary storage unit in the first storage unit via the posture changing unit, the second storage unit, and the posture changing unit.

[0010] A sheet handling method according to the present disclosure is a sheet handling method performed by a sheet handling apparatus. The sheet handling apparatus comprises: a first transport unit that transports a sheet in a first posture that is one posture of a short edge feed posture and a long edge feed posture; a second transport unit that transports a sheet in a second posture that is the other posture of the short edge feed posture and the long edge feed posture; a first storage unit that stores the sheet in the first posture transported by the first transport unit; a second storage unit that allows the sheet in the second posture to be stored therein and taken out therefrom, where the sheet in the second posture is transported by the second transport unit; and a posture changing unit that rotates a sheet in the second posture in a first direction or a second direction opposite to the first direction between the first transport unit and the second transport unit to change a posture of the sheet to the first posture. The sheet handling method comprises alternatively performing, by the sheet handling apparatus, based on a storage state in the first storage unit: first storage processing of rotating the sheet having been stored in the second storage unit in the first direction by the posture changing unit and storing the sheet in the first transport unit; or second storage processing of rotating the sheet in the second direction by the posture changing unit and storing the sheet in the first transport unit.

[0011] In the sheet handling method according to the present disclosure, in a case where a difference in thickness between a portion comprising a thick part of the sheet and a portion not comprising the thick part in a storage body formed of a plurality of the sheets within

the first storage unit is equal to or less than a threshold value, the sheet handling apparatus may perform the first storage processing, and in a case where the difference exceeds the threshold value, the sheet handling apparatus may perform the second storage processing. In the sheet handling method according to the present disclosure, in a case where a difference in thickness between a thickest part, which is the thickest, and a thinnest part, which is the thinnest, in the storage body formed of the plurality of sheets within the first storage unit is equal to or less than the threshold value, the sheet handling apparatus may perform the first storage processing, and in a case where the difference exceeds the threshold value, the sheet handling apparatus may perform the second storage processing.

[0012] In the sheet handling method according to the present disclosure, the sheet handling apparatus may detect an orientation of the sheet in the first posture during transport by the first transport unit. In a case where the second storage processing is performed, the sheet handling apparatus may determine, as a determination criterion orientation, a most detected orientation during the transport with respect to the plurality of sheets stored in the first storage unit, the sheet handling apparatus may rotate the sheet in the second direction and may store the sheet in the first storage unit, where the sheet is a sheet whose orientation during the transport detected after determining the determination criterion orientation is the determination criterion orientation, and the sheet handling apparatus may rotate the sheet in the first direction and may store the sheet in the first storage unit, where the sheet is a sheet whose orientation during the transport detected after determining the determination criterion orientation is not the determination criterion orientation.

[0013] In the sheet handling method according to the present disclosure, in a case where a number of the sheets stored in the first storage unit is equal to or less than a set number, the sheet handling apparatus may perform the first storage processing, and in a case where the number of the sheets stored in the first storage unit exceeds the set number, the sheet handling apparatus may perform the second storage processing.

[0014] A sheet handling apparatus according to the present disclosure comprises: a first transport unit that transports a sheet in a first posture that is one posture of a short edge feed posture and a long edge feed posture; a reception unit that receives a sheet in the first posture and guides the sheet to the first transport unit; a second transport unit that transports a sheet in a second posture that is the other posture of the short edge feed posture and the long edge feed posture; a first storage unit that stores the sheet in the first posture transported by the first transport unit; a second storage unit that allows the sheet in the second posture to be stored therein and taken out therefrom, where the sheet in the second posture is transported by the second transport unit; a posture changing unit that rotates a sheet in a first direc-

tion between the first transport unit and the second transport unit to change a posture of the sheet to the first posture or the second posture; a storage state determination unit that determines a storage state in the first storage unit; and a control unit. The control unit controls the first transport unit, the second transport unit, the first storage unit, the second storage unit, and the posture changing unit based on the storage state in the first storage unit determined by the storage state determination unit such that first storage processing or second storage processing is alternatively performed. The first storage processing stores the sheet in the first storage unit without passing the sheet through the posture changing unit and the second storage unit, where the sheet has been guided from the reception unit to the first transport unit. The second storage processing stores the sheet in the first storage unit by storing the sheet in the second storage unit via the posture changing unit and passing the sheet through the posture changing unit from the second storage unit to thereby rotate the sheet in the first direction, where the sheet has been guided from the reception unit to the first transport unit.

[0015] In the sheet handling apparatus according to the present disclosure, the storage state determination unit may determine whether a difference in thickness between a portion comprising a thick part of the sheet and a portion not comprising the thick part in a storage body formed of a plurality of the sheets within the first storage unit is equal to or less than a threshold value, and in a case where it has been determined that the difference in thickness is equal to or less than the threshold value, the control unit may cause the first storage processing to be performed, and in a case where it has been determined that the difference in thickness exceeds the threshold value, the control unit may cause the second storage processing to be performed. In the sheet handling apparatus according to the present disclosure, the storage state determination unit may determine whether a difference in thickness between a thickest part, which is the thickest, and a thinnest part, which is the thinnest, in the storage body formed of the plurality of sheets within the first storage unit is equal to or less than the threshold value, and in a case where it has been determined that the difference in thickness is equal to or less than the threshold value, the control unit may cause the first storage processing to be performed, and in a case where it has been determined that the difference in thickness exceeds the threshold value, the control unit may cause the second storage processing to be performed.

[0016] The sheet handling apparatus according to the present disclosure may further comprise an orientation detection unit that detects an orientation of the sheet in the first posture during transport by the first transport unit. In a case where the second storage processing is performed, the control unit may determine, as a determination criterion orientation, a most detected orientation during the transport with respect to the plurality of sheets stored in the first storage unit, the control unit may cause

the sheet to be stored in the first storage unit via the posture changing unit, the second storage unit, and the posture changing unit, where the sheet is a sheet whose orientation during the transport detected after determining the determination criterion orientation is the determination criterion orientation, and the control unit may cause the sheet to be stored in the first storage unit without passing the sheet through the posture changing unit and the second storage unit, where the sheet is a sheet whose orientation during the transport detected after determining the determination criterion orientation is not the determination criterion orientation.

[0017] The sheet handling apparatus according to the present disclosure may further comprise a temporary storage unit that temporarily stores the sheet in the first posture, where the sheet is transported by the first transport unit. In a case where the second storage processing is performed, the control unit may cause the sheet in the determination criterion orientation to be temporarily stored in the temporary storage unit, and may cause the sheet not in the determination criterion orientation to be stored in the first storage unit without passing the sheet not in the determination criterion orientation through the posture changing unit and the second storage unit, and the control unit may cause, after every sheet having been guided from the reception unit to the first transport unit is stored in the temporary storage unit or the first storage unit, the sheet having been stored in the temporary storage unit to be stored in the first storage unit via the posture changing unit, the second storage unit, and the posture changing unit.

[0018] A sheet handling apparatus according to the present disclosure comprises: a first transport unit that transports a sheet in a first posture that is one posture of a short edge feed posture and a long edge feed posture; a second transport unit that transports a sheet in a second posture that is the other posture of the short edge feed posture and the long edge feed posture; a first storage unit that stores the sheet in the first posture transported by the first transport unit; a second storage unit that allows the sheet in the second posture to be stored therein and taken out therefrom, where the sheet in the second posture is transported by the second transport unit; a posture changing unit that rotates a sheet in the second posture in a first direction or a second direction opposite to the first direction between the first transport unit and the second transport unit to change a posture of the sheet to the first posture; a storage state determination unit that determines a storage state in the first storage unit; and a control unit. The control unit controls the first transport unit, the second transport unit, the first storage unit, the second storage unit, and the posture changing unit based on the storage state in the first storage unit determined by the storage state determination unit such that first storage processing or second storage processing is alternatively performed. The first storage processing rotates the sheet having been stored in the second storage unit in the first direction by the posture

changing unit and stores the sheet in the first transport unit. The second storage processing rotates the sheet in the second direction by the posture changing unit and stores the sheet in the first transport unit.

[0019] In the sheet handling apparatus according to the present disclosure, the storage state determination unit may determine whether a difference in thickness between a portion comprising a thick part of the sheet and a portion not comprising the thick part in a storage body formed of a plurality of the sheets within the first storage unit is equal to or less than a threshold value, and in a case where it has been determined that the difference in thickness is equal to or less than the threshold value, the control unit may cause the first storage processing to be performed, and in a case where it has been determined that the difference in thickness exceeds the threshold value, the control unit may cause the second storage processing to be performed. In the sheet handling apparatus according to the present disclosure, the storage state determination unit may determine whether a difference in thickness between a thickest part, which is the thickest, and a thinnest part, which is the thinnest, in the storage body formed of the plurality of sheets within the first storage unit is equal to or less than the threshold value, and in a case where it has been determined that the difference in thickness is equal to or less than the threshold value, the control unit may cause the first storage processing to be performed, and in a case where it has been determined that the difference in thickness exceeds the threshold value, the control unit may cause the second storage processing to be performed.

[0020] The sheet handling apparatus according to the present disclosure may further comprise an orientation detection unit that detects an orientation of the sheet in the first posture during transport by the first transport unit. In a case where the second storage processing is performed, the control unit may determine, as a determination criterion orientation, a most detected orientation during the transport with respect to the plurality of sheets stored in the first storage unit, the control unit may cause the sheet to be rotated in the second direction and stored in the first storage unit, where the sheet is a sheet whose orientation during the transport detected after determining the determination criterion orientation is the determination criterion orientation, and the control unit may cause the sheet to be rotated in the first direction and stored in the first storage unit, where the sheet is a sheet whose orientation during the transport detected after determining the determination criterion orientation is not the determination criterion orientation.

[0021] In the sheet handling apparatus according to the present disclosure, the storage state determination unit may determine whether a number of the sheets stored in the first storage unit is equal to or less than a set number, and in a case where it has been determined that the number of the sheets stored in the first storage unit is equal to or less than the set number, the control unit may cause the first storage processing to be per-

formed, and in a case where it has been determined that the number of the sheets stored in the first storage unit exceeds the set number, the control unit may cause the second storage processing to be performed.

Advantageous Effects of Invention

[0022] The sheet handling method and the sheet handling apparatus according to the present disclosure are capable of appropriately storing a sheet in a first storage unit that stores a sheet in a short edge feed posture or a long edge feed posture.

Brief Description of Drawings

[0023]

FIG. 1 is a schematic diagram illustrating a configuration of a sheet according to an embodiment;

FIG. 2 is a diagram provided for describing orientations of the sheet at the time of long edge feed according to the embodiment;

FIG. 3 is a diagram provided for describing orientations of the sheet at the time of short edge feed according to the embodiment;

FIG. 4 is a block diagram illustrating a schematic configuration of a sheet handling apparatus according to Embodiment 1;

FIG. 5 is a flowchart illustrating storage processing of storing the sheet, which has been received by a reception unit, in a first storage unit according to Embodiment 1;

FIG. 6A is a diagram provided for describing first storage processing according to Embodiment 1;

FIG. 6B is a diagram provided for describing second storage processing according to Embodiment 1;

FIG. 7 is a block diagram illustrating a schematic configuration of a sheet handling apparatus according to Embodiment 2;

FIG. 8 is a flowchart illustrating storage processing of storing the sheet within a second storage unit in a first storage unit according to Embodiment 2;

FIG. 9A is a diagram provided for describing first storage processing according to Embodiment 2;

FIG. 9B is a diagram provided for describing second storage processing according to Embodiment 2;

FIG. 10 is a schematic diagram illustrating a schematic configuration of a sheet handling apparatus according to Embodiments 3 and 4;

FIG. 11A is a diagram provided for describing first storage processing according to Embodiments 3 and 4;

FIG. 11B is a diagram provided for describing second storage processing according to Embodiments 3 and 4;

FIG. 12 is a block diagram illustrating a control system of the sheet handling apparatus according to Embodiments 3 and 4;

FIG. 13 is a flowchart illustrating storage processing of storing the sheet, which has been deposited through a depositing unit, in a recycle storage unit according to Embodiment 3;

FIG. 14 is a flowchart illustrating storage processing of storing the sheet, which has been deposited through the depositing unit, in the recycle storage unit according to Embodiment 3;

FIG. 15 is a flowchart illustrating storage processing of storing the sheet, which has been deposited through a depositing unit, in a recycle storage unit according to Embodiments 3 and 4;

FIG. 16 is a flowchart illustrating storage processing of storing the sheet, which has been deposited through a depositing unit, in a recycle storage unit according to Embodiment 4; and

FIG. 17 is a flowchart illustrating storage processing of storing the sheet, which has been deposited through the depositing unit, in the recycle storage unit according to Embodiment 4.

Detailed Description of the Invention

[Embodiments]

[0024] Hereinafter, embodiments of the present disclosure will be described.

<Configuration of Sheet>

[0025] First, a configuration of a sheet that is handled by a sheet handling apparatus in the present embodiment will be described. FIG. 1 is a schematic diagram illustrating the configuration of the sheet.

[0026] A sheet P illustrated in FIG. 1 is a banknote formed in a rectangular shape. In the present embodiment, a direction along a long side Pa will be referred to as a left-and-right direction of the sheet P, and a direction along a short side Pb will be referred to as a top-and-bottom direction of the sheet P. A top side in the top-and-bottom direction is an upper side of, for example, a portrait drawn on a front surface Pc of the sheet P in an up-and-down direction, and a bottom side is a side opposite to the top side. A left side of the sheet P in the left-and-right direction is a left side when the sheet P is viewed from a side of the front surface Pc such that the top side is located in an upper part, and a right side is a side opposite to the left side.

[0027] In some predetermined portion of the sheet P, a thick part Px thicker than the other portion (thin part) Py is formed. For the purpose of thickening the thick part Px, it is possible to exemplify counterfeit prevention. The thick part Px may be thick by processing such as embossing or may be thick by attaching another member such as an IC tag or a thin film thereto. A direction in side view in which the thick part Px protrudes from the thin part Py may be a direction only on a side of the front surface Pc or only on a side of a rear surface Pd, or may

be directions on both the sides of the front surface Pc and the rear surface Pd. The shape of the thick part Px in plan view may be a square or any other shape. The thick part Px may be present at one location or may be present at a plurality of locations. The present embodiment exemplifies a case where the thick part Px is present on a top left side of the front surface Pc of the sheet P.

<Orientation of Sheet at the time of Long Edge Feed>

[0028] Next, orientations of the sheet P at the time of long edge feed in the present embodiment will be described. The long edge feed refers to transporting the sheet P such that the long side Pa is located at a front in a transport direction. FIG. 2 is a diagram provided for describing orientations of the sheet at the time of the long edge feed.

[0029] As illustrated in FIG. 2, the orientations of the sheet P at the time of the long edge feed comprise orientations of A, B, C, and D patterns. The orientation of the A pattern is an orientation in which the top side is located in the front in the transport direction in a state in which the front surface Pc faces up. The orientation of the B pattern is an orientation in which the bottom side is located in the front in the transport direction in the state in which the front surface Pc faces up. The orientation of the C pattern is an orientation in which the bottom side is located in the front in the transport direction in a state in which the rear surface Pd faces up. The orientation of the D pattern is an orientation in which the top side is located in the front in the transport direction in the state in which the rear surface Pd faces up.

<Orientation of Sheet at the time of Short Edge Feed>

[0030] Next, orientations of the sheet P at the time of short edge feed in the present embodiment will be described. The short edge feed refers to transporting the sheet P such that the short side Pb is located in the front in the transport direction. FIG. 3 is a diagram provided for describing orientations of the sheet at the time of the short edge feed.

[0031] As illustrated in FIG. 3, the orientations of the sheet P at the time of the short edge feed comprise orientations of E, F, G, and H patterns. The orientation of the E pattern is an orientation in which the right side is located in the front in the transport direction in the state in which the front surface Pc faces up. The orientation of the F pattern is an orientation in which the left side is located in the front in the transport direction in the state in which the front surface Pc faces up. The orientation of the G pattern is an orientation in which the right side is located in the front in the transport direction in the state in which the rear surface Pd faces up. The orientation of the H pattern is an orientation in which the left side is located in the front in the transport direction in the state in which the rear surface Pd faces up.

<Embodiment 1>

[0032] Next, Embodiment 1 of the present disclosure will be described.

<Configuration of Sheet Handling Apparatus>

[0033] First, a configuration of a sheet handling apparatus will be described. FIG. 4 is a block diagram illustrating a schematic configuration of the sheet handling apparatus.

[0034] A sheet handling apparatus 1 illustrated in FIG. 4 comprises a first transport unit 11, a reception unit 12, a second transport unit 13, a first storage unit 14, a second storage unit 15, a posture changing unit 16, a storage state determination unit 17, and a control unit 18.

[0035] The first transport unit 11 transports a sheet P having a rectangular shape in a first posture that is one posture of a short edge feed posture and a long edge feed posture. The reception unit 12 receives a sheet P in the first posture from outside of the sheet handling apparatus 1 and guides the sheet P to the first transport unit 11. The second transport unit 13 transports a sheet P in a second posture that is the other posture of the short edge feed posture and the long edge feed posture. In Embodiments 1 and 2, a case where the first posture is the long edge feed posture and the second posture is the short edge feed posture will be described as an example, but the first posture may be the short edge feed posture and the second posture may be the long edge feed posture.

[0036] The first storage unit 14 stores the sheet P, which is transported in the first posture by the first transport unit 11, in the first posture as is. The first storage unit 14 ejects the sheet P, which has been stored, in a direction opposite to the storage direction without changing the orientation of the sheet P. The second storage unit 15 stores the sheet P, which is transported in the second posture by the second transport unit 13, in the second posture as is. The second storage unit 15 ejects the sheet P, which has been stored, in the direction opposite to the storage direction without changing the orientation of the sheet P.

[0037] The first storage unit 14 and the second storage unit 15 may be formed of a winding-type storage unit in which a plurality of the sheets P is stored in a state of being wound around a rotating body, or may be formed of a stacking-type storage unit in which a plurality of the sheets P is stored in a state of being stacked. The storage schemes (winding-type or stacking-type) of the first storage unit 14 and the second storage unit 15 may be the same or different. At least one of the first storage unit 14 and the second storage unit 15 may be formed to be detachable from the sheet handling apparatus 1. In Embodiments 1 and 2, a case where the first storage unit 14 is a recycle storage unit that stores the sheet P, which is recyclable, and the second storage unit 15 is an attachable/detachable storage unit for moving the sheet P

to and from another sheet handling apparatus such as a change machine will be described as an example, but the first storage unit 14 may be an attachable/detachable storage unit and the second storage unit 15 may be a recycle storage unit.

[0038] The posture changing unit 16 is disposed between the first transport unit 11 and the second transport unit 13 and rotates a sheet P, which has been transported by one transport unit of the first transport unit 11 and the second transport unit 13, by 90° in a first direction D1 (see FIG. 6B). The posture changing unit 16 rotates the sheet P around an axis orthogonal to the main surface of the sheet P. The posture changing unit 16 preferably rotates the sheet P around an axis passing through the center of the sheet P.

[0039] The storage state determination unit 17 determines whether a storage state of the sheet P in the first storage unit 14 satisfies a predetermined criterion. As the predetermined criterion, it is possible to exemplify that a difference in thickness between a thickest part, which is the thickest, and a thinnest part, which is the thinnest, in a storage body formed of a plurality of the sheets P within the first storage unit 14 is equal to or less than a threshold value, or that the number of the sheets P stored in the first storage unit 14 is equal to or less than a set number. Note that, the storage body means a roll-shaped wound product of the sheets P in a case where the first storage unit 14 is of a winding type, and means a bundle of the sheets P in a case where the first storage unit 14 is of a stacking type.

[0040] The control unit 18 controls the first transport unit 11, the second transport unit 13, the first storage unit 14, the second storage unit 15, and the posture changing unit 16 based on a determination result of the storage state determination unit 17 such that first storage processing or second storage processing is performed when the sheet P received by the reception unit 12 is transported to the first storage unit 14. Details of the first storage processing and the second storage processing will be described later.

<Operation of Sheet Handling Apparatus>

[0041] Next, an operation of the sheet handling apparatus 1 will be described. The sheet handling apparatus 1 in Embodiment 1 is capable of performing "storage processing of storing the sheet P, which has been received by the reception unit 12, in the first storage unit 14", "storage processing of storing the sheet P within the second storage unit 15 in the first storage unit 14", and "storage processing of storing the sheet P within the first storage unit 14 in the second storage unit 15". Hereinafter, the "storage processing of storing the sheet P, which has been received by the reception unit 12, in the first storage unit 14" will be described in detail, and the other pieces of processing will be briefly described. FIG. 5 is a flowchart illustrating the storage processing of storing the sheet, which has been received by the reception unit,

in the first storage unit. FIG. 6A is a diagram provided for describing the first storage processing. FIG. 6B is a diagram provided for describing the second storage processing.

<Storage Processing of storing Sheet, which has been received by Reception Unit, in First Storage Unit>

[0042] As illustrated in FIG. 5, the reception unit 12 receives a plurality of the sheets P, which has been brought in by a user, one by one in the first posture (step S1). The control unit 18 controls the first transport unit 11 such that the sheet P is transported in the first posture. On the other hand, the storage state determination unit 17 determines whether the storage state of the sheet P in the first storage unit 14 satisfies the predetermined criterion (step S2).

[0043] In a case where the storage state determination unit 17 has determined that the storage state in the first storage unit 14 satisfies the predetermined criterion (step S2: YES), the control unit 18 causes the first storage processing to be performed (step S3). In the first storage processing in step S3, the control unit 18 controls the first transport unit 11 and the first storage unit 14 such that the sheet P which has been guided from the reception unit 12 to the first transport unit 11 is stored in a first orientation (the first posture) in the first storage unit 14 without passing the sheet P through the posture changing unit 16 and the second storage unit 15 as illustrated in FIG. 6A.

[0044] In a case where the storage state determination unit 17 has determined that the storage state in the first storage unit 14 does not satisfy the predetermined criterion (step S2: NO), on the other hand, the control unit 18 causes the second storage processing to be performed (step S4) as illustrated in FIG. 5. In the second storage processing in step S4, the control unit 18 controls the first transport unit 11, the second transport unit 13, the first storage unit 14, the second storage unit 15, and the posture changing unit 16 such that the sheet P which has been guided from the reception unit 12 to the first transport unit 11 is stored in a second orientation (the first posture) different from the first orientation in the first storage unit 14 by passing the sheet P through the posture changing unit 16, the second storage unit 15, and the posture changing unit 16 and rotating the sheet P by 90° in the first direction D1 twice as illustrated in FIG. 6B. Note that, in the present disclosure, in a case where the first orientation is the orientation of the A, B, C, D, E, F, G or H pattern, the second orientation is the orientation of the B, A, D, C, F, E, H or G pattern, respectively.

[0045] As illustrated in FIG. 5, when the first storage processing in step S3 or the second storage processing in step S4 has been performed, the control unit 18 determines whether every sheet P received by the reception unit 12 has been stored in the first storage unit 14 (step S5). In a case where the control unit 18 has determined that every sheet P has not been stored in the first storage

unit 14 (step S5: NO), the control unit 18 causes the processing in step S2 to be performed. In a case where the control unit 18 has determined that every sheet P has been stored in the first storage unit 14 (step S5: YES), on the other hand, the control unit 18 ends the processing.

[0046] Here, when it is configured such that only the first storage processing illustrated in FIG. 6A is performed without determination by the storage state determination unit 17 whether the storage state in the first storage unit 14 satisfies the predetermined criterion, in a case where the orientations of the every sheet P received by the reception unit 12 are the orientation of the B pattern, for example, every sheet P is stored in the orientation of the B pattern (the first orientation) in the first storage unit 14. In this case, since the thick parts Px of every sheet P overlap in the first storage unit 14, the difference in thickness between the thickest part and the thinnest part in a storage body, that is, the difference between a portion comprising the thick part Px and a portion not comprising the thick part Px in a storage body may increase.

[0047] In Embodiment 1, on the other hand, the control unit 18 causes the first storage processing illustrated in FIG. 6A or the second storage processing illustrated in FIG. 6B to be alternatively performed, based on whether the storage state in the first storage unit 14 satisfies the predetermined criterion. For this reason, for example, in a case where the orientations of every sheet P received by the reception unit 12 are the orientation of the B pattern, the sheet P that has been transported by the first storage processing is stored in the orientation of the B pattern (the first orientation) in the first storage unit 14, whereas the sheet P that has been transported by the second storage processing is stored in the orientation of the A pattern (the second orientation) in the first storage unit 14. It is therefore possible to suppress overlapping of the thick parts Px of every sheet P in the first storage unit 14. Accordingly, the sheet handling apparatus 1 makes it possible to suppress an increase in the difference in thickness between the thickest part and the thinnest part in a storage body and to appropriately store the sheet P in the first storage unit 14.

<Storage Processing of storing Sheet within Second Storage Unit in First Storage Unit>

[0048] The second storage unit 15 ejects a plurality of the sheets P within the second storage unit 15 one by one in the second posture based on the control of the control unit 18. The control unit 18 controls the second transport unit 13 and the posture changing unit 16 such that the sheet P is transported in the second posture and is rotated by 90° in the first direction D1. Then, the control unit 18 controls the first transport unit 11 and the first storage unit 14 such that the sheet P whose posture has been changed from the second posture to the first posture is stored in the first storage unit 14. The control unit 18 causes the processing described above to be repeated

until every sheet P ejected from the second storage unit 15 is stored in the first storage unit 14.

<Storage Processing of storing Sheet within First Storage Unit in Second Storage Unit>

[0049] The first storage unit 14 ejects a plurality of the sheets P within the first storage unit 14 one by one in the second posture based on the control of the control unit 18. The control unit 18 controls the first transport unit 11 and the posture changing unit 16 such that the sheet P is transported in the first posture and is rotated by 90° in the first direction D1. Then, the control unit 18 controls the second transport unit 13 and the second storage unit 15 such that the sheet P whose posture has been changed from the first posture to the second posture is stored in the second storage unit 15. The control unit 18 causes the processing described above to be repeated until every sheet P ejected from the first storage unit 14 is stored in the second storage unit 15.

<Embodiment 2>

[0050] Next, Embodiment 2 of the present disclosure will be described.

<Configuration of Sheet Handling Apparatus>

[0051] First, a configuration of a sheet handling apparatus will be described. Note that, the same configurations as those in the sheet handling apparatus 1 of Embodiment 1 will be denoted by the same names and the same reference signs, and descriptions thereof will be omitted. FIG. 7 is a block diagram illustrating a schematic configuration of the sheet handling apparatus.

[0052] A sheet handling apparatus 1A illustrated in FIG. 7 comprises the first transport unit 11, the second transport unit 13, the first storage unit 14, the second storage unit 15, a posture changing unit 16A, the storage state determination unit 17, and a control unit 18A.

[0053] The posture changing unit 16A is disposed between the first transport unit 11 and the second transport unit 13, and rotates a sheet P, which has been transported by one transport unit of the first transport unit 11 and the second transport unit 13, by 90° in a first direction D1 (see FIG. 9A) or a second direction D2 (see FIG. 9B).

[0054] The control unit 18A controls the first transport unit 11, the second transport unit 13, the first storage unit 14, the second storage unit 15, and the posture changing unit 16A based on a determination result of the storage state determination unit 17 such that first storage processing or second storage processing is performed when the sheet P ejected from the second storage unit 15 is transported to the first storage unit 14. Details of the first storage processing and the second storage processing will be described later.

<Operation of Sheet Handling Apparatus>

[0055] Next, storage processing of storing the sheet P within the second storage unit 15 in the first storage unit 14 will be described as an operation of the sheet handling apparatus 1A. FIG. 8 is a flowchart illustrating the storage processing of storing the sheet within the second storage unit in the first storage unit. FIG. 9A is a diagram provided for describing the first storage processing. FIG. 9B is a diagram provided for describing the second storage processing.

<Storage Processing of storing Sheet, which has been received by Reception Unit, in First Storage Unit>

[0056] As illustrated in FIG. 8, the second storage unit 15 ejects a plurality of the sheets P within the second storage unit 15 one by one in the second posture based on the control of the control unit 18A (step S11). The control unit 18A controls the second transport unit 13 such that the sheet P is transported in the second posture. The storage state determination unit 17 determines whether the storage state of the sheet P in the first storage unit 14 satisfies a predetermined criterion (step S12). As the predetermined criterion, the same conditions as those exemplified in Embodiment 1 can be exemplified.

[0057] In a case where the storage state determination unit 17 has determined that the storage state in the first storage unit 14 satisfies the predetermined criterion (step S12: YES), the control unit 18A causes the first storage processing to be performed (step S13). In the first storage processing in step S13, the control unit 18A controls the first transport unit 11, the first storage unit 14, and the posture changing unit 16A such that the sheet P which has been ejected from the second storage unit 15 is stored in a first orientation (the first posture), in which the sheet P is rotated by 90° in the first direction D1, in the first storage unit 14 as illustrated in FIG. 9A.

[0058] In a case where the storage state determination unit 17 has determined that the storage state in the first storage unit 14 does not satisfy the predetermined criterion (step S12: NO), on the other hand, the control unit 18A causes the second storage processing to be performed (step S14) as illustrated in FIG. 8. In the second storage processing in step S14, the control unit 18A controls the first transport unit 11, the first storage unit 14, and the posture changing unit 16A such that the sheet P which has been ejected from the second storage unit 15 is stored in a second orientation (the first posture), in which the sheet P is rotated by 90° in the second direction D2 opposite to the first direction D1, in the first storage unit 14 as illustrated in FIG. 9B.

[0059] As illustrated in FIG. 8, when the first storage processing in step S13 or the second storage processing in step S14 has been performed, the control unit 18A determines whether every sheet P ejected from the second storage unit 15 has been stored in the first storage unit 14 (step S15). In a case where the control unit 18A

has determined that every sheet P has not been stored in the first storage unit 14 (step S15: NO), the control unit 18A causes the processing in step S12 to be performed. In a case where the control unit 18A has determined that every sheet P has been stored in the first storage unit 14 (step S15: YES), on the other hand, the control unit 18A ends the processing.

[0060] Here, when it is configured such that only the first storage processing illustrated in FIG. 9A is performed without determination by the storage state determination unit 17 whether the storage state in the first storage unit 14 satisfies the predetermined criterion, in a case where the orientations of the every sheet P ejected from the second storage unit 15 are the orientation of the E pattern, for example, every sheet P is stored in the orientation of the A pattern (the first orientation) in the first storage unit 14. In this case, since the thick parts Px of every sheet P overlap in the first storage unit 14, the difference in thickness between the thickest part and the thinnest part in a storage body, that is, the difference between a portion comprising the thick part Px and a portion not comprising the thick part Px in a storage body may increase.

[0061] In Embodiment 2, on the other hand, the control unit 18A causes the first storage processing illustrated in FIG. 9A or the second storage processing illustrated in FIG. 9B to be alternatively performed, based on whether the storage state in the first storage unit 14 satisfies the predetermined criterion. For this reason, for example, in a case where the orientations of every sheet P ejected from the second storage unit 15 are the orientation of the E pattern, the sheet P that has been transported by the first storage processing is stored in the orientation of the A pattern (the first orientation) in the first storage unit 14, whereas the sheet P that has been transported by the second storage processing is stored in the orientation of the B pattern (the second orientation) in the first storage unit 14. It is therefore possible to suppress overlapping of the thick parts Px of every sheet P in the first storage unit 14. Accordingly, the sheet handling apparatus 1A makes it possible to suppress an increase in the difference in thickness between the thickest part and the thinnest part in a storage body and to appropriately store the sheet P in the first storage unit 14.

<Embodiment 3>

[0062] Next, Embodiment 3 of the present disclosure will be described.

<Configuration of Sheet Handling Apparatus>

[0063] First, a configuration of a sheet handling apparatus will be described. FIG. 10 is a schematic diagram illustrating a schematic configuration of the sheet handling apparatus.

[0064] FIG. 11A is a diagram provided for describing first storage processing. FIG. 11B is a diagram provided

for describing second storage processing. FIG. 12 is a block diagram illustrating a control system of the sheet handling apparatus. Note that, hereinafter, the front side is a side on which a user of the sheet handling apparatus faces the sheet handling apparatus, and the rear side is a side opposite to the front side. Further, the right side is a right side as viewed from the user facing the sheet handling apparatus, and the left side is a side opposite to the right side. The upper side is an upper side in a case where the sheet handling apparatus is installed on a horizontal plane, and the lower side is a side opposite to the upper side.

[0065] A sheet handling apparatus 2 illustrated in FIG. 10 is installed, for example, in a store or in a back office of a bank. The sheet handling apparatus 2 dispenses a change fund for being loaded into a change machine or the like installed in a checkout counter of a store or the like, or deposits proceeds from sales collected from the change machine. The sheet handling apparatus 2 comprises a sheet transport cassette 20, a processing unit 21 in an upper part, and a safe 22 in a lower part.

[0066] The sheet transport cassette 20 is utilized for movement of the sheet P between the sheet handling apparatus 2 and the change machine. The sheet transport cassette 20 is an example of the second storage unit of the present disclosure. The sheet transport cassette 20 comprises a feeding mechanism for ejecting the sheet P in a short edge feed posture, a storage mechanism for storing the sheet P that is transported in the short edge feed posture, and motors for driving these mechanisms. The short edge feed posture is an example of the second posture of the present disclosure.

[0067] The processing unit 21 comprises an upper housing 210. Inside the upper housing 210, a depositing unit 211, a dispensing unit 212, a temporary storage unit 213, a recognition unit 214, a cassette attachment unit 215, a depositing/dispensing unit 216, a posture changing unit 217, an upper-side transport unit 23, and a control unit 24 are disposed.

[0068] The depositing unit 211 is an example of the reception unit of the present disclosure. The depositing unit 211 comprises a feeding mechanism for taking in (receiving) a plurality of the sheets P, which is stacked, one by one in a long edge feed posture. The long edge feed posture is an example of the first posture of the present disclosure.

[0069] The dispensing unit 212 is a part to which the sheet P dispensed from the safe 22 is transported during dispensing processing, for example.

[0070] The temporary storage unit 213 is an example of the temporary storage unit of the present disclosure. The temporary storage unit 213 temporarily stores the sheet P to be deposited during depositing processing, for example. The temporary storage unit 213 is capable of feeding out the sheet P which has been stored. The temporary storage unit 213 is formed of a winding-type storage unit.

[0071] The recognition unit 214 is disposed in a first

transport path 281 of the upper-side transport unit 23. The recognition unit 214 uses a well-known method to recognize the denomination and fitness of the sheet P. The recognition unit 214 also functions as an orientation detection unit that detects which orientation among the orientations of the A, B, C, and D patterns is the orientation of the sheet P on the first transport path 281. The recognition unit 214 may also detect the orientation of the sheet P based on the position of the thick part Px of the sheet P or the orientation of a portrait or the like. The recognition unit 214 transmits an authenticity determination result, denomination and fitness recognition results, and a detection result of the orientation of the sheet P to the control unit 24. Note that, the recognition unit 214 may not be caused to function as an orientation detection unit and an orientation detection unit that performs only detection processing of detecting the orientation of the sheet P may be disposed.

[0072] The cassette attachment unit 215 is configured to allow the sheet transport cassette 20 to be attached thereto. When the sheet transport cassette 20 is attached to the cassette attachment unit 215, the sheet transport cassette 20 can be controlled by the control unit 24.

[0073] The depositing/dispersing unit 216 comprises an opening for receiving the sheet P in the short edge feed posture ejected from the sheet transport cassette 20 attached to the cassette attachment unit 215 and transferring the sheet P to the upper-side transport unit 23 without changing the posture. The opening of the depositing/dispersing unit 216 is also an opening for transporting the sheet P, which is short-edge fed from the upper-side transport unit 23, to the sheet transport cassette 20 without changing the posture.

[0074] The posture changing unit 217 is disposed in a third transport path 283 of the upper-side transport unit 23. The posture changing unit 217 rotates a sheet P, which is being transported from the depositing/dispersing unit 216 to the recognition unit 214, by 90° in a first direction D1 (see FIG. 11B) and changes the posture of the sheet P from the short edge feed posture to the long edge feed posture. The posture changing unit 217 rotates the sheet P, which is being transported from the recognition unit 214 to the depositing/dispersing unit 216, by 90° in the first direction D1 and changes the posture of the sheet P from the long edge feed posture to the short edge feed posture. As the posture changing unit 217, a configuration in which the posture changing unit 217 comprises a pair of transport rollers, which is arranged in the width direction of the third transport path 283 and serves for transporting the sheet P in a direction along the third transport path 283, and the posture of the sheet P is changed by causing the rotation speeds of the pair of transport rollers to differ from each other can be exemplified. Further, the configuration disclosed in Japanese Patent Application Laid-Open No. 2021-149754 may be applied as the posture changing unit 217.

[0075] The control unit 24 integrally controls the sheet handling apparatus 2. The control unit 24 comprises a

central processing unit (CPU), and the CPU executes a sheet handling program stored in a memory (not illustrated) of the sheet handling apparatus 2 to thereby realize the function of the control unit 24. Specific processing of the control unit 24 will be described later.

[0076] In the safe 22, a storage unit 25, a collection unit 26, and a lower-side transport unit 27 are disposed.

[0077] The storage unit 25 comprises a multipurpose storage unit 251 and three recycle storage units 252. Each of the multipurpose storage unit 251 and the recycle storage units 252 is formed of a stacking-type storage unit. Each of the multipurpose storage unit 251 and the recycle storage units 252 takes in and stores the sheets P, which is long-edge fed, one by one, and feeds out the sheets P, which have been stored, one by one in the long edge feed posture.

[0078] The multipurpose storage unit 251 is an example of the temporary storage unit of the present disclosure. The multipurpose storage unit 251 is utilized for various applications.

[0079] Each of the recycle storage units 252 is an example of the first storage unit of the present disclosure. Denominations that are stored in the respective recycle storage units 252 are set in advance. Note that, the number of the recycle storage units 252 is not limited to three, but may be equal to or less than two or may be equal to or greater than four.

[0080] The collection unit 26 is a part to which the sheet P to be collected is transported during depositing processing, for example. The sheet P to be collected is, for example, high-value money of a fit note or an unfit note.

[0081] The upper-side transport unit 23 and the lower-side transport unit 27 form a transport unit 28. Within the sheet handling apparatus 2, the transport unit 28 transports the sheets P one by one with an appropriate space between the sheets P.

[0082] The upper-side transport unit 23 comprises a first transport path 281, a second transport path 282, a third transport path 283, a fourth transport path 284, a fifth transport path 285, a sixth transport path 286, a seventh transport path 287, and an eighth transport path 288.

[0083] The first transport path 281 is formed in a loop shape. The first transport path 281 comprises an upper-side path 281A extending frontward and rearward, a lower-side path 281B extending frontward and rearward below the upper-side path 281A, a front reverse rotation path 281C connecting the upper-side path 281A and the lower-side path 281B on the front side, and a rear reverse rotation path 281D connecting the upper-side path 281A and the lower-side path 281B on the rear side. In the upper-side path 281A, the recognition unit 214 is disposed.

[0084] The second transport path 282 connects a position on the upper-side path 281A frontward from the recognition unit 214 and the depositing unit 211. The third transport path 283 connects a position on the upper-side path 281A rearward from the connection position with

the second transport path 282 and frontward from the recognition unit 214 and the depositing/dispensing unit 216. The third transport path 283 is provided with the posture changing unit 217. The fourth transport path 284 connects a position on the upper-side path 281A frontward from the connection position with the second transport path 282 and the dispensing unit 212. The fifth transport path 285 connects the front reverse rotation path 281C and the temporary storage unit 213. Each of the sixth transport path 286, the seventh transport path 287, and the eighth transport path 288 connects the lower-side path 281B and the lower-side transport unit 27.

[0085] The lower-side transport unit 27 comprises a ninth transport path 289, a tenth transport path 290, and an eleventh transport path 291. The ninth transport path 289 connects the sixth transport path 286 and the multipurpose storage unit 251. The tenth transport path 290 connects the seventh transport path 287 and the collection unit 26. The eleventh transport path 291 connects the eighth transport path 288 and each of the recycle storage units 252.

[0086] In each part of the transport unit 28, tracking sensors (illustrations thereof will be omitted) that detect the passage of the sheet P are disposed. Upon receiving a command from the control unit 24, the transport unit 28 transports the sheet P to a predetermined transport destination based on detection signals of the tracking sensors.

[0087] Among the first transport path 281 to the eleventh transport path 291 described above, a portion of the third transport path 283 on a side of the depositing/dispensing unit 216 rather than the posture changing unit 217 forms a second transport unit 28B (see FIG. 12) that short-edge feeds a sheet P. A portion of the third transport path 283 on a side of the first transport path 281 rather than the posture changing unit 217, and the first, second, and fourth to eleventh transport paths 281, 282, and 284 to 291 form a first transport unit 28A (see FIG. 12) that long-edge feeds the sheet P.

[0088] The first transport unit 28A and the recognition unit 214 are configured such that the orientations of a sheet P, which has been deposited in the long edge feed posture through the depositing unit 211, in the top-and-bottom direction (the top-and-bottom direction of the sheet P) and of the face/back of the sheet P are the same as the orientations of the sheet P in the top-and-bottom direction and of the face/back of the sheet P, which are detected by the recognition unit 214. For example, the orientation of the sheet P deposited in the orientation of the A pattern through the depositing unit 211 is detected as the orientation of the A pattern by the recognition unit 214.

[0089] The first transport unit 28A and each of the recycle storage units 252 are configured such that the sheet P deposited in the long edge feed posture through the depositing unit 211 can be stored in each of the recycle storage units 252 without changing the orientations of the sheet P in the top-and-bottom direction and of the

face/back of the sheet P. For example, as illustrated in FIG. 11A, the first transport unit 28A and each of the recycle storage units 252 are configured such that the sheet P deposited in the orientation of the A pattern through the depositing unit 211 can be stored in the orientation of the A pattern in each of the recycle storage units 252.

[0090] The first transport unit 28A, the temporary storage unit 213, and the multipurpose storage unit 251 are configured such that the face/back of the sheet P deposited in the long edge feed posture through the depositing unit 211 are reversed and can be stored in the temporary storage unit 213 or the multipurpose storage unit 251 without changing the orientation of the sheet P in the top-and-bottom direction. For example, as illustrated in FIG. 11B, the first transport unit 28A, the temporary storage unit 213, and the multipurpose storage unit 251 are configured such that the sheet P deposited in the orientation of the A pattern through the depositing unit 211 can be stored in the orientation of the D pattern in the temporary storage unit 213 or the multipurpose storage unit 251.

[0091] The first transport unit 28A, the temporary storage unit 213, the multipurpose storage unit 251, and the posture changing unit 217 are configured such that the sheet P ejected from the temporary storage unit 213 or the multipurpose storage unit 251 can be rotated by 90° in the first direction D1 and transported to the second transport unit 28B without reversing the face/back of the sheet P. For example, as illustrated in FIG. 11B, the first transport unit 28A, the temporary storage unit 213, the multipurpose storage unit 251, and the posture changing unit 217 are configured such that the sheet P ejected in the orientation of the C pattern from the multipurpose storage unit 251 can be rotated in the orientation of the H pattern and transported to the second transport unit 28B.

[0092] The second transport unit 28B and the sheet transport cassette 20 are configured such that the face/back of the sheet P rotated by the posture changing unit 217 are reversed between the posture changing unit 217 and the sheet transport cassette 20 and the sheet P is transported without changing the orientation of the sheet P in the left-and-right direction. For example, as illustrated in FIG. 11B, the second transport unit 28B and the sheet transport cassette 20 are configured such that the sheet P rotated in the orientation of the H pattern by the posture changing unit 217 can be stored in the orientation of the F pattern in the sheet transport cassette 20. Further, for example, as illustrated in FIG. 11B, the second transport unit 28B and the sheet transport cassette 20 are configured such that the sheet P ejected in the orientation of the E pattern from the sheet transport cassette 20 can be transported in the orientation of the G pattern to the posture changing unit 217.

[0093] The first transport unit 28A, the posture changing unit 217, and each of the recycle storage units 252 are configured such that the sheet P ejected from the sheet transport cassette 20 can be rotated by 90° in the

first direction D1, the face/back of the sheet P can be reversed, and the sheet P can be stored in each of the recycle storage units 252. For example, as illustrated in FIG. 11B, the first transport unit 28A, the posture changing unit 217, and each of the recycle storage units 252 are configured such that the sheet P transported in the orientation of the G pattern by the second transport unit 28B can be rotated in the orientation of the C pattern and stored in the orientation of the B pattern in each of the recycle storage units 252.

[0094] Next, a control system of the sheet handling apparatus 2 will be described. As illustrated in FIG. 12, the control unit 24 is configured such that various kinds of information can be transmitted and received among the sheet transport cassette 20, the temporary storage unit 213, the recognition unit 214, the depositing/dispensing unit 216, the posture changing unit 217, the first transport unit 28A, the second transport unit 28B, the multipurpose storage unit 251, each of the recycle storage units 252, and a storage state determination unit 30.

[0095] The storage state determination unit 30 determines whether the storage state of the sheet P in each of the recycle storage units 252 satisfies the predetermined criterion. In Embodiment 3, the predetermined criterion is that the difference in thickness between the thickest part and the thinnest part in a bundle of the sheets P stored in each of the recycle storage units 252 is equal to or less than the threshold value. Note that, the predetermined criterion may be that the difference between a portion comprising the thick part Px and a portion not comprising the thick part Px in a bundle of the sheets P is equal to or less than the threshold value.

[0096] The storage state determination unit 30 is configured to comprise, for example: a detection sensor that detects that each of the recycle storage units 252 has become nearly full; a counter that counts the number of the sheets P stored in each of the recycle storage units 252; and a memory that stores a determination criterion number. The term "nearly full" refers to a state in which there is little physical space for storing a new sheet P within each of the recycle storage units 252. The determination criterion number is the number of the sheets P in a case where each of the recycle storage units 252 becomes nearly full in a state in which the difference between the thickest part and the thinnest part in a bundle of the sheets P is equal to or less than the threshold value. In a case where the detection sensor detects that the recycle storage unit 252 is nearly full even though the number of sheets stored in the recycle storage unit 252 has not reached the determination criterion number, the storage state determination unit 30 determines that the difference in thickness between the thickest part and thinnest the part in a bundle of the sheets P exceeds the threshold value. Note that, the storage state determination unit 30 may be configured to comprise an imaging apparatus and may determine based on a captured image whether the difference in thickness between the thickest part and the thinnest part in a bundle of the sheets

P is equal to or less than the threshold value. Further, the storage state determination unit 30 may also use a recognition result of the recognition unit 214 instead of a count result of the counter.

<Operation of Sheet Handling Apparatus>

[0097] Next, an operation of the sheet handling apparatus 2 will be described. The sheet handling apparatus 2 in Embodiment 3 is capable of performing "storage processing of storing the sheet P, which has been deposited through the depositing unit 211, in the recycle storage unit 252", "storage processing of storing the sheet P within the sheet transport cassette 20 in the recycle storage unit 252", and "storage processing of storing the sheet P within the recycle storage unit 252 in the sheet transport cassette 20". Hereinafter, the "storage processing of storing the sheet P, which has been deposited through the depositing unit 211, in the recycle storage unit 252" will be described in detail, and the other pieces of processing will be briefly described. FIGS. 13 to 15 are flowcharts each illustrating the storage processing of storing the sheet, which has been deposited through the depositing unit, in the recycle storage unit.

<Storage Processing of storing Sheet, which has been deposited through Depositing Unit, in Recycle Storage Unit>

[0098] As illustrated in FIG. 13, the depositing unit 211 receives a plurality of the sheets P, which has been brought in by a user, one by one in the long edge feed posture (step S21). The control unit 24 controls the first transport unit 28A such that the sheet P is transported on the second transport path 282 and the upper-side path 281A. The recognition unit 214 performs authenticity determination processing and denomination and fitness recognition processing for the sheet P on the upper-side path 281A and detection processing of detecting the orientation of the sheet P and transmits results of these pieces of processing to the control unit 24.

[0099] The control unit 24 determines the recycle storage unit 252 or the collection unit 26 as the storage destination of the sheet P based on the denomination and fitness recognition results transmitted from the recognition unit 214. In a case where the control unit 24 has determined the recycle storage unit 252 as the storage destination of the sheet P, the storage state determination unit 30 determines whether the difference in thickness between the thickest part and the thinnest part in a bundle of the sheets P within the recycle storage unit 252 is equal to or less than the threshold value (step S22).

[0100] In a case where the storage state determination unit 30 has determined that the difference in thickness between the thickest part and the thinnest part in a bundle of the sheets P is equal to or less than the threshold value (step S22: YES), the control unit 24 causes the first storage processing to be performed (step S23). In the first

storage processing in step S23, the control unit 24 controls the first transport unit 28A and the recycle storage unit 252 such that the sheet P is transported in a clockwise direction in FIG. 10 on the first transport path 281 and is stored in the recycle storage unit 252. In the first storage processing, for example, as illustrated in FIG. 11A, the sheet P deposited in the orientation of the A pattern through the depositing unit 211 is stored in the orientation of the A pattern (the first orientation) in the recycle storage unit 252. Further, the control unit 24 calculates each number of stored sheets in each orientation in each of the recycle storage units 252 based on a detection result of the orientation of the sheet P transmitted from the recognition unit 214.

[0101] Next, the control unit 24 determines whether there is a sheet P during transport in the first transport unit 28A (step S24). In a case where the control unit 24 has determined that there is no sheet P during transport in the first transport unit 28A (step S24: NO), that is in a case where the control unit 24 has determined that every sheet P deposited through the depositing unit 211 has been stored in the recycle storage unit 252 or the collection unit 26, the control unit 24 ends the processing. In a case where the control unit 24 has determined that there is a sheet P during transport in the first transport unit 28A (step S24: YES), that is in a case where the control unit 24 has determined that not every sheet P deposited through the depositing unit 211 has been stored in the recycle storage unit 252 or the collection unit 26, on the other hand, the control unit 24 causes the processing in step S22 to be performed. That is, the control unit 24 determines whether the difference in thickness between the thickest part and the thinnest part in a bundle of the sheets P within the recycle storage unit 252 in which the next sheet P is stored is equal to or less than the threshold value.

[0102] In a case where the storage state determination unit 30 has determined that the difference in thickness between the thickest part and the thinnest part in a bundle of the sheets P exceeds the threshold value (step S22: NO), the control unit 24 causes the second storage processing to be performed (step S25). In the second storage processing in step S25, with respect to the sheets P within the recycle storage unit 252 determined as the storage destination for the next sheet P to be stored, the control unit 24 specifies the most orientation during transport, which is detected by the recognition unit 214, as a determination criterion orientation as illustrated in FIG. 14 (step S31).

[0103] The control unit 24 determines based on a recognition result of the recognition unit 214 whether the orientation of the sheet P to be stored, which is long-edge fed, is the determination criterion orientation (step S32). In a case where the control unit 24 has determined that the orientation of the sheet P to be stored is not the determination criterion orientation (step S32: NO), the control unit 24 causes the same processing as the first transport processing in step S23 to be performed and causes

the sheet P to be stored in the recycle storage unit 252 as illustrated in FIG. 11A (step S33). In a case where the control unit 24 has determined that the orientation of the sheet P to be stored is the determination criterion orientation (step S32: YES), on the other hand, the control unit 24 controls the first transport unit 28A and the multipurpose storage unit 251 such that the sheet P is transported in the clockwise direction on the first transport path 281 and is temporarily stored in the multipurpose storage unit 251 as illustrated in FIG. 11B (step S34).

[0104] Here, the reason why the storage destination of the sheet P is changed depending on whether the orientation of the sheet P to be stored is the determination criterion orientation in the processing in steps S33 and S34 will be described. In a case where the sheet P is stored in the recycle storage unit 252, the sheet P deposited in the orientation of the A pattern through the depositing unit 211 is stored in the orientation of the A pattern in the recycle storage unit 252 after the recognition unit 214 detects the orientation of the A pattern. That is, the sheet P is stored, in the same orientation as the orientation detected by the recognition unit 214, in the recycle storage unit 252. For this reason, for example, in a case where the determination criterion orientation is the orientation of the A pattern, the difference in thickness between the thickest part and the thinnest part in a bundle of the sheets P further increases when the sheet P whose direction has been determined as the orientation of the A pattern by the recognition unit 214 is stored in the recycle storage unit 252. When the sheet P whose direction has been determined as the orientation of the B, C or D pattern by the recognition unit 214 is stored in the recycle storage unit 252, on the other hand, the difference in thickness between the thickest part and the thinnest part in a bundle of the sheets P decreases. As described above, the storage destination of the sheet P is changed depending on whether the orientation of the sheet P to be stored is the determination criterion orientation such that the difference in thickness between the thickest part and the thinnest part in a bundle of the sheets P does not increase.

[0105] After the processing in step S33 or S34, the control unit 24 determines whether there is a sheet P during transport in the first transport unit 28A (step S35). In a case where the control unit 24 has determined that there is a sheet P during transport in the first transport unit 28A (step S35: YES), the control unit 24 causes the processing in step S32 to be performed, which is for the next sheet P to be stored. In a case where the control unit 24 has determined that there is no sheet P during transport in the first transport unit 28A (step S35: NO), on the other hand, the control unit 24 determines whether the sheet P is stored in the multipurpose storage unit 251 (step S36).

[0106] In a case where the control unit 24 has determined that the sheet P is not stored in the multipurpose storage unit 251 (step S36: NO), the control unit 24 ends the processing. In a case where the control unit 24 has

determined that the sheet P is stored in the multipurpose storage unit 251 (step S36: YES), on the other hand, the control unit 24 controls the multipurpose storage unit 251 such that the sheet P is ejected in the long edge feed posture from the multipurpose storage unit 251 as illustrated in FIG. 15 (step S37). The control unit 24 controls the first transport unit 28A and the posture changing unit 217 such that the sheet P is transported in a counter-clockwise direction on the first transport path 281 and, as illustrated in FIG. 11B, is rotated by 90° in the first direction D1 by the posture changing unit 217 (step S38). Further, the control unit 24 controls the second transport unit 28B and the sheet transport cassette 20 such that the sheet P which has been rotated by the posture changing unit 217 is temporarily stored in the sheet transport cassette 20 (step S39).

[0107] The control unit 24 determines whether there is a sheet P during transport in the first transport unit 28A or the second transport unit 28B (step S40). In a case where the control unit 24 has determined that there is a sheet P during transport (step S40: YES), the control unit 24 causes the processing in step S38 to be performed, which is for the next sheet P to be stored. In a case where the control unit 24 has determined that there is no sheet P during transport (step S40: NO), on the other hand, the control unit 24 controls the sheet transport cassette 20 such that the sheet P is ejected in the short edge feed posture from the sheet transport cassette 20 (step S41). The control unit 24 controls the second transport unit 28B and the posture changing unit 217 such that the sheet P is rotated by 90° in the first direction D1 by the posture changing unit 217 as illustrated in FIG. 11B (step S42). Further, the control unit 24 controls the first transport unit 28A and the recycle storage unit 252 such that the sheet P that has been rotated by the posture changing unit 217 is stored in the recycle storage unit 252 (step S43).

[0108] The control unit 24 determines whether there is a sheet P during transport in the second transport unit 28B (step S44). In a case where the control unit 24 has determined that there is a sheet P during transport (step S44: YES), the control unit 24 causes the processing in step S42 to be performed, which is for the next sheet P to be stored. In a case where the control unit 24 has determined that there is no sheet P during transport (step S44: NO), on the other hand, the control unit 24 ends the processing.

[0109] With the processing described above, in a case where the determination criterion orientation is the orientation of the A pattern, for example, the orientation of the sheet P deposited in the orientation of the A pattern into the depositing unit 211 is changed by the posture changing unit 217 and is stored in the orientation of the B pattern (the second orientation) in the recycle storage unit 252. On the other hand, the sheet P deposited in the orientation of the B, C or D pattern into the depositing unit 211 is stored in the orientation as is (the first orientation) in the recycle storage unit 252. For this reason, the sheet handling apparatus 2 is capable of suppressing

overlapping of numerous thick parts Px within the recycle storage unit 252. Accordingly, the sheet handling apparatus 2 is capable of suppressing an increase in the difference in thickness between the thickest part and the thinnest part in a bundle of sheets (storage body) and is capable of appropriately storing the sheet P in the recycle storage unit 252.

[0110] In particular, since it is determined in accordance with the orientation detected by the recognition unit 214 whether the sheet P is directly stored in the recycle storage unit 252, the sheet P can be properly stored in the recycle storage unit 252 regardless of the orientation of the sheet P when received by the depositing unit 211.

[0111] In a case where the second storage processing is performed, the control unit 24 causes the sheet P in the determination criterion orientation to be temporarily stored in the multipurpose storage unit 251 and causes the sheet P not in the determination criterion orientation to be stored in the recycle storage unit 252. Then, after every sheet P deposited through the depositing unit 211 is stored in the multipurpose storage unit 251 or the recycle storage unit 252, the control unit 24 passes the sheet P, which has been stored in the multipurpose storage unit 251, through the posture changing unit 217, the sheet transport cassette 20, and the posture changing unit 217 to cause the sheet P to be stored in the recycle storage unit 252. For this reason, it is possible to shorten the execution period of the second storage processing in comparison with a configuration in which the sheet P in the determination criterion orientation is not temporarily stored in the multipurpose storage unit 251, but is passed through the posture changing unit 217, the sheet transport cassette 20, and the posture changing unit 217 to be stored in the recycle storage unit 252.

<Storage Processing of storing Sheet within Sheet Transport Cassette in Recycle Storage Unit>

[0112] Storage processing of storing the sheet P within the sheet transport cassette 20 in the recycle storage unit 252 is performed as collection processing of proceeds from sales, for example. The sheet transport cassette 20 ejects a plurality of the sheets P within the sheet transport cassette 20 one by one in the short edge feed posture. The control unit 24 causes the posture changing unit 217 to rotate the sheet P in the short edge feed posture by 90° in the first direction D1. Then, the control unit 24 causes the sheet P, whose posture has been changed from the short edge feed posture to the long edge feed posture, to be stored in the recycle storage unit 252. The control unit 24 causes the processing described above to be repeated until every sheet P ejected from the sheet transport cassette 20 is stored in the recycle storage unit 252.

<Storage Processing of storing Sheet within Recycle Storage Unit in Sheet Transport Cassette>

[0113] Storage processing of storing the sheet P within the recycle storage unit 252 in the sheet transport cassette 20 is performed as replenishment processing with a change fund for a change machine, for example. The recycle storage unit 252 ejects a plurality of the sheets P within the recycle storage unit 252 one by one in the long edge feed posture. The control unit 24 causes the posture changing unit 217 to rotate the sheet P in the long edge feed posture by 90° in the first direction D1. Then, the control unit 24 causes the sheet P, whose posture has been changed from the long edge feed posture to the short edge feed posture, to be stored in the sheet transport cassette 20. The control unit 24 causes the processing described above to be repeated until every sheet P ejected from the recycle storage unit 252 is stored in the sheet transport cassette 20.

<Embodiment 4>

[0114] Next, Embodiment 4 of the present disclosure will be described. Embodiment 4 is the same as Embodiment 3 in terms of using the sheet handling apparatus 2 in Embodiment 3, and thus, differences will be mainly described.

<Configuration of Sheet Handling Apparatus>

[0115] In a sheet handling apparatus 2A of Embodiment 4 illustrated at FIGS. 10 and 12, each processing performed by a control unit 24A and a storage state determination unit 30A differs from each processing performed by the control unit 24 and the storage state determination unit 30 in Embodiment 3.

[0116] The storage state determination unit 30A determines whether the storage state of the sheet P in each of the recycle storage units 252 satisfies a predetermined criterion. In Embodiment 4, the predetermined criterion is that the number of the sheets P stored in each of the recycle storage units 252 is equal to or less than a set number. The set number may be set based on an input operation of an operation unit (not illustrated) of the sheet handling apparatus 2A. In this case, only a user identified by an identification equipment may be able to set the set number. Further, the set number may be different for each denomination or may be different for each transaction performed by the sheet handling apparatus 2A. The storage state determination unit 30A is configured to comprise, for example: a counter that counts the number of the sheets P stored in each of the recycle storage units 252; and a memory that stores the set number. The storage state determination unit 30A may also use a recognition result of the recognition unit 214 instead of a count result of the counter.

<Operation of Sheet Handling Apparatus>

[0117] Next, as an operation of the sheet handling apparatus 2A, storage processing of storing the sheet P, which has been deposited through the depositing unit 211, in the recycle storage unit 252 will be described with reference to FIGS. 15 to 17. FIGS. 16 and 17 are flowcharts each illustrating storage processing of storing the sheet, which has been deposited through the depositing unit, in the recycle storage unit. Note that, hereinafter, a case where orientations of every sheet P received by the depositing unit 211 are the same will be described. Further, a description of the same processing as in Embodiment 3 will be simplified.

[0118] As illustrated in FIG. 16, the depositing unit 211 receives a plurality of the sheets P one by one in the long edge feed posture (step S21). The recognition unit 214 transmits results of authenticity determination processing and denomination and fitness recognition processing for the sheet P transported on the upper-side path 281A and a detection processing result of the orientation of the sheet P to the control unit 24A. In a case where the control unit 24A has determined the recycle storage unit 252 as the storage destination of the sheet P, the storage state determination unit 30A determines whether the number of the sheets P stored within the recycle storage unit 252 is equal to or less than the set number (step S51).

[0119] In a case where the storage state determination unit 30A has determined that the number of stored sheets is equal to or less than the set number (step S51: YES), the control unit 24A causes the first storage processing to be performed (step S23). Next, the control unit 24A determines whether there is a sheet P during transport in the first transport unit 28A (step S24). In a case where the control unit 24A has determined that there is no sheet P during transport in the first transport unit 28A (step S24: NO), the control unit 24A ends the processing. In a case where the control unit 24A has determined that there is a sheet P during transport in the first transport unit 28A (step S24: YES), on the other hand, the control unit 24 causes the processing in step S51 to be performed. That is, by the processing in step S23, the control unit 24A determines whether the number of the sheets P stored within the recycle storage unit 252 in which the next sheet P is stored is equal to or less than the set number.

[0120] In a case where the storage state determination unit 30A has determined that the number of sheets stored in the recycle storage unit 252 exceeds the set number (step S51: NO), the control unit 24A causes the second storage processing to be performed (step S52). In the second storage processing in step S52, the control unit 24A causes the next sheet P to be stored to be temporarily stored in the multipurpose storage unit 251 as illustrated in FIG. 17 (step S34). After the processing in step S34, the control unit 24A determines whether there is a sheet P during transport in the first transport unit 28A (step S35). In a case where the control unit 24A has determined that there is a sheet P during transport in the

first transport unit 28A (step S35: YES), the control unit 24A causes the processing in step S34 to be performed, which is for the next sheet P to be stored. In a case where the control unit 24A has determined that there is no sheet P during transport in the first transport unit 28A (step S35: NO), on the other hand, the control unit 24A causes the processing in S37 to S44 illustrated in FIG. 15 to be performed as in Embodiment 3.

[0121] With the processing described above, in a case where every sheet P is deposited in the orientation of the A pattern into the depositing unit 211, for example, the sheets P are stored in the orientation of the A pattern (the first orientation) in the recycle storage unit 252 until the number of sheets stored in the recycle storage unit 252 becomes the set number and, after the number of stored sheets becomes the set number, the orientation of the sheets P is changed by the posture changing unit 217 and the sheets are stored in the orientation of the B pattern (the second orientation) in the recycle storage unit 252. For this reason, the sheet handling apparatus 2A is capable of suppressing overlapping of numerous thick parts Px within the recycle storage unit 252. Accordingly, the sheet handling apparatus 2A is capable of suppressing an increase in the difference in thickness between the thickest part and the thinnest part in a bundle of sheets (storage body) and is capable of appropriately storing the sheet P in the recycle storage unit 252.

[Variations of Embodiments]

[0122] It goes without saying that the present disclosure is not limited to those indicated in the embodiments described thus far, and various modifications can be made without departing from the spirit of the present disclosure. The embodiments described above and variations that are indicated below may be combined in any way as long as it is applicable.

[0123] For example, in Embodiments 1 to 4, the sheet handling apparatuses 1, 1A, 2, and 2A may be configured such that the orientation of the face/back of the sheet P stored in the first storage unit 14 or the recycle storage unit 252 by the first storage processing differs from the orientation of the face/back of the sheet P stored in the first storage unit 14 or the recycle storage unit 252 by the second storage processing.

[0124] For example, the sheet P is temporarily stored only in the multipurpose storage unit 251 in Embodiments 3 and 4, but may be temporarily stored only in the temporary storage unit 213 or may be selectively stored in the multipurpose storage unit 251 or the temporary storage unit 213.

[0125] In Embodiments 3 and 4, the sheet P is temporarily stored in the multipurpose storage unit 251 and is then stored in the sheet transport cassette 20 via the posture changing unit 217, but the sheet handling apparatuses 2 and 2A may be configured such that the sheet P is not be temporarily stored in the multipurpose storage unit 251 and can be stored in the sheet transport cassette

20 via the posture changing unit 217.

[0126] In Embodiments 3 and 4, the depositing unit 211, the temporary storage unit 213, the multipurpose storage unit 251, and the recycle storage unit 252 may be configured to allow the sheet P in the short edge feed posture to be stored therein or taken out therefrom, and the sheet transport cassette 20 may be configured to allow the sheet P in the long edge feed posture to be stored therein or taken out therefrom to perform the same processing as the processing described above.

[0127] In Embodiments 3 and 4, it may be configured such that in the processing of storing the sheet P within the sheet transport cassette 20 in the recycle storage unit 252, the sheet P is rotated in the first direction D1 or in the second direction D2 opposite to the first direction D1 by the posture changing unit 217 based on a determination result of the storage state determination units 30 and 30A, and is then stored in the recycle storage unit 252 in the same manner as in Embodiment 2. Further, it may be configured such that the storage state determination units 30 and 30A can determine the storage state of the sheet P in the sheet transport cassette 20, and that in the processing of storing the sheet P within the sheet transport cassette 20 in the recycle storage unit 252, the sheet P is rotated in the first direction D1 or in the second direction D2 opposite to the first direction D1 by the posture changing unit 217 based on a determination result of the storage state determination units 30 and 30A, and is then stored in the sheet transport cassette 20.

[0128] The sheet that is handled by the sheet handling apparatus of the present disclosure may be a voucher, a check, a security, a card-like medium, or the like.

Reference Signs List

[0129]

- 1, 1A, 2, 2A Sheet handling apparatus
- 11, 28A First transport unit
- 12 Reception unit
- 13, 28B Second transport unit
- 14 First storage unit
- 15 Second storage unit
- 16, 16A, 217 Posture changing unit
- 17, 30, 30A Storage state determination unit
- 18, 18A, 24, 24A Control unit
- 20 Sheet transport cassette
- 21 Processing unit
- 22 Safe
- 23 Upper-side transport unit
- 25 Storage unit
- 26 Collection unit
- 27 Lower-side transport unit
- 28 Transport unit
- 210 Upper housing
- 211 Depositing unit
- 212 Dispensing unit
- 213 Temporary storage unit

214 Recognition unit
 215 Cassette attachment unit
 216 Depositing/dispensing unit
 251 Multipurpose storage unit
 252 Recycle storage unit 5
 281, 282, 283, 284, 285, 286, 287, 288, 289, 290,
 291 First to eleventh transport paths
 281A Upper-side path
 281B Lower-side path
 281C Front reverse rotation path 10
 281D Rear reverse rotation path
 D1 First direction
 D2 Second direction
 P Sheet
 Pa Long side 15
 Pb Short side
 Pc Front surface
 Pd Rear surface
 Px Thick part
 Py Thin part 20

Claims

1. A sheet handling method performed by a sheet handling apparatus, the sheet handling apparatus comprising:
 - a first transport unit that transports a sheet in a first posture that is one posture of a short edge feed posture and a long edge feed posture; 30
 - a reception unit that receives a sheet in the first posture and guides the sheet to the first transport unit;
 - a second transport unit that transports a sheet in a second posture that is the other posture of the short edge feed posture and the long edge feed posture; 35
 - a first storage unit that stores the sheet in the first posture transported by the first transport unit; 40
 - a second storage unit that allows the sheet in the second posture to be stored therein and taken out therefrom, the sheet in the second posture being transported by the second transport unit; and 45
 - a posture changing unit that rotates a sheet in a first direction between the first transport unit and the second transport unit to change a posture of the sheet to the first posture or the second posture, wherein the sheet handling method comprises alternatively performing, by the sheet handling apparatus, based on a storage state in the first storage unit: 50
 - first storage processing of storing the sheet in the first storage unit without passing the sheet through the posture changing unit and 55

the second storage unit, the sheet having been guided from the reception unit to the first transport unit; or
 second storage processing of storing the sheet in the first storage unit by storing the sheet in the second storage unit via the posture changing unit and passing the sheet through the posture changing unit from the second storage unit to thereby rotate the sheet in the first direction, the sheet having been guided from the reception unit to the first transport unit.

2. The sheet handling method according to claim 1, wherein:
 - in a case where a difference in thickness between a portion comprising a thick part of the sheet and a portion not comprising the thick part in a storage body formed of a plurality of the sheets within the first storage unit is equal to or less than a threshold value, the sheet handling apparatus performs the first storage processing, and in a case where the difference exceeds the threshold value, the sheet handling apparatus performs the second storage processing.
3. The sheet handling method according to claim 2, wherein:

the sheet handling apparatus detects an orientation of the sheet in the first posture during transport by the first transport unit, and in a case where the second storage processing is performed,

the sheet handling apparatus determines, as a determination criterion orientation, a most detected orientation during the transport with respect to the plurality of sheets stored in the first storage unit, the sheet handling apparatus stores the sheet in the first storage unit via the posture changing unit, the second storage unit, and the posture changing unit, the sheet being a sheet whose orientation during the transport detected after determining the determination criterion orientation is the determination criterion orientation, and the sheet handling apparatus stores the sheet in the first storage unit without passing the sheet through the posture changing unit and the second storage unit, the sheet being a sheet whose orientation during the transport detected after determining the determination criterion orientation is not the determination criterion orientation.

4. The sheet handling method according to claim 3, wherein:

the sheet handling apparatus further comprises a temporary storage unit that temporarily stores the sheet in the first posture, the sheet being transported by the first transport unit, in a case where the second storage processing is performed,

the sheet handling apparatus temporarily stores the sheet in the determination criterion orientation in the temporary storage unit, and stores the sheet not in the determination criterion orientation in the first storage unit without passing the sheet not in the determination criterion orientation through the posture changing unit and the second storage unit, and the sheet handling apparatus stores, after every sheet having been guided from the reception unit to the first transport unit is stored in the temporary storage unit or the first storage unit, the sheet having been stored in the temporary storage unit in the first storage unit via the posture changing unit, the second storage unit, and the posture changing unit.

5. A sheet handling method performed by a sheet handling apparatus, the sheet handling apparatus comprising:

a first transport unit that transports a sheet in a first posture that is one posture of a short edge feed posture and a long edge feed posture;
a second transport unit that transports a sheet in a second posture that is the other posture of the short edge feed posture and the long edge feed posture;
a first storage unit that stores the sheet in the first posture transported by the first transport unit;
a second storage unit that allows the sheet in the second posture to be stored therein and taken out therefrom, the sheet in the second posture being transported by the second transport unit; and
a posture changing unit that rotates a sheet in the second posture in a first direction or a second direction opposite to the first direction between the first transport unit and the second transport unit to change a posture of the sheet to the first posture, wherein the sheet handling method comprises alternatively performing, by the sheet handling apparatus, based on a storage state in the first storage unit:

first storage processing of rotating the sheet having been stored in the second storage unit in the first direction by the posture

changing unit and storing the sheet in the first transport unit; or
second storage processing of rotating the sheet in the second direction by the posture changing unit and storing the sheet in the first transport unit.

6. The sheet handling method according to claim 5, wherein in a case where a difference in thickness between a portion comprising a thick part of the sheet and a portion not comprising the thick part in a storage body formed of a plurality of the sheets within the first storage unit is equal to or less than a threshold value, the sheet handling apparatus performs the first storage processing, and in a case where the difference exceeds the threshold value, the sheet handling apparatus performs the second storage processing.

7. The sheet handling method according to claim 6, wherein:

the sheet handling apparatus detects an orientation of the sheet in the first posture during transport by the first transport unit, and in a case where the second storage processing is performed,

the sheet handling apparatus determines, as a determination criterion orientation, a most detected orientation during the transport with respect to the plurality of sheets stored in the first storage unit, the sheet handling apparatus rotates the sheet in the second direction and stores the sheet in the first storage unit, the sheet being a sheet whose orientation during the transport detected after determining the determination criterion orientation is the determination criterion orientation, and the sheet handling apparatus rotates the sheet in the first direction and stores the sheet in the first storage unit, the sheet being a sheet whose orientation during the transport detected after determining the determination criterion orientation is not the determination criterion orientation.

8. The sheet handling method according to any one of claims 1 to 7, wherein in a case where a number of the sheets stored in the first storage unit is equal to or less than a set number, the sheet handling apparatus performs the first storage processing, and in a case where the number of the sheets stored in the first storage unit exceeds the set number, the sheet handling apparatus performs the second storage processing.

9. A sheet handling apparatus, comprising:

a first transport unit that transports a sheet in a first posture that is one posture of a short edge feed posture and a long edge feed posture; 5
 a reception unit that receives a sheet in the first posture and guides the sheet to the first transport unit;
 a second transport unit that transports a sheet in a second posture that is the other posture of the short edge feed posture and the long edge feed posture; 10
 a first storage unit that stores the sheet in the first posture transported by the first transport unit; 15
 a second storage unit that allows the sheet in the second posture to be stored therein and taken out therefrom, the sheet in the second posture being transported by the second transport unit; 20
 a posture changing unit that rotates a sheet in a first direction between the first transport unit and the second transport unit to change a posture of the sheet to the first posture or the second posture; 25
 a storage state determination unit that determines a storage state in the first storage unit; and
 a control unit, wherein the control unit controls the first transport unit, the second transport unit, the first storage unit, the second storage unit, and the posture changing unit based on the storage state in the first storage unit determined by the storage state determination unit such that first storage processing or second storage processing is alternatively performed, the first storage processing storing the sheet in the first storage unit without passing the sheet through the posture changing unit and the second storage unit, the sheet having been guided from the reception unit to the first transport unit, the second storage processing storing the sheet in the first storage unit by storing the sheet in the second storage unit via the posture changing unit and passing the sheet through the posture changing unit from the second storage unit to thereby rotate the sheet in the first direction, the sheet having been guided from the reception unit to the first transport unit. 40 45

10. The sheet handling apparatus according to claim 9, 50
 wherein:

the storage state determination unit determines whether a difference in thickness between a portion comprising a thick part of the sheet and a portion not comprising the thick part in a storage body formed of a plurality of the sheets within the first storage unit is equal to or less than a 55

threshold value, and

in a case where it has been determined that the difference in thickness is equal to or less than the threshold value, the control unit causes the first storage processing to be performed, and in a case where it has been determined that the difference in thickness exceeds the threshold value, the control unit causes the second storage processing to be performed.

11. The sheet handling apparatus according to claim 10, further comprising an orientation detection unit that detects an orientation of the sheet in the first posture during transport by the first transport unit, wherein: in a case where the second storage processing is performed,

the control unit determines, as a determination criterion orientation, a most detected orientation during the transport with respect to the plurality of sheets stored in the first storage unit, the control unit causes the sheet to be stored in the first storage unit via the posture changing unit, the second storage unit, and the posture changing unit, the sheet being a sheet whose orientation during the transport detected after determining the determination criterion orientation is the determination criterion orientation, and

the control unit causes the sheet to be stored in the first storage unit without passing the sheet through the posture changing unit and the second storage unit, the sheet being a sheet whose orientation during the transport detected after determining the determination criterion orientation is not the determination criterion orientation.

12. The sheet handling apparatus according to claim 11, further comprising a temporary storage unit that temporarily stores the sheet in the first posture, the sheet being transported by the first transport unit, wherein: in a case where the second storage processing is performed,

the control unit causes the sheet in the determination criterion orientation to be temporarily stored in the temporary storage unit, and causes the sheet not in the determination criterion orientation to be stored in the first storage unit without passing the sheet not in the determination criterion orientation through the posture changing unit and the second storage unit, and the control unit causes, after every sheet having been guided from the reception unit to the first transport unit is stored in the temporary storage unit or the first storage unit, the sheet having been stored in the temporary storage unit to be stored in the first storage unit via the posture

changing unit, the second storage unit, and the posture changing unit.

13. A sheet handling apparatus, comprising:

a first transport unit that transports a sheet in a first posture that is one posture of a short edge feed posture and a long edge feed posture;
 a second transport unit that transports a sheet in a second posture that is the other posture of the short edge feed posture and the long edge feed posture;
 a first storage unit that stores the sheet in the first posture transported by the first transport unit;
 a second storage unit that allows the sheet in the second posture to be stored therein and taken out therefrom, the sheet in the second posture being transported by the second transport unit;
 a posture changing unit that rotates a sheet in the second posture in a first direction or a second direction opposite to the first direction between the first transport unit and the second transport unit to change a posture of the sheet to the first posture;
 a storage state determination unit that determines a storage state in the first storage unit; and
 a control unit, wherein the control unit controls the first transport unit, the second transport unit, the first storage unit, the second storage unit, and the posture changing unit based on the storage state in the first storage unit determined by the storage state determination unit such that first storage processing or second storage processing is alternatively performed, the first storage processing rotating the sheet having been stored in the second storage unit in the first direction by the posture changing unit and storing the sheet in the first transport unit, the second storage processing rotating the sheet in the second direction by the posture changing unit and storing the sheet in the first transport unit.

14. The sheet handling apparatus according to claim 13, wherein:

the storage state determination unit determines whether a difference in thickness between a portion comprising a thick part of the sheet and a portion not comprising the thick part in a storage body formed of a plurality of the sheets within the first storage unit is equal to or less than a threshold value, and
 in a case where it has been determined that the difference in thickness is equal to or less than the threshold value, the control unit causes the

first storage processing to be performed, and in a case where it has been determined that the difference in thickness exceeds the threshold value, the control unit causes the second storage processing to be performed.

15. The sheet handling apparatus according to claim 14, further comprising an orientation detection unit that detects an orientation of the sheet in the first posture during transport by the first transport unit, wherein: in a case where the second storage processing is performed,

the control unit determines, as a determination criterion orientation, a most detected orientation during the transport with respect to the plurality of sheets stored in the first storage unit, the control unit causes the sheet to be rotated in the second direction and stored in the first storage unit, the sheet being a sheet whose orientation during the transport detected after determining the determination criterion orientation is the determination criterion orientation, and the control unit causes the sheet to be rotated in the first direction and stored in the first storage unit, the sheet being a sheet whose orientation during the transport detected after determining the determination criterion orientation is not the determination criterion orientation.

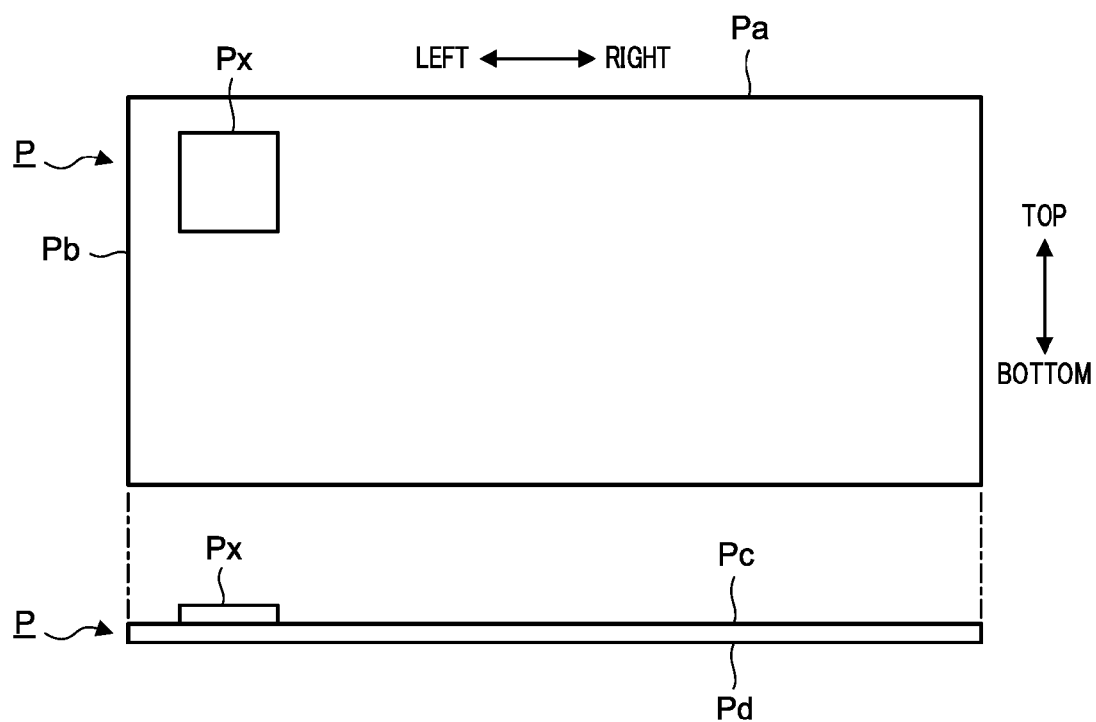


FIG. 1

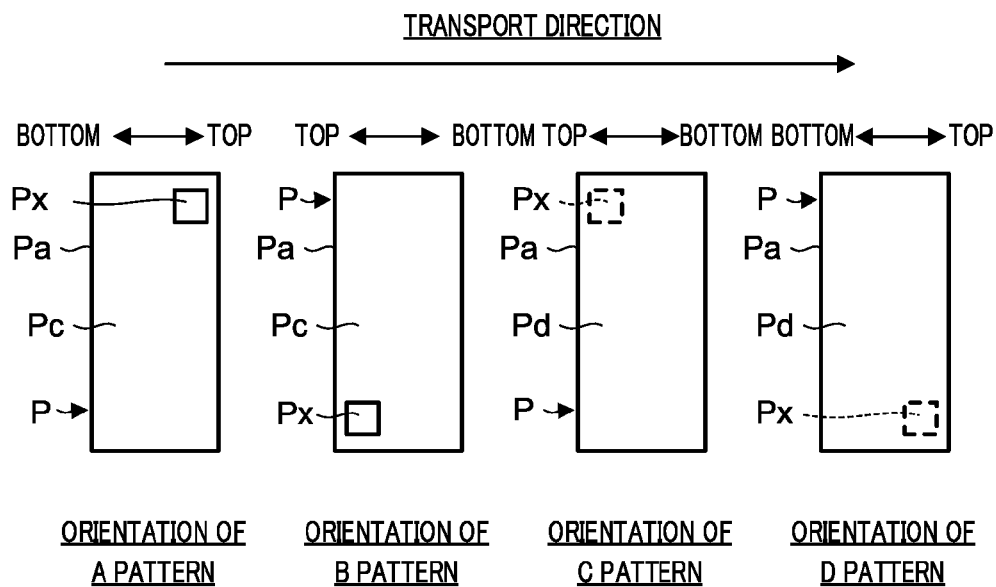


FIG. 2

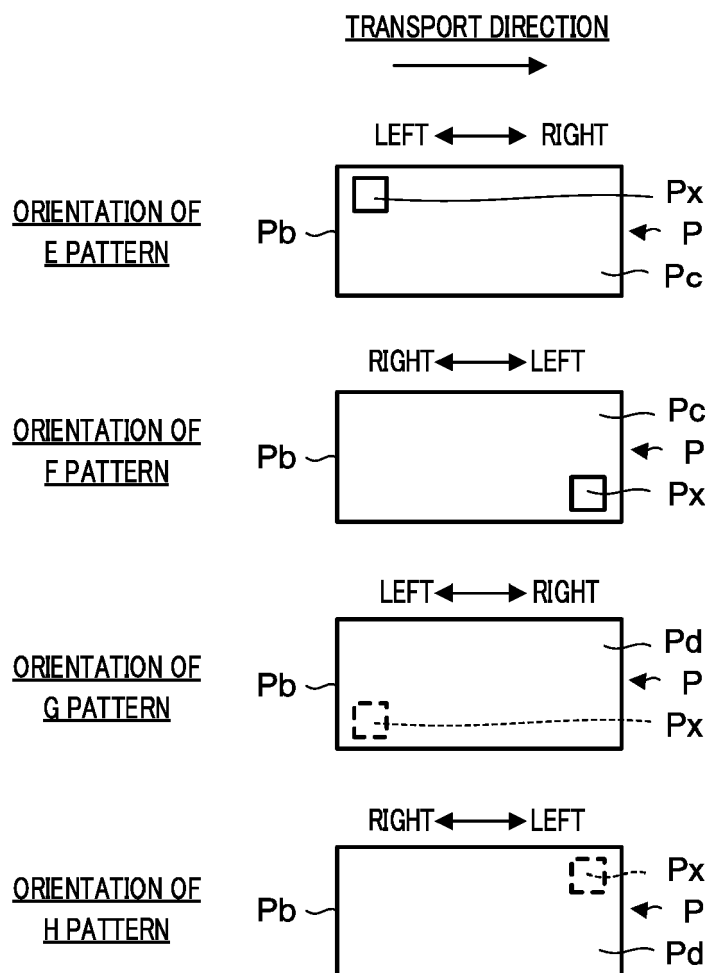


FIG. 3

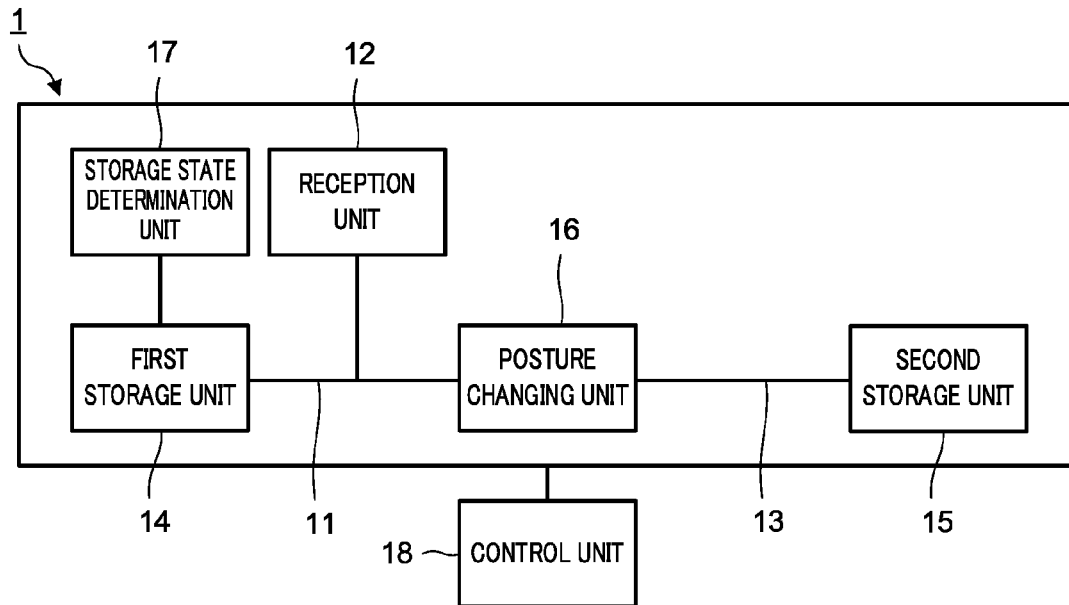


FIG. 4

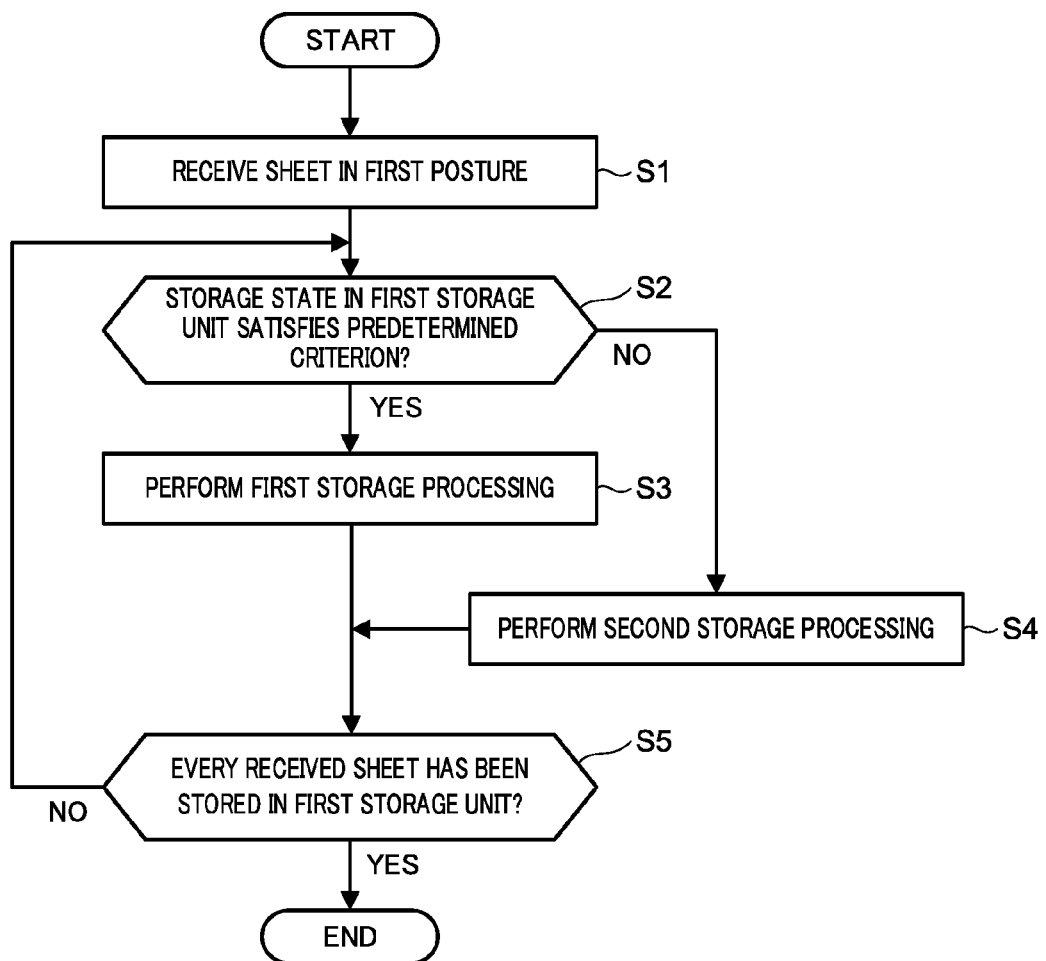


FIG. 5

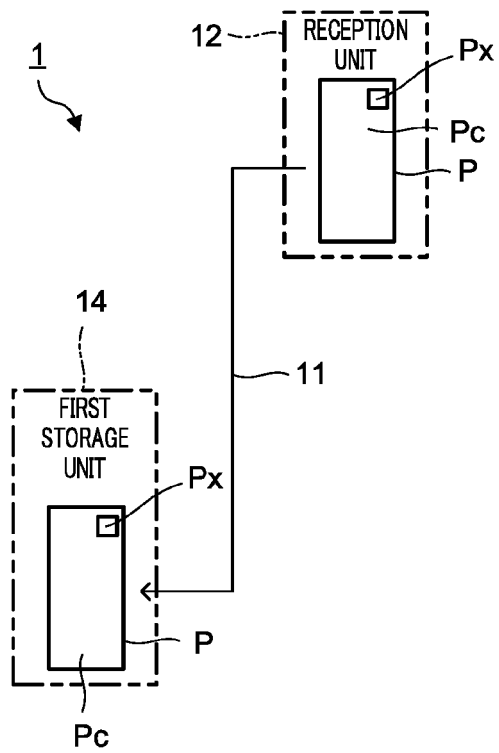


FIG. 6A

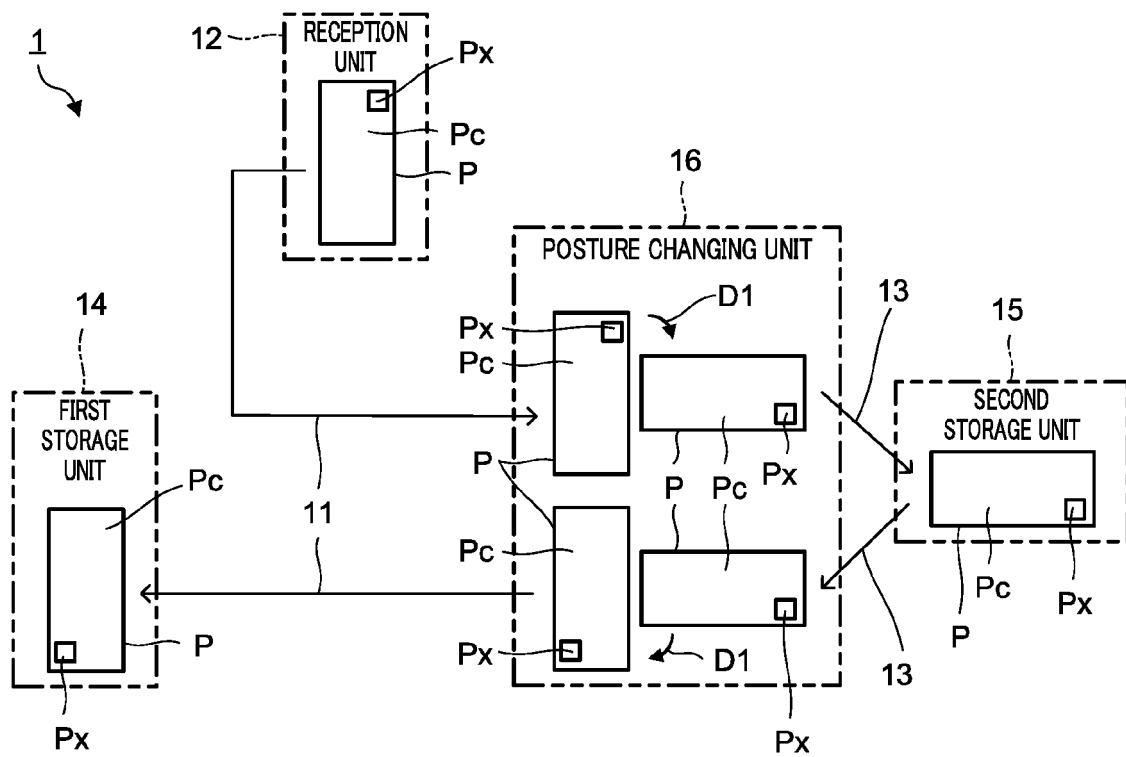


FIG. 6B

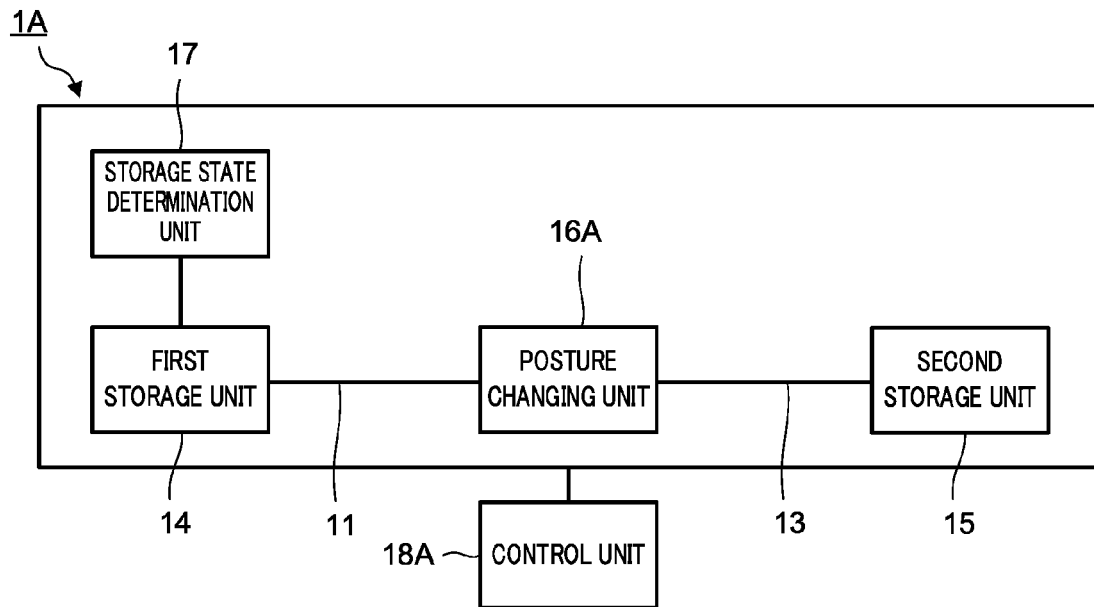


FIG. 7

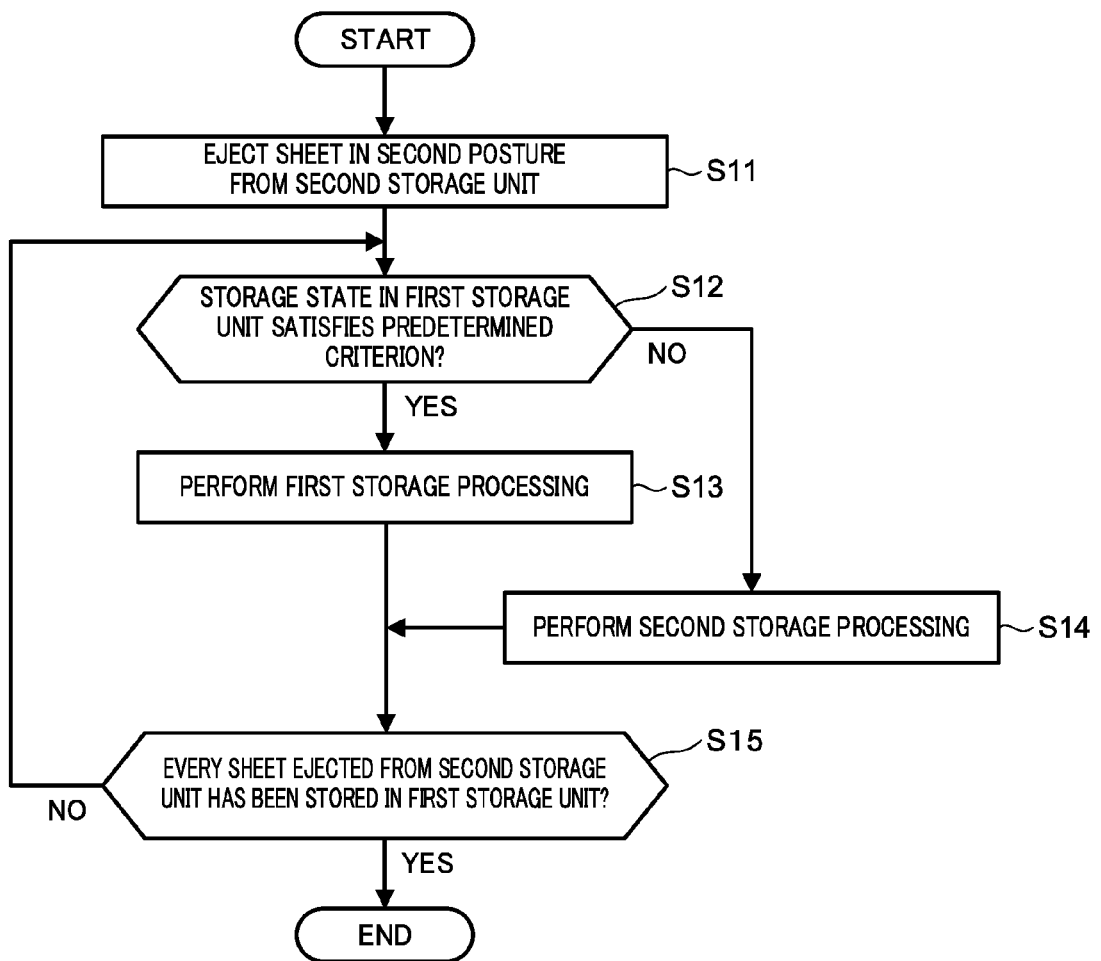


FIG. 8

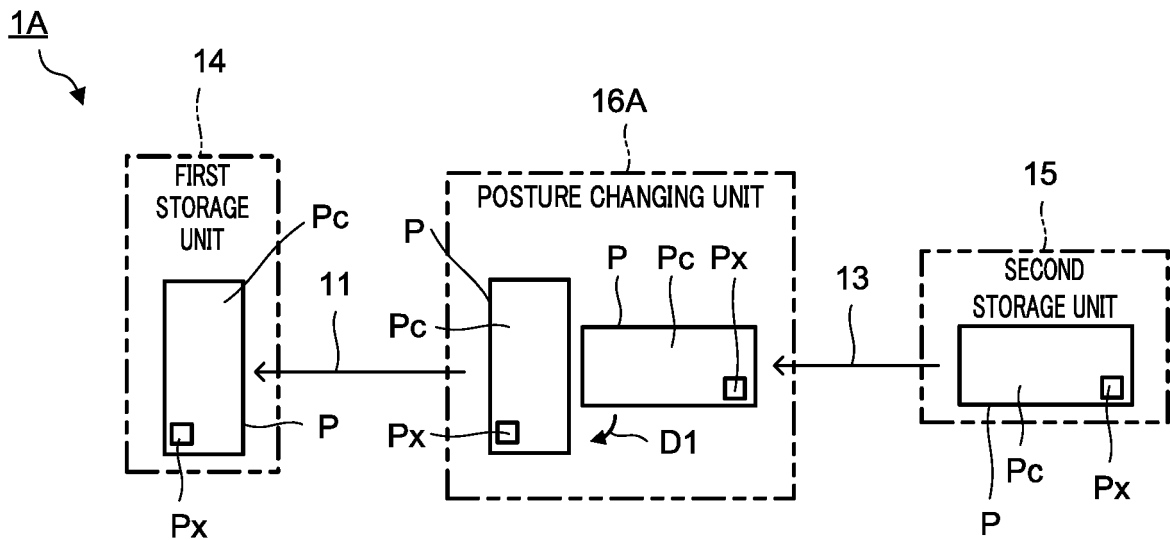


FIG. 9A

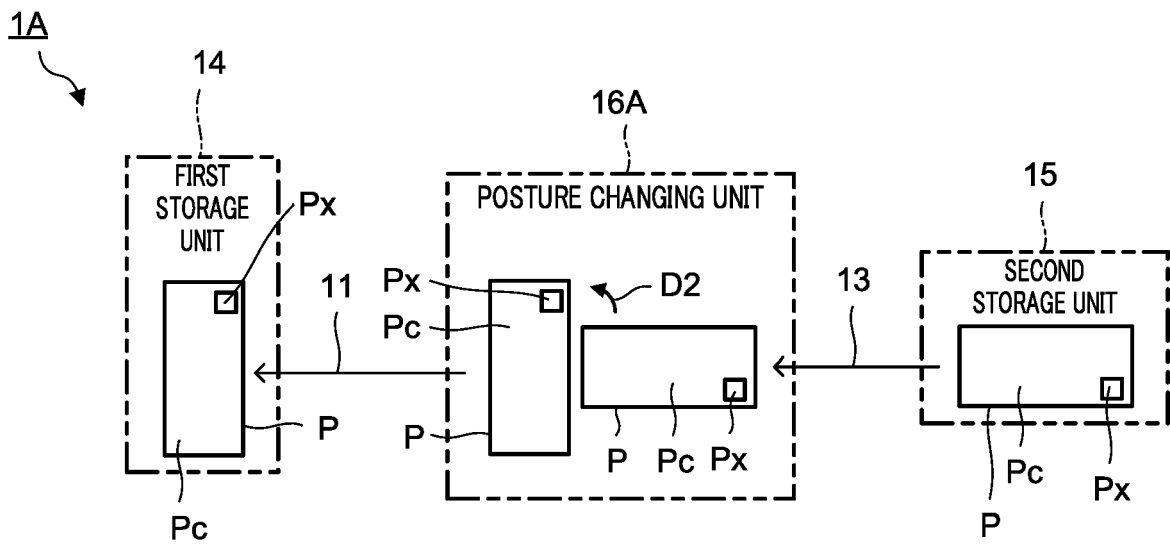


FIG. 9B

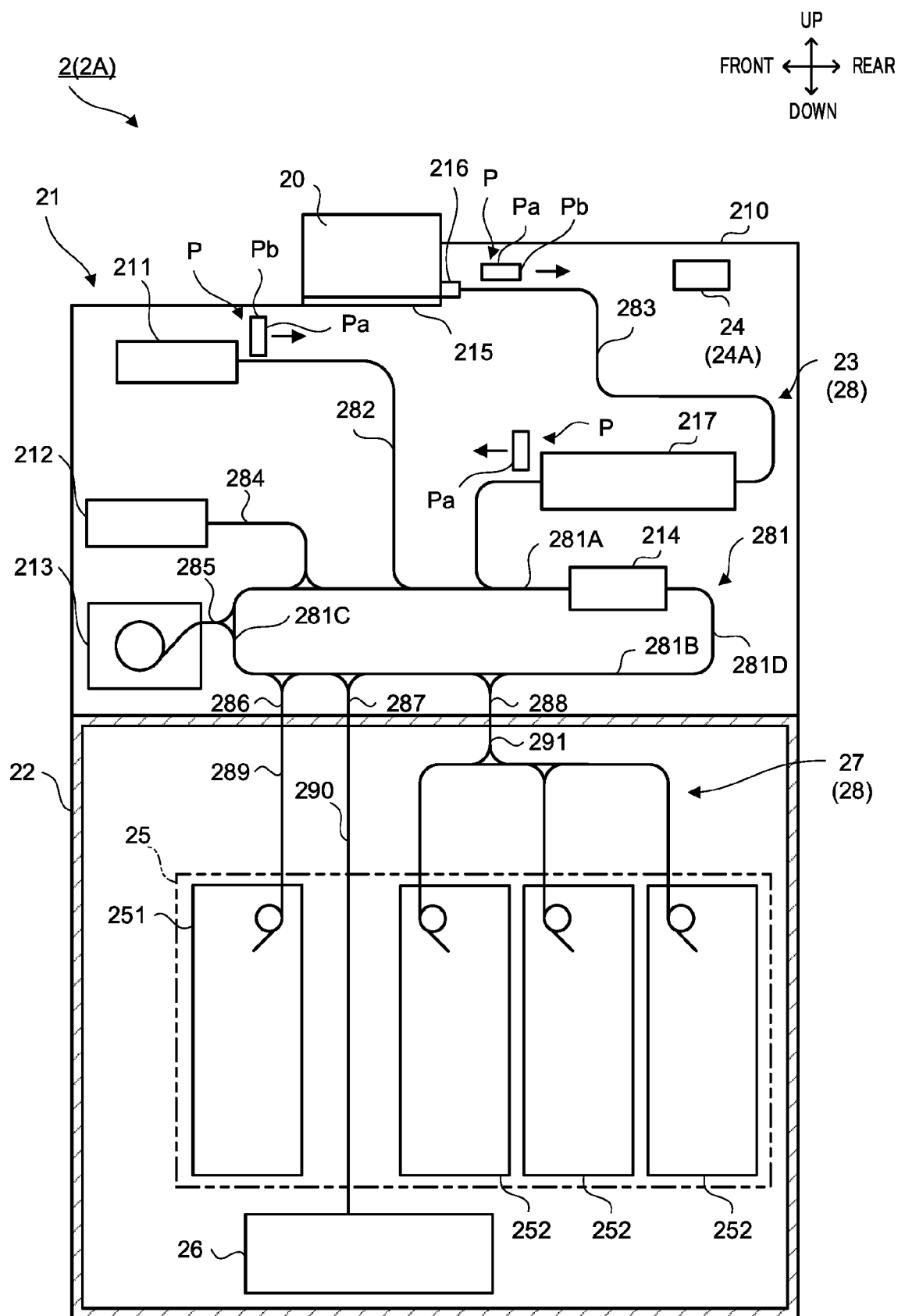


FIG. 10

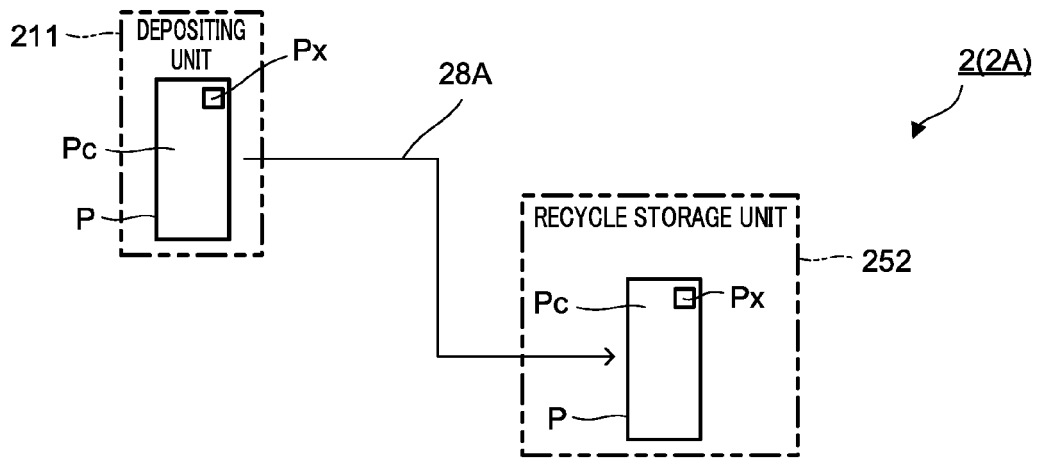


FIG. 11A

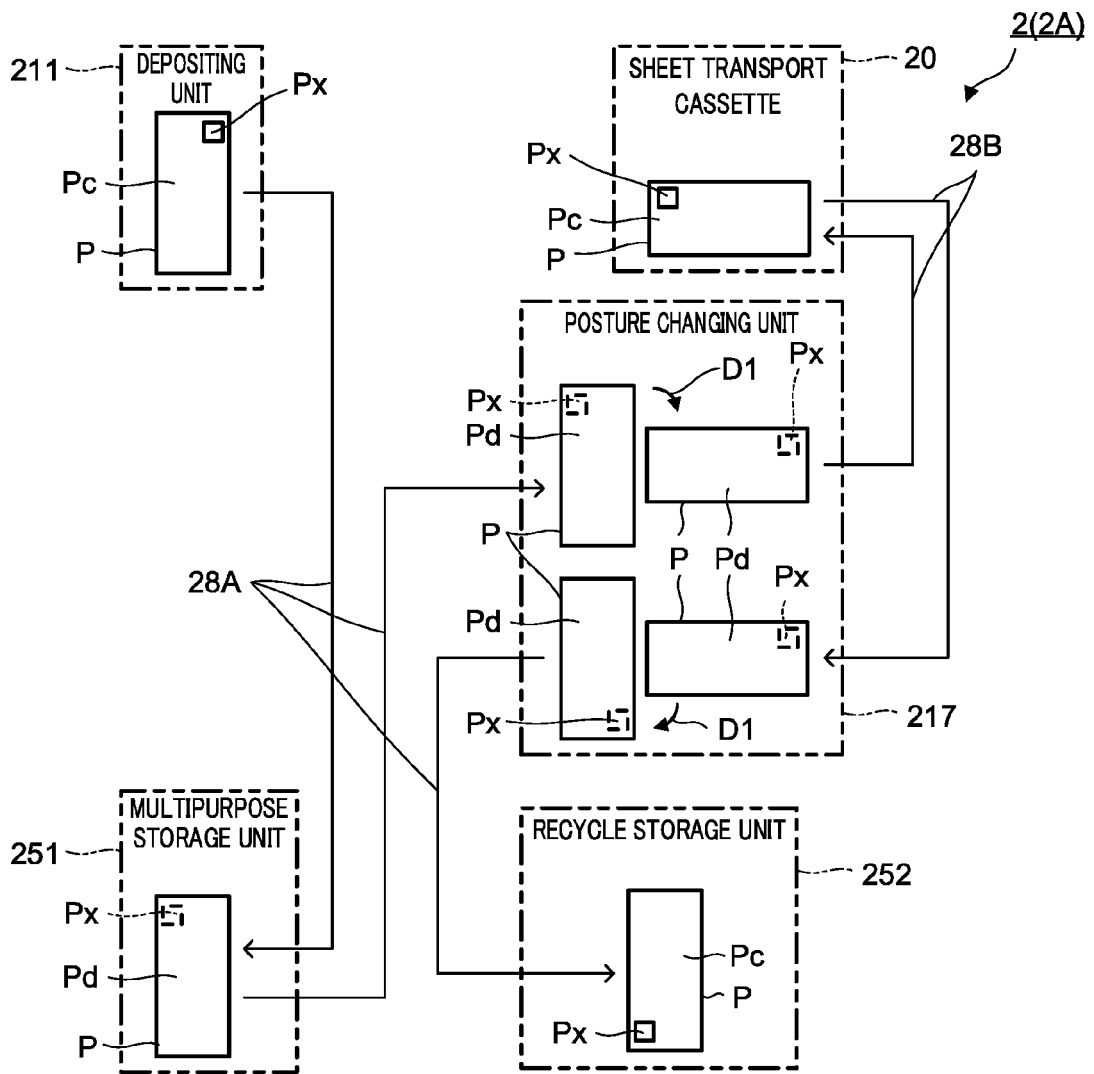


FIG. 11B

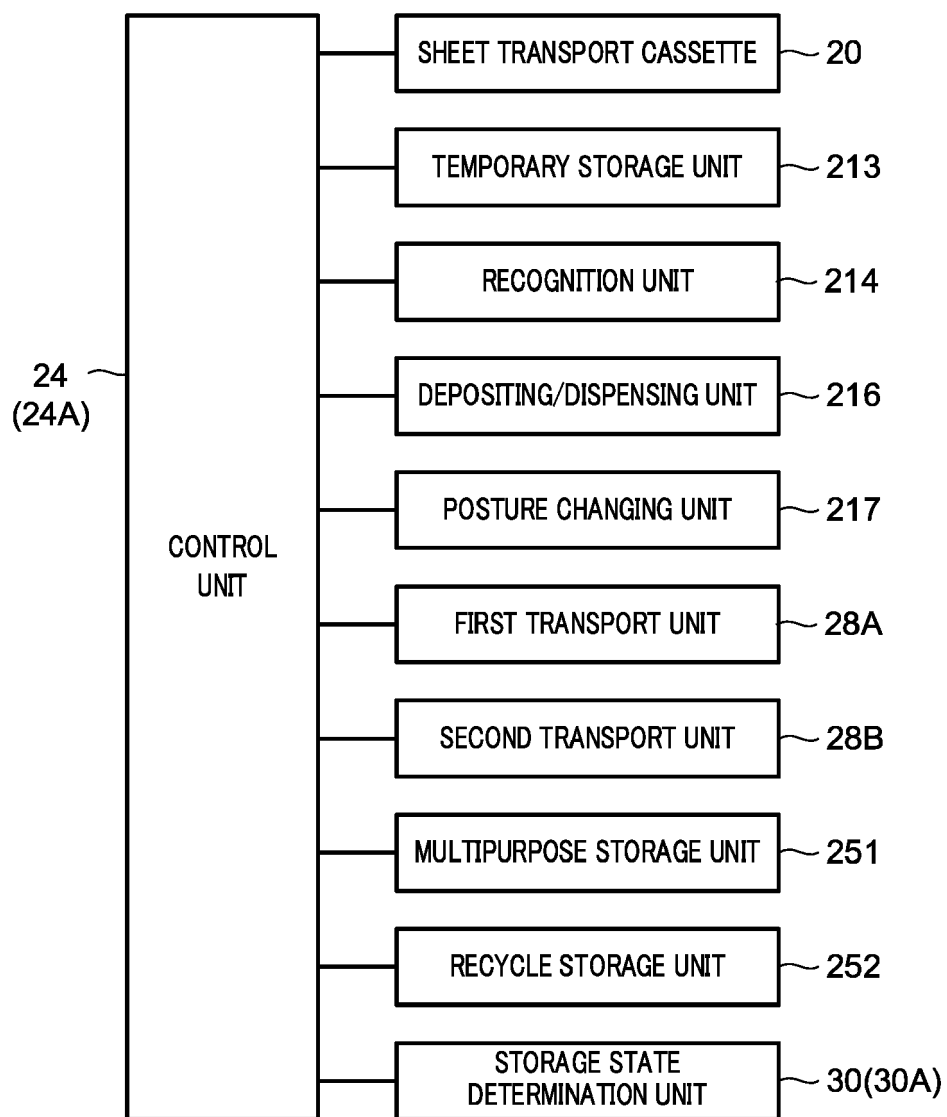


FIG. 12

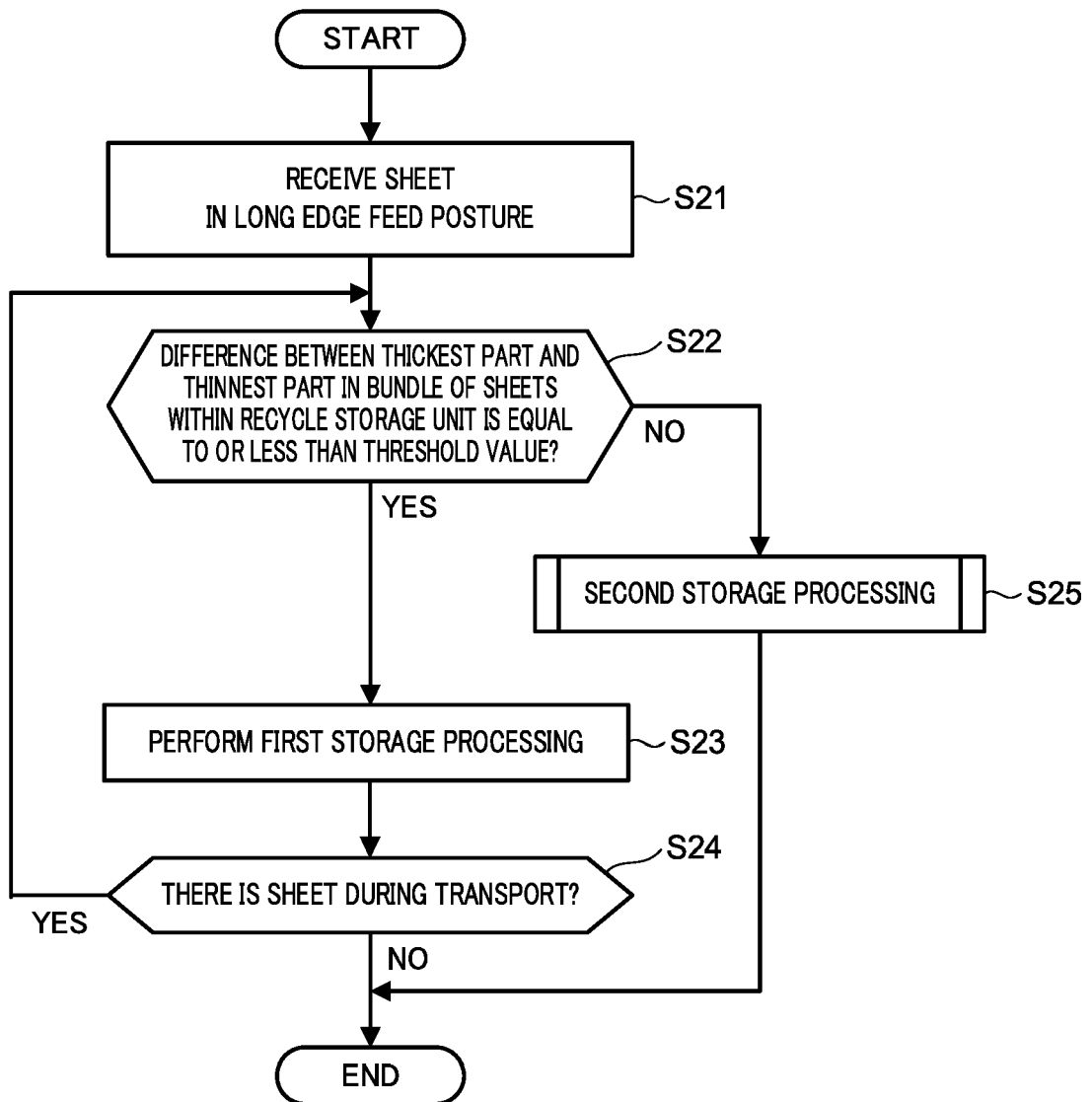


FIG. 13

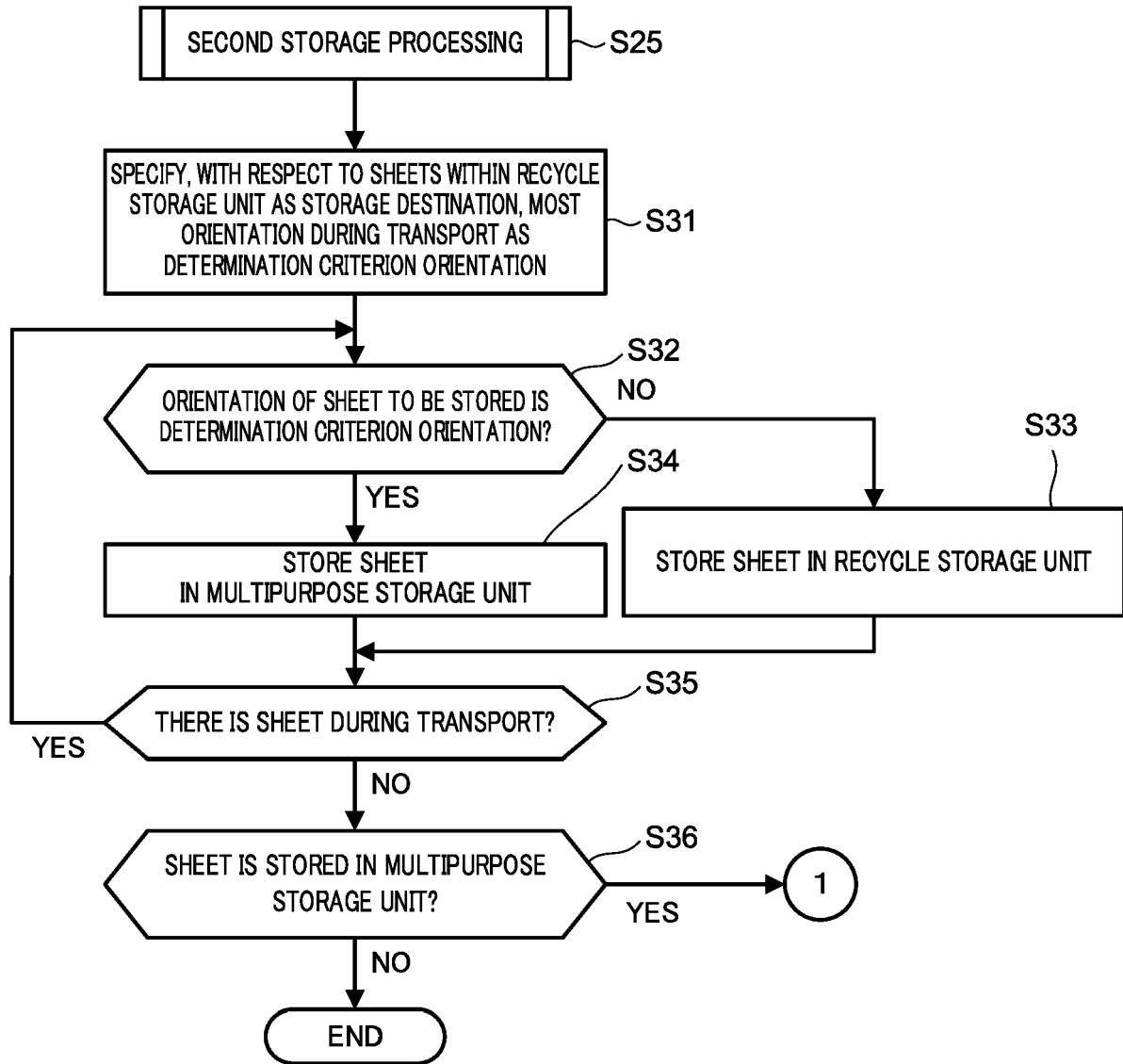


FIG. 14

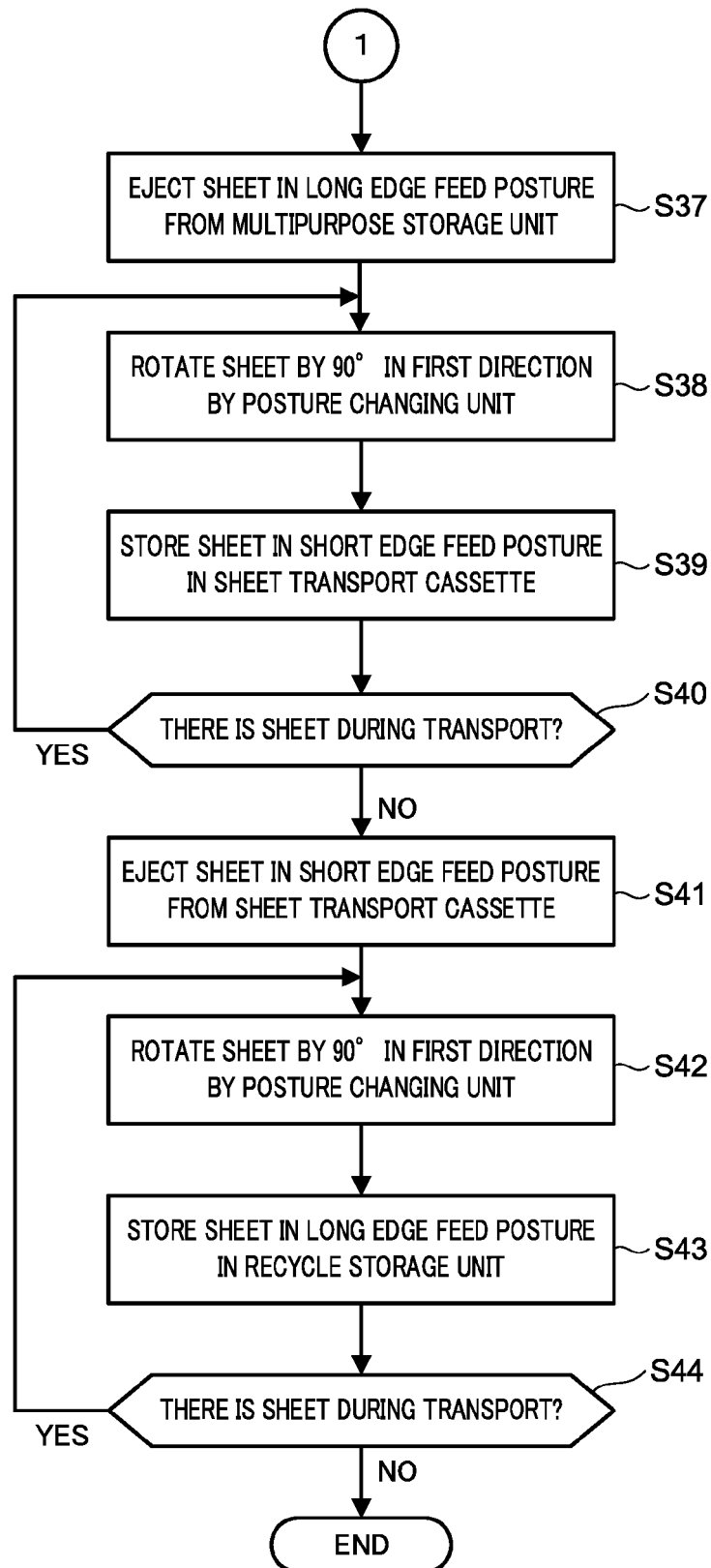


FIG. 15

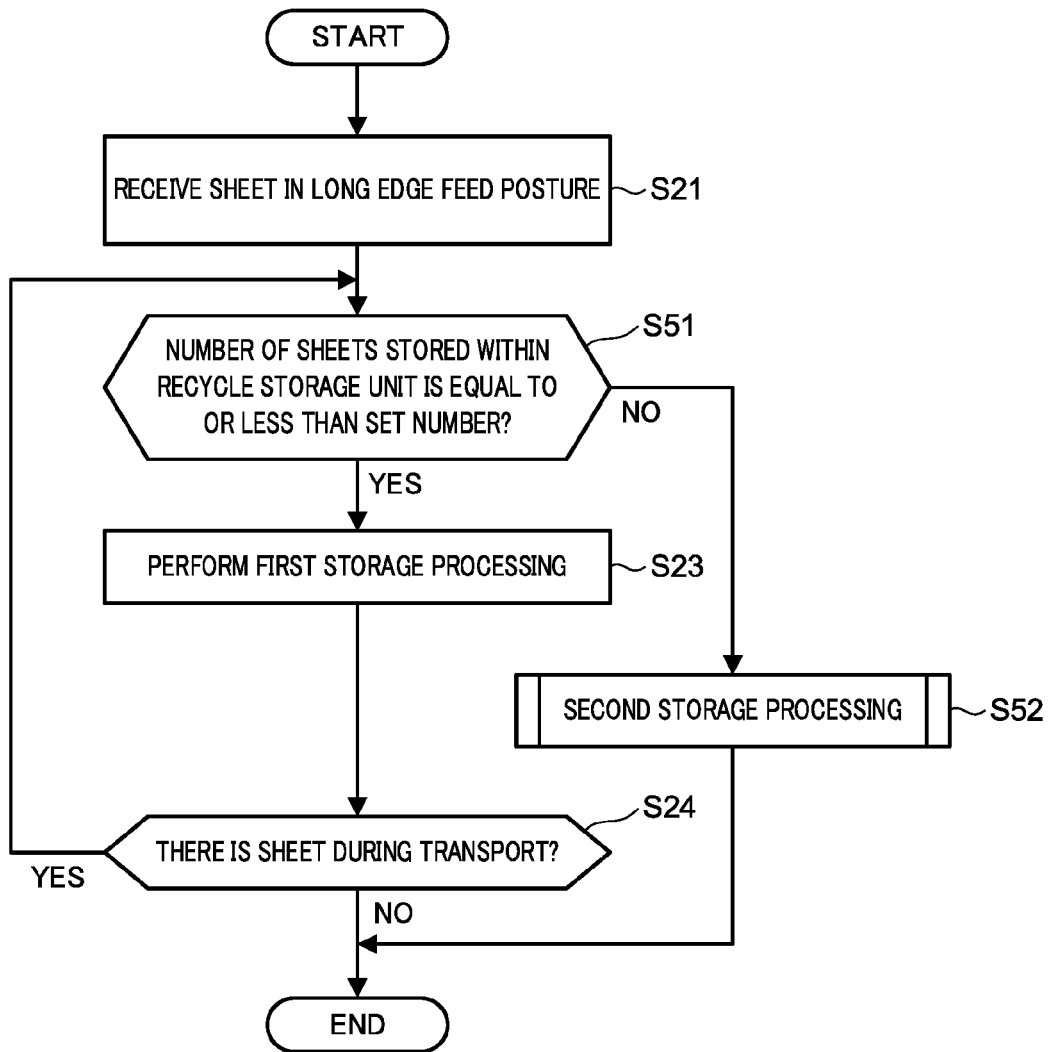


FIG. 16

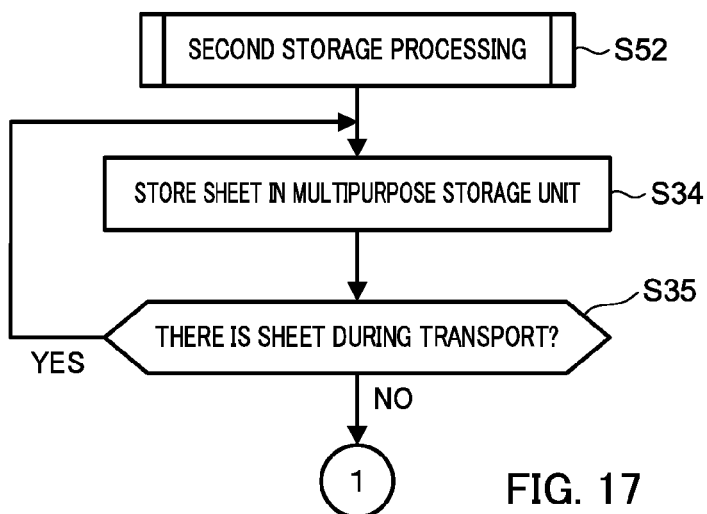


FIG. 17



EUROPEAN SEARCH REPORT

Application Number

EP 23 15 9025

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X	US 2021/383634 A1 (KOBAYASHI SATORU [JP] ET AL) 9 December 2021 (2021-12-09)	1, 2, 5, 6, 8-10, 13, 14	INV. G07D11/16 G07D11/23
A	* paragraphs [0104] - [0148] * * figures 2-5 *	3, 4, 7, 11, 12, 15	G07D11/20 G07D11/25 G07D11/34
A	WO 2010/106647 A1 (GLORY KOGYO KK [JP]; SAKAMOTO MASAO [JP]) 23 September 2010 (2010-09-23) * paragraphs [0019] - [0116] * * figures 1-8 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			G07D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 July 2023	Examiner Bauer, Sebastian
CATEGORY OF CITED DOCUMENTS 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		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	

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ON EUROPEAN PATENT APPLICATION NO.

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5 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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07-07-2023

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		US 2021383634 A1	09-12-2021
WO 2010106647 A1	23-09-2010	NONE	

REFERENCES CITED IN THE DESCRIPTION

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