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(54) **BILL PROCESSING DEVICE AND MONEY DISPENSING METHOD**

(57) The money processing apparatus has: a dispensing unit; an escape unit; a storage unit for storing banknotes of different denominations; and a control unit that, when dispensing banknotes stored in the storage unit, performs a control for conveying the banknotes delivered from the storage unit to the escape unit in accordance with the denomination so that the banknotes are grouped by denomination and dispensed to the money dispensing unit.

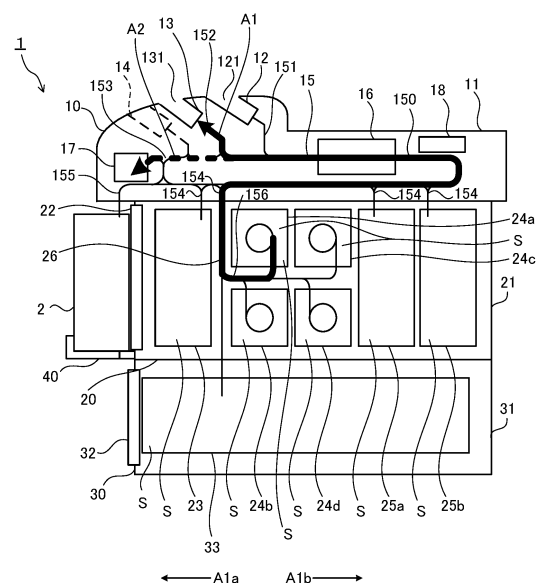


FIG. 3

Description

Technical Field

[0001] The present invention relates to a money processing apparatus and a dispensing method.

Background Art

[0002] Patent Literature (hereinafter, referred to as "PTL") 1 discloses, in paragraphs [0088] to [0102] and FIGS. 8 and 9, dispensing processing from a storage and ejection unit 53 which stores banknotes of a plurality of denominations in a mixed state. In PTL 1, among banknotes ejected from the storage and ejection unit 53, banknotes of denominations to be dispensed are transported to an outlet 16 until reaching a number of banknotes to be dispensed, and other banknotes are transported to a temporary storage unit 28 or a reject box 52.

Citation List

Patent Literature

[0003] PTL 1
WO 2009/069200

Summary of Invention

Technical Problem

[0004] In PTL 1, the order in which banknotes are transported to the outlet 16 depends on the storage order of banknotes stored in the storage and ejection unit 53. Accordingly, the banknotes dispensed to the outlet 16 are not necessarily grouped for each denomination.

[0005] For example, it is assumed that the denomination of the banknote most recently stored in the storage and ejection unit 53 is a denomination A, the denomination of the banknote stored prior thereto is the denomination A, the denomination of the banknote stored prior thereto is a denomination B, the denomination of the banknote stored prior thereto is a denomination C, the denomination of the banknote stored prior thereto is the denomination A, and so on, and that three banknotes of the denomination A and one banknote of the denomination B are dispensed from the storage and ejection unit 53. In this case, the banknote of the denomination A, the banknote of the denomination A, the banknote of the denomination B, and the banknote of the denomination A are dispensed in this order to the outlet 16, and the banknote of the denomination B is mixed in among the banknotes of the denomination A. Note that, the banknote of the denomination C stored among the banknotes of the denomination A and the banknote of the denomination B in the storage and ejection unit 53 is transported to the temporary storage unit 28.

[0006] An object of the present invention is therefore

to provide a technique capable of grouping banknotes to be dispensed for each denomination and dispensing the banknotes to a dispensing unit.

Solution to Problem

[0007] A money processing apparatus of the present invention comprises: a dispensing unit; an escape unit, a storage unit that stores banknotes of different kinds of denominations; and a control unit that performs control to cause the banknotes fed out from the storage unit to be transported to the escape unit in accordance with the denominations such that the banknotes are grouped for each of the denominations and dispensed to the dispensing unit, when the banknotes stored in the storage unit are dispensed,.

[0008] A dispensing method of the present invention comprises: feeding out banknotes from a storage unit that stores banknotes of different denominations in dispensing processing; and performing control to cause the banknotes fed out from the storage unit to be transported to an escape unit in accordance with the denominations such that the banknotes fed out from the storage unit are grouped for each of the denominations and dispensed to a dispensing unit in the dispensing processing.

Advantageous Effects of Invention

[0009] According to the present invention, it is possible to group banknotes to be dispensed for each denomination and dispense the banknotes to a dispensing unit.

Brief Description of Drawings

[0010]

FIG. 1 illustrates a money processing apparatus according to an embodiment;

FIG. 2 illustrates the money processing apparatus when an attachable/detachable storage unit is detached;

FIG. 3 illustrates an example of a banknote transport route in dispensing processing of the money processing apparatus;

FIG. 4 is a diagram describing an operation example of the money processing apparatus;

FIG. 5 illustrates a flowchart for an operation example of the money processing apparatus;

FIG. 6 illustrates an example of a banknote transport route in dispensing processing of the money processing apparatus according to Embodiment 2;

FIG. 7 is a diagram describing an operation example of the money processing apparatus;

FIG. 8 is a diagram describing an operation example of the money processing apparatus according to Embodiment 3; and

FIG. 9 illustrates an example of a banknote transport route in dispensing processing of the money

processing apparatus according to Embodiment 4.

Description of Embodiments

[0011] Hereinafter, embodiments of the present invention will be described with reference to the accompanying drawings.

[0012] Hereinafter, the present invention will be described in detail with reference to the accompanying drawings. Note that, in the following description, the "front" of a money processing apparatus means a side on which an opening for performing at least one operation of money input operation and money discharge operation is provided. Further, the "left" of the money processing apparatus means the left side of a person facing the side on which the opening is provided, and the "right" of the money processing apparatus means the right side of a person facing the side on which the opening is provided.

[0013] Hereinafter, the "reject banknote" refers to a banknote that cannot be a processing target for predetermined processing. Examples of the "reject banknote" include a sheet that is not a banknote, and a banknote that passes through a recognition unit to be described later in a skew state or in a multi-feed state and therefore cannot be correctly recognized by the recognition unit. The "fit note" refers to a banknote with relatively little stain, tear, and/or the like, and the "unfit note" refers to a banknote with a relatively large amount of stain, tear, and/or the like.

(Embodiment 1)

(1) Configuration of Money Processing Apparatus

[0014] FIG. 1 illustrates a money processing apparatus 1 according to the embodiment. In FIG. 1, the direction indicated by an arrow A1a represents a front direction of the money processing apparatus 1, and the direction indicated by an arrow A1b represents a rear direction of the money processing apparatus 1. Further, FIG. 1 also illustrates an attachable/detachable storage unit 2. The money processing apparatus 1 is, for example, installed at a teller counter of a bank and is used by a teller. Hereinafter, the teller may be referred to as "user".

[0015] The money processing apparatus 1 is a money depositing and dispensing machine to/from which money is deposited/dispensed. The money processing apparatus 1 comprises a processing unit 10, a storage box 20 provided below the processing unit 10, and a second storage box 30 provided under the storage box 20. The processing unit 10 can be drawn forward with respect to the storage box 20 and the second storage box 30.

[0016] The processing unit 10 is surrounded by an upper housing 11. An inlet (opening) 121 and an outlet (opening) 131 are provided in the upper housing 11. A transport unit 15, a recognition unit 16, a temporary storage unit 17, and a control unit 18 are disposed within the upper housing 11, that is, within the processing unit 10.

The control unit 18 may be disposed within the storage box 20 or the second storage box 30.

[0017] A banknote feeding mechanism (not illustrated) that feeds out banknotes one by one to the transport unit 15 in a predetermined cycle is disposed near the inlet 121. The inlet 121 and the banknote feeding mechanism form a depositing unit 12.

[0018] A stacking mechanism (not illustrated) that piles up banknotes is disposed near the outlet 131. The outlet 131 and the stacking mechanism form a dispensing unit 13. A second dispensing unit 14 having the same configuration as that of the dispensing unit 13 may be provided next to the dispensing unit 13 as needed.

[0019] Banknotes dispensed to the outlet 131 are stacked such that surfaces thereof overlap. For example, banknotes dispensed to the outlet 131 may be stacked so as to be piled up vertically or may be stacked so as to be piled up horizontally.

[0020] Banknotes dispensed to the outlet 131 are stacked so as to be aligned in the order in which the banknotes are transported from the transport unit 15 to the outlet 131. For example, in a case where banknotes dispensed to the outlet 131 are piled up vertically at the outlet 131, the banknote at the bottom is the banknote most previously transported to the outlet 131, and the banknote at the top is the banknote most recently transported to the outlet 131.

[0021] The stacking mechanism may be provided in the transport unit 15. Banknotes that are stacked so as to be aligned in the order in which the banknotes are transported by the stacking mechanism may be transported in a bound state to the outlet 131.

[0022] Further, a banknote feeding mechanism that feeds out banknotes left behind at the dispensing unit 13 one by one to the transport unit 15 may be provided. The banknote left behind refers to a banknote that is once dispensed to the dispensing unit 13, but then has not been taken out from the dispensing unit 13 for a predetermined time.

[0023] Note that, the processing unit 10 may be provided with a depositing and dispensing unit. For example, the upper housing 11 of the processing unit 10 may be provided with one opening through which both depositing and dispensing of banknotes are performed, and a banknote feeding mechanism and a stacking mechanism may be disposed around the opening.

[0024] The transport unit 15 transports banknotes at a predetermined transport speed. The transport unit 15 is formed of a belt mechanism or a roller mechanism that transports banknotes. The transport unit 15 comprises a loop-shaped transport path 150 that enables banknotes to be transported bi-directionally, and a first diversion path 151, a second diversion path 152, a third diversion path 153, a fourth diversion path 154, and a fifth diversion path 155 that are diverged from the loop-shaped transport path 150. The diversion path may be referred to as "transport path".

[0025] The first diversion path 151 connects the loop-

shaped transport path 150 and the depositing unit 12. The second diversion path 152 connects the loop-shaped transport path 150 and the dispensing unit 13. The third diversion path 153 connects the loop-shaped transport path 150 and the temporary storage unit 17. The fourth diversion path 154 connects the loop-shaped transport path 150 and the storage box 20, and also connects the loop-shaped transport path 150 and the second storage box 30. The fifth diversion path 155 connects the loop-shaped transport path 150 and the attachable/detachable storage unit 2 to be described later.

[0026] The recognition unit 16 comprises a sensor such as an image sensor, an optical sensor, and a magnetic sensor, and recognizes the authenticity, denominations, fitness, and the like of banknotes transported by the transport unit 15.

[0027] The temporary storage unit 17 temporarily stores banknotes. The temporary storage unit 17 takes in and stores banknotes one by one, and feeds out the stored banknotes one by one. The temporary storage unit 17 is formed of, for example, a winding-type storage unit in which a plurality of banknotes is stored in a state of being wound around a rotating body. The temporary storage unit 17 may also be formed of a stacking-type storage unit in which a plurality of banknotes is stored in a state of being stacked.

[0028] The control unit 18 comprises at least a central processing unit (CPU) and a memory (hereinafter, which may also be referred to as "memory unit"). The control unit 18 controls each unit forming the money processing apparatus 1 such that banknotes are transported among the depositing unit 12, the dispensing unit 13, the temporary storage unit 17, the storage box 20, the second storage box 30, and the attachable/detachable storage unit 2 to be described later via the transport unit 15.

[0029] The control unit 18 may be connected to a terminal apparatus such as a personal computer, for example. The control unit 18 receives, for example, an instruction of depositing processing or dispensing processing from the terminal apparatus. Further, the control unit 18 transmits, for example, a result of depositing processing or a result of dispensing processing to the terminal apparatus.

[0030] Further, the control unit 18 may be connected to an external computer via a communication line. The external computer may be, for example, a computer that manages financial accounts or a computer that manages financial transactions. The control unit 18 receives, for example, an instruction of depositing processing or dispensing processing from the external computer. Further, the control unit 18 transmits, for example, a result of depositing processing or a result of dispensing processing to the external computer.

[0031] The storage box 20 can be formed of, for example, a safe, forms a lower housing 21, and comprises, in a front portion thereof, a storage box door 22 that is lockable. Note that, the "storage box door" herein collectively refers to members capable of closing an opening

unit comprised by the lower housing 21. Accordingly, examples of the "storage box door" include a door attached to the lower housing 21 via a hinge, a sliding door slidable along the lower housing 21, a plate member capable of coming into contact with or being separated from the lower housing 21, and the like.

[0032] The storage box door 22 can be opened from a front portion of the storage box 20 when the attachable/detachable storage unit 2 is detached from an attachment unit 40 (for example, see FIG. 2). Provision of the storage box door 22 in the front portion of the storage box 20 makes it easy for a person who operates the money processing apparatus 1 from the front to access the interior of the storage box 20.

[0033] The storage box 20 comprises, in order from the front portion, one multipurpose storage unit 23, four first storage units 24a to 24d, and two second storage units 25a and 25b disposed therein. Further, a vertical transport path 26 is disposed between the multipurpose storage unit 23 and the first storage units 24a and 24b.

[0034] Hereinafter, the first storage units 24a to 24d may be referred to as "first storage unit 24" in a case where they are not distinguished. Further, hereinafter, the second storage units 25a and 25b may be referred to as "second storage unit 25" in a case where they are not distinguished.

[0035] The multipurpose storage unit 23 comprises a storage area S of stacking-type in which a plurality of banknotes is stored in a state of being stacked. The multipurpose storage unit 23 is a banknote storage unit used for various purposes, and is used, for example, for storing overflow banknotes, dispensing reject banknotes, banknotes left behind, counterfeit notes, and suspect notes. Further, the multipurpose storage unit 23 may also be used for the same purpose as that of the second storage unit 25.

[0036] The overflow banknote refers to a banknote that cannot be stored in a storage unit (the first storage unit 24 or the second storage unit 25) that is to store the banknote because the storage unit becomes full. Further, the dispensing reject banknote refers to, among banknotes fed out from the first storage unit 24 or the second storage unit 25 when banknote dispensing processing is performed, a banknote that cannot be recognized as normal by the recognition unit 16 due to transport abnormality such as skewing and therefore cannot be dispensed.

[0037] The first storage unit 24 is, for example, a winding-type storage unit in which a plurality of banknotes is stored in a state of being wound around a rotating body. A storage area S of the first storage unit 24, in which banknotes are stored, is connected to a sixth diversion path 156 horizontally diverged from the vertical transport path 26.

[0038] The second storage unit 25 comprises one storage area S connected to the fourth diversion path 154. The storage area S is a stacking-type storage area in which a plurality of banknotes is stored in a state of being stacked. In the storage area S, specific kinds of bank-

knotes among banknotes sorted by authenticity, fitness, denominations, and the like are stored.

[0039] The vertical transport path 26 connects the fourth diversion path 154 and a collection unit 33 disposed within the second storage box 30.

[0040] The second storage box 30 can be formed of, for example, a safe, forms a bottom housing 31, and comprises, in a front portion thereof, a storage box door 32 that is lockable. Further, the second storage box 30 comprises the collection unit 33 therein. The collection unit 33 comprises a storage area S in which, among banknotes deposited from the depositing unit 12 and banknotes stored in the storage box 20, banknotes to be collected are stored. After banknotes to be collected are stored therein, the banknotes are collected from the inside of the collection unit 33 by a collection worker. Alternatively, after banknotes to be collected are stored therein, the collection unit 33 is detached from the money processing apparatus 1 by a collection worker and is collected together with the banknotes. Then, a collection unit 33 that is empty is attached instead.

[0041] An outside of the storage box 20 is provided with the attachment unit 40 for attaching the attachable/detachable storage unit 2 to the money processing apparatus 1. The outside of the storage box 20 is, for example, an outer surface of the storage box 20. The outer surface of the storage box 20 is an outer surface of the storage box 20, which is accessible without unlocking the storage box door 22 that is locked, and specifically is an outer surface of the lower housing 21 or an outer surface of the storage box door 22. More specifically, the attachment unit 40 is provided on a front surface of the storage box 20 as illustrated in FIGS. 1 and 2. The attachment unit 40 may detachably attach the attachable/detachable storage unit 2 to the outside of the storage box 20, and may also be provided on a rear surface of the storage box 20. Further, the attachment unit 40 may also be provided on a front surface, a rear surface or an upper surface of the processing unit 10. Further, the attachment unit 40 may also be provided on a front surface or a rear surface of the second storage box 30.

[0042] The attachment unit 40 comprises a terminal (not illustrated) for supplying at least one of electric power and a control signal from the control unit 18 to the attachable/detachable storage unit 2, and a terminal cover (not illustrated) covering the terminal. The terminal of the attachment unit 40 is outside the storage box 20 and is therefore easily soiled. However, it is possible to prevent the terminal from being soiled by providing the terminal cover. Further, the attachable/detachable storage unit 2 comprises a terminal (not illustrated) that is connected to the terminal comprised by the attachment unit 40.

[0043] The shape and structure of the attachment unit 40 are not limited as long as the attachment unit 40 is capable of connecting a storage area S within the attachable/detachable storage unit 2 and the fifth diversion path 155 and is capable of supplying at least one of electric power and a control signal to the attachable/detachable

storage unit 2 via the terminal. For example, the attachment unit 40 may have a structure of supporting the attachable/detachable storage unit 2 from below, or may have a structure of holding the attachable/detachable storage unit 2 from above and below or from left and right. For example, the attachment unit 40 may be provided on a lower surface of the front portion of the processing unit 10 and may have a structure of suspending the attachable/detachable storage unit 2 to the front surface of the storage box 20.

[0044] Note that, the terminal cover preferably comprises a mechanism of automatically opening and closing in cooperation with a part of the attachable/detachable storage unit 2 in accordance with attachment of the attachable/detachable storage unit 2 to the attachment unit 40 or detachment of the attachable/detachable storage unit 2 from the attachment unit 40. Since there are a variety of publicly known opening and closing mechanisms as such, any opening and closing mechanism can be employed therefrom.

[0045] The attachable/detachable storage unit 2 has, for example, a cuboid outer shape, and comprises the storage area S therein. The storage area S is a stacking-type storage area in which a plurality of banknotes is stored in a state of being stacked or a winding-type storage area in which a plurality of banknotes is stored in a state of being wound around a rotating body. The attachable/detachable storage unit 2 comprises a driving mechanism (not illustrated) made of a motor or the like for storing banknotes within the storage area S and discharging banknotes outside the storage area S. Further, the attachable/detachable storage unit 2 may not comprise the driving mechanism. In such a case, the money processing apparatus 1 may be configured to comprise a driving mechanism to transmit driving to the attachable/detachable storage unit 2 attached to the money processing apparatus 1.

[0046] The attachable/detachable storage unit 2 stores banknotes in a state of being isolated from an outside of the attachable/detachable storage unit 2. For example, the attachable/detachable storage unit 2 comprises an opening only in a portion which is connected to the fifth diversion path 155, in which banknotes are stored, and from which banknotes are fed out, and prevents banknotes within the storage area S from being touched by an operator or the like. The attachable/detachable storage unit 2 comprises a door with a lock, and an operator or the like can take out banknotes within the storage area S or store banknotes within the storage area S by opening the door.

[0047] The order in which banknotes are fed out from the multipurpose storage unit 23, the first storage unit 24, the second storage unit 25, and the attachable/detachable storage unit 2 depends on the order in which banknotes are stored therein. For example, these storage units take in and out banknotes in a last-in first-out manner. Further, the multipurpose storage unit 23, the second storage unit 25, and the attachable/detachable

storage unit 2 that are stacking-type storage units may also take in and out banknotes in a first-in first-out manner.

[0048] FIG. 2 illustrates the money processing apparatus 1 when the attachable/detachable storage unit 2 is detached. FIG. 2 illustrates the money processing apparatus 1 depicted in FIG. 1. As illustrated in FIG. 2, the attachable/detachable storage unit 2 can be detached from the attachment unit 40. That is, banknotes stored in the attachable/detachable storage unit 2 are managed within the attachable/detachable storage unit 2 and are managed in a state of being isolated from the outside of the attachable/detachable storage unit 2.

(2) Operation of Money Processing Apparatus 1

[0049] The dispensing processing refers to, for example, processing which dispenses, based on an instruction of dispensing, banknotes of required denominations with each required number thereof outside the money processing apparatus 1 from the storage units within the money processing apparatus 1 comprising the attachable/detachable storage unit 2. Banknotes fed out from the storage units may be recognized by the recognition unit 16 and only banknotes recognized as normal may be dispensed.

[0050] The depositing processing refers to, for example, processing which feeds out banknotes placed into the depositing unit 12 from the depositing unit 12 to the transport unit 15, which causes the banknotes transported by the transport unit 15 to be recognized by the recognition unit 16, and which calculates the amount of money of banknotes recognized as normal. Further, the depositing processing refers to processing which accepts the calculated amount of money as a deposited amount of money, and which stores the banknotes within the money processing apparatus 1 (within the storage box 20 or the second storage box 30) comprising the attachable/detachable storage unit 2.

[0051] The kinds of denominations of banknotes may be more than the number of the storage units of the money processing apparatus 1. In this case, at least one storage unit stores banknotes of different kinds of denominations. For example, at least one storage unit stores banknotes of a first denomination and banknotes of a second denomination. For example, the banknotes of the first denomination are banknotes of a denomination A, and the banknotes of the second denomination are banknotes of a denomination B. Further, this storage unit may store banknotes of a third denomination. For example, the banknotes of the third denomination are banknotes of a denomination C.

[0052] In a case where banknotes are dispensed from a storage unit, which stores banknotes of different kinds of denominations, to the dispensing unit 13, the control unit 18 controls each unit such that the banknotes are grouped for each denomination and dispensed to the dispensing unit 13. For example, the control unit 18 causes

two banknotes of the denomination A, three banknotes of the denomination B, and two banknotes of the denomination C to be dispensed to the dispensing unit 13. In this case, the control unit 18 controls each unit such that the banknotes are dispensed in the order of, for example, the denomination A, the denomination A, the denomination B, the denomination B, the denomination B, the denomination C, and the denomination C to the dispensing unit 13. Thus, the two banknotes of the denomination A are grouped, the three banknotes of the denomination B are grouped, the two banknotes of the denomination C are grouped, and the banknotes of the denominations A to C are dispensed to the dispensing unit 13, which, for example, makes it easy for a user to confirm the number of dispensed banknotes (which may also be referred to as "dispensing number" hereinafter) for each denomination.

[0053] FIG. 3 illustrates an example of a banknote transport route in dispensing processing of the money processing apparatus 1. The same elements in FIG. 3 as those in FIG. 1 are denoted by the same reference signs. Hereinafter, the first storage unit 24a stores banknotes of different kinds of denominations. The money processing apparatus 1 dispenses banknotes from the first storage unit 24a storing banknotes of different kinds of denominations to the dispensing unit 13.

[0054] When banknotes stored in the first storage unit 24a are dispensed to the dispensing unit 13, the control unit 18 performs control to cause the banknotes fed out from the first storage unit 24a to be transported to the temporary storage unit 17 in accordance with the denominations such that the banknotes are grouped for each denomination and dispensed to the dispensing unit 13. For example, in a case where two five euro banknotes and two ten euro banknotes are dispensed, the control unit 18 causes the two five euro banknotes and the two ten euro banknotes to be dispensed to the dispensing unit 13 such that the two five euro banknotes are grouped and stacked and the two ten euro banknotes are grouped and stacked. Examples of the state in which banknotes are grouped and stacked include a state in which the banknotes are stacked in an overlapping manner and a state in which the banknotes are stacked while being adjacent to each other.

[0055] The control unit 18 controls the first storage unit 24a such that banknotes stored in the first storage unit 24a are fed out one by one to the transport unit 15 (the sixth diversion path 156 comprised by the transport unit 15). The control unit 18 controls the transport unit 15, the sixth diversion path 156, the vertical transport path 26, and the loop-shaped transport path 150 such that the banknotes stored in the first storage unit 24a are fed out to the dispensing unit 13 or the temporary storage unit 17. For example, the control unit 18 causes, among the banknotes fed out from the first storage unit 24a, a banknote of a denomination, which is to be dispensed to the dispensing unit 13, to be transported to the dispensing unit 13 as indicated by an arrow A1, and a banknote of

a denomination, which is not to be dispensed to the dispensing unit 13, to be transported to the temporary storage unit 17 as indicated by an arrow A2 with a dotted line.

[0056] FIG. 4 is a diagram describing an operation example of the money processing apparatus 1. The "5" indicated in (a) to (i) of FIG. 4 represents a five euro banknote. The "10" indicated therein represents a ten euro banknote. The "20" indicated therein represents a twenty euro banknote.

[0057] In each first storage unit 24a illustrated in (a) to (i) of FIG. 4, it is indicated that the more upward a banknote is, the more recently the banknote is stored in the first storage unit 24a. For example, in the first storage unit 24a indicated in (a) of FIG. 4, the five euro banknote described at the top is the banknote most recently stored in the first storage unit 24a, whereas the five euro banknote described at the bottom is the banknote most previously stored in the first storage unit 24a.

[0058] In each dispensing unit 13 illustrated in (a) to (i) of FIG. 4, it is indicated that the more upward a banknote is, the more recently the banknote is dispensed to the dispensing unit 13. For example, in the dispensing unit 13 illustrated in (f) of FIG. 4, the ten euro banknote described at the top is the banknote most recently dispensed to dispensing unit 13. The five euro banknote described at the bottom is the banknote most previously dispensed to the dispensing unit 13.

[0059] In each temporary storage unit 17 illustrated in (a) to (i) of FIG. 4, it is indicated that the more upward a banknote is, the more recently the banknote is temporarily stored in the temporary storage unit 17. For example, in the temporary storage unit 17 illustrated in (g) of FIG. 4, the five euro banknote described at the top is the banknote most recently temporarily stored in the temporary storage unit 17. The twenty euro banknote described at the bottom is the banknote most previously temporarily stored in the temporary storage unit 17.

[0060] The memory unit stores information on banknotes stored in the first storage unit 24a. For example, the memory unit stores information indicating denominations of banknotes stored in the first storage unit 24a and information indicating the storage order of the banknotes of the denominations in the first storage unit 24a. Specifically, the first storage unit 24a stores the banknotes illustrated in (a) of FIG. 4. In this case, the memory unit stores information on the banknotes such that the denominations of the banknotes illustrated in (a) of FIG. 4 and the storage order of the banknotes of the denominations therein can be known. Hereinafter, information indicating denominations of banknotes stored in the first storage unit 24a and information indicating the storage order of the banknotes of the denominations therein, where both the pieces of information are stored in the memory unit, may also be referred to as "storage information".

[0061] The memory unit stores information on banknotes dispensed to the dispensing unit 13. For example, the memory unit stores information indicating denomina-

tions of banknotes dispensed to the dispensing unit 13 and information indicating the dispensing order of the banknotes of the denominations in the dispensing unit 13. Specifically, the banknotes illustrated in (f) of FIG. 4 are dispensed to the dispensing unit 13. In this case, the memory unit stores information on the banknotes such that the denominations of the banknotes illustrated in (f) of FIG. 4 and the dispensing order of the banknotes of the denominations therein can be known. Hereinafter, information indicating denominations of banknotes dispensed to the dispensing unit 13 and information indicating the dispensing order of the banknotes of the denominations therein, where both the pieces of information are stored in the memory unit, may also be referred to as "dispensing information".

[0062] The memory unit stores information on banknotes temporarily stored in the temporary storage unit 17. For example, the memory unit stores information indicating denominations of banknotes temporarily stored in the temporary storage unit 17 and information indicating the temporary storage order of the banknotes of the denominations in the temporary storage unit 17. Specifically, the banknotes illustrated in (g) of FIG. 4 are temporarily stored in the temporary storage unit 17. In this case, the memory unit stores information on the banknotes such that the denominations of the banknotes illustrated in (g) of FIG. 4 and the temporary storage order of the banknotes of the denominations therein can be known. Hereinafter, information indicating denominations of banknotes temporarily stored in the temporary storage unit 17 and information indicating the temporary storage order of the banknotes of the denominations therein, where both the pieces of information are stored in the memory unit, may also be referred to as "temporary storage information".

[0063] The storage information on the first storage unit 24a, the dispensing information on the dispensing unit 13, and the temporary storage information on the temporary storage unit 17 are updated by the control unit 18. For example, when a banknote is stored in the first storage unit 24a, the control unit 18 updates the storage information on the first storage unit 24a in the memory unit. Further, when a banknote is fed out from the first storage unit 24a, the control unit 18 updates the storage information on the first storage unit 24a in the memory unit. Further, when a banknote is dispensed to the dispensing unit 13, the control unit 18 updates the dispensing information in the memory unit. Further, when a banknote is removed from the dispensing unit 13, the control unit 18 updates the dispensing information in the memory unit. Further, when a banknote is temporarily stored in the temporary storage unit 17, the control unit 18 updates the temporary storage information in the memory unit. Further, when a banknote is fed out from the temporary storage unit 17, the control unit 18 updates the temporary storage information in the memory unit.

[0064] As described above, the control unit 18 manages the storage information, the dispensing information,

and the temporary storage information by the memory unit. Thus, the control unit 18 is capable of grasping denominations of banknotes stored in the first storage unit 24a and the storage order of the banknotes therein by referring to the memory unit. Further, the control unit 18 is capable of grasping denominations of banknotes dispensed to the dispensing unit 13 and the dispensing order of the banknotes therein by referring to the memory unit. Further, the control unit 18 is capable of grasping denominations of banknotes temporarily stored in the temporary storage unit 17 and the temporary storage order of the banknotes therein by referring to the memory unit.

[0065] As illustrated in (a) of FIG. 4, the first storage unit 24a stores banknotes of different denominations. For example, the first storage unit 24a stores three kinds of banknotes of the five euro banknote, the ten euro banknote, and the twenty euro banknote.

[0066] Hereinafter, an example will be described in which firstly two five euro banknotes as banknotes of a first denomination and then two ten euro banknotes as banknotes of a second denomination are dispensed from the first storage unit 24a to the dispensing unit 13.

[0067] Further, hereinafter, a denomination of banknotes to be dispensed to the dispensing unit 13 may also be referred to as "target denomination". A denomination of banknotes not to be dispensed to the dispensing unit 13 may also be referred to as "non-target denomination". For example, five euro banknotes are banknotes of the target denomination until two five euro banknotes are firstly dispensed to the dispensing unit 13. Denominations of banknotes other than five euro banknotes are the non-target denominations. Further, in a case where two five euro banknotes have been dispensed and then two ten euro banknotes are to be dispensed, ten euro banknotes are banknotes of the target denomination. Denominations of banknotes other than ten euro banknotes are the non-target denominations.

[0068] In (a) of FIG. 4, the banknote most recently stored in the first storage unit 24a is a five euro banknote. The five euro banknote is a banknote of a target denomination. The control unit 18 controls the first storage unit 24a such that the most recently stored five euro banknote is fed out from the first storage unit 24a to the transport unit 15 (as described above, the first storage unit 24a takes in and out banknotes in a last-in first-out manner). The control unit 18 controls the transport unit 15 such that the five euro banknote fed out to the transport unit 15 is transported to the dispensing unit 13. Thus, the five euro banknote of the target denomination is dispensed to the dispensing unit 13 as illustrated in (b) of FIG. 4.

[0069] In (b) of FIG. 4, the banknote most recently stored in the first storage unit 24a is a twenty euro banknote. The twenty euro banknote is a banknote of a non-target denomination. The control unit 18 controls the first storage unit 24a such that the twenty euro banknote is fed out from the first storage unit 24a to the transport unit 15. The control unit 18 controls the transport unit 15 such that the twenty euro banknote fed out to the transport

unit 15 is transported to the temporary storage unit 17. Thus, the twenty euro banknote of the non-target denomination is temporarily stored in the temporary storage unit 17 as illustrated in (c) of FIG. 4.

[0070] In (c) of FIG. 4, the banknote most recently stored in the first storage unit 24a is a ten euro banknote. The ten euro banknote is a banknote of a non-target denomination. The control unit 18 controls the first storage unit 24a such that the ten euro banknote is fed out from the first storage unit 24a to the transport unit 15. The control unit 18 controls the transport unit 15 such that the ten euro banknote fed out to the transport unit 15 is transported to the temporary storage unit 17. Thus, the ten euro banknote of the non-target denomination is temporarily stored in the temporary storage unit 17 as illustrated in (d) of FIG. 4.

[0071] In (d) of FIG. 4, the banknote most recently stored in the first storage unit 24a is a five euro banknote. The five euro banknote is a banknote of the target denomination. The control unit 18 controls the first storage unit 24a such that the five euro banknote is fed out from the first storage unit 24a to the transport unit 15. The control unit 18 controls the transport unit 15 such that the five euro banknote fed out to the transport unit 15 is transported to the dispensing unit 13. Thus, the five euro banknote of the target denomination is dispensed to the dispensing unit 13 as illustrated in (e) of FIG. 4.

[0072] Note that, in (e) of FIG. 4, the number of five euro banknotes dispensed to the dispensing unit 13 has reached the dispensing number of two five euro banknotes. Accordingly, the processing which transports banknotes of the first denomination to the dispensing unit 13 is assumed to have been completed. Then, the subsequent target denomination is set to the ten euro banknote.

[0073] In (e) of FIG. 4, the banknote most recently stored in the first storage unit 24a is a ten euro banknote. The ten euro banknote is a banknote of the target denomination. The control unit 18 controls the first storage unit 24a such that the ten euro banknote is fed out from the first storage unit 24a to the transport unit 15. The control unit 18 controls the transport unit 15 such that the ten euro banknote fed out to the transport unit 15 is transported to the dispensing unit 13. Thus, the ten euro banknote of the target denomination is dispensed to the dispensing unit 13 as illustrated in (f) of FIG. 4.

[0074] In (f) of FIG. 4, the banknote most recently stored in the first storage unit 24a is a five euro banknote. The five euro banknote is a banknote of a non-target denomination. The control unit 18 controls the first storage unit 24a such that the five euro banknote is fed out from the first storage unit 24a to the transport unit 15. The control unit 18 controls the transport unit 15 such that the five euro banknote fed out to the transport unit 15 is transported to the temporary storage unit 17. Thus, the five euro banknote of the non-target denomination is temporarily stored in the temporary storage unit 17 as illustrated in (g) of FIG. 4.

[0075] In (g) of FIG. 4, the banknote most recently stored in the first storage unit 24a is a ten euro banknote. The ten euro banknote is a banknote of the target denomination. The control unit 18 controls the first storage unit 24a such that the ten euro banknote is fed out from the first storage unit 24a to the transport unit 15. The control unit 18 controls the transport unit 15 such that the ten euro banknote fed out to the transport unit 15 is transported to the dispensing unit 13. Thus, the ten euro banknote of the target denomination is dispensed to the dispensing unit 13 as illustrated in (h) of FIG. 4. Since the number of ten euro banknotes dispensed to the dispensing unit 13 has reached the dispensing number of two ten euro banknotes, the processing which transports banknotes of the second denomination to the dispensing unit 13 is assumed to have been completed. The two five euro banknotes and the two ten euro banknotes are grouped for each denomination and dispensed to the dispensing unit 13.

[0076] When the dispensing of the two five euro banknotes and the two ten euro banknotes is completed, the control unit 18 controls the temporary storage unit 17 and the transport unit 15 such that the banknotes temporarily stored in the temporary storage unit 17 are returned to the first storage unit 24a. For example, the control unit 18 causes the five euro banknote, the ten euro banknote, and the twenty euro banknote in the temporary storage unit 17 illustrated in (h) of FIG. 4 to be returned to the first storage unit 24a. Thus, the temporary storage unit 17 becomes empty as illustrated in (i) of FIG. 4, and returns to the state before the start of the dispensing processing.

[0077] FIG. 5 is a flowchart for an operation example of the money processing apparatus 1. The control unit 18 of the money processing apparatus 1 receives, for example, an instruction of dispensing processing from a terminal apparatus (step S1).

[0078] The control unit 18 selects a target denomination whose banknotes are to be dispensed to the dispensing unit 13 (step S2). For example, in a case where denominations of banknotes to be dispensed and each number thereof are designated in step S1, the control unit 18 selects the smallest denomination among the designated denominations of the banknotes as the target denomination. In a case where the control unit 18 shifts the processing from step S7 to step S2, the control unit 18 sequentially selects each denomination in increasing order of the denominations as a target denomination. More specifically, the control unit 18 has two twenty euro banknotes, two ten euro banknotes, and one five euro banknote designated by the instruction of dispensing processing in step S1. In this case, the control unit 18 first selects the five euro as a target denomination. In a case where the control unit 18 shifts the processing from step S7 to step S2, the control unit 18 selects the ten euro as a target denomination. In a case where the control unit 18 shifts the processing from step S7 to step S2 next time, the control unit 18 selects the twenty euro as

a target denomination.

[0079] Note that, in a case where denominations of banknotes to be dispensed and each number thereof are designated in step S1, the control unit 18 selects the smallest denomination among the designated denominations of the banknotes as an initial target denomination, but the present disclosure is not limited thereto. The control unit 18 may select the largest denomination among the designated denominations of the banknotes as an initial target denomination. Then, in a case where the control unit 18 shifts the processing from step S7 to step S2, the control unit 18 may sequentially select each denomination in decreasing order of the denominations as the next target denomination.

[0080] Further, in a case where an instruction of dispensing in step S1 designates a dispensing amount and does not designate denominations of banknotes to be dispensed, the control unit 18 may determine denominations of banknotes to be dispensed. For example, the control unit 18 may determine denominations of banknotes to be dispensed and each number thereof such that a minimum number of banknotes satisfy a designated amount of money. For example, in a case where 45 euros are designated as a dispensing amount of money, the control unit 18 may determine two twenty euro banknotes and one five euro banknote, which represent the minimum number of banknotes.

[0081] When the control unit 18 selects a target denomination of banknotes to be dispensed in step S2, the control unit 18 controls the first storage unit 24a such that a banknote is fed out from the first storage unit 24a (step S3).

[0082] When the banknote is fed out from the first storage unit 24a, the control unit 18 refers to the storage information on the first storage unit 24a in the memory unit, and determines whether the fed-out banknote is a banknote of the denomination selected in step S2 (step S4). At this time, the control unit 18 updates the storage information on the first storage unit 24a in accordance with the fact that the banknote has been fed out from the first storage unit 24a.

[0083] In a case where the control unit 18 determines that the banknote fed out from the first storage unit 24a is not a banknote of the target denomination selected in step S2 ("No" in S4), the control unit 18 controls the transport unit 15 such that the banknote fed out from the first storage unit 24a is transported to the temporary storage unit 17 (step S9). At this time, the control unit 18 updates the temporary storage information in accordance with the fact that the banknote has been transported to the temporary storage unit 17.

[0084] In a case where the control unit 18 determines that the banknote fed out from the first storage unit 24a is a banknote of the target denomination selected in step S2 ("Yes" in S4), on the other hand, the control unit 18 controls the transport unit 15 such that the banknote fed out from the first storage unit 24a is transported to the dispensing unit 13 (step S5). At this time, the control unit

18 updates the dispensing information in accordance with the fact that the banknote has been transported to the dispensing unit 13.

[0085] The control unit 18 refers to the dispensing information, and determines whether the number of banknotes of the target denomination selected in step S2 has reached a dispensing number (step S6).

[0086] In a case where the control unit 18 determines that the number of banknotes of the target denomination selected in step S2 has not reached the dispensing number ("No" in S6), the control unit 18 shifts the processing to step S3.

[0087] In a case where the control unit 18 determines that the number of banknotes of the target denomination selected in step S2 has reached the dispensing number ("Yes" in S6), on the other hand, the control unit 18 determines whether there is a banknote of any other denomination to be dispensed (step S7).

[0088] In a case where the control unit 18 determines that there is a banknote of another denomination to be dispensed ("Yes" in S7), the control unit 18 shifts the processing to step S2.

[0089] In a case where the control unit 18 determines that there is no banknote of any other denomination to be dispensed ("No" in S7), on the other hand, the control unit 18, refers to the temporary storage information, and causes a banknote temporarily stored in the temporary storage unit 17 to be returned to the first storage unit 24a (step S8). The control unit 18 then ends the processing of the flowchart.

[0090] As described above, the control unit 18 of the money processing apparatus 1 performs control to cause banknotes fed out from the first storage unit 24a to be transported to the temporary storage unit 17 in accordance with the denominations such that the banknotes are grouped for each denomination and dispensed to the dispensing unit 13, when the banknotes stored in the first storage unit 24a are dispensed. Thus, the control unit 18 is capable of causing banknotes, which are dispensed to the dispensing unit 13, to be grouped for each denomination and dispensed to the dispensing unit 13. Further, banknotes are grouped for each denomination and dispensed to the dispensing unit 13, thereby making it easy for a user to confirm the number of dispensed banknotes for each denomination, for example.

[0091] Further, in a case where a banknote fed out from the first storage unit 24a is a banknote of a first denomination, the control unit 18 of the money processing apparatus 1 causes the banknote fed out from the first storage unit 24a to be transported to the dispensing unit 13. At this time, the target denomination is the first denomination. In a case where a banknote fed out from the first storage unit 24a is a banknote of a second denomination, the control unit 18 causes the banknote fed out from the first storage unit 24a to be transported to the temporary storage unit 17. The second denomination is a non-target denomination. When these pieces of processing are repeated and the number of banknotes

of the first denomination transported to the dispensing unit 13 reaches its dispensing number, the control unit 18 causes a banknote of the second denomination to be transported to the dispensing unit 13. At this time, the target denomination is changed to the second denomination. Thus, the control unit 18 is capable of causing banknotes, which are dispensed to the dispensing unit 13, to be grouped for each denomination and dispensed to the dispensing unit 13. Further, banknotes are grouped for each denomination and dispensed to the dispensing unit 13, thereby making it easy for a user to confirm the number of dispensed banknotes for each denomination, for example.

15 [Variation 1]

[0092] The dispensing processing is configured such that a banknote of a non-target denomination is temporarily stored in the temporary storage unit 17, but the present disclosure is not limited thereto. For example, at least one of the multipurpose storage unit 23, the first storage unit 24, the second storage unit 25, and the attachable/detachable storage unit 2 may be used as a storage unit that temporarily stores a banknote of a non-target denomination. Further, among the multipurpose storage unit 23, the first storage unit 24, the second storage unit 25, and the attachable/detachable storage unit 2, a storage unit used in reconciliation processing may be used as a storage unit that temporarily stores a banknote of a non-target denomination. The reconciliation processing refers to, for example, processing which circularly moves a banknote stored in a storage unit between the storage unit and a storage unit for reconciliation processing (reconciliation processing storage unit) and which, when the banknote is moved, confirms the inventory amount of banknotes or the like by using the recognition unit 16. Note that, the storage unit that temporarily stores a banknote of a non-target denomination may be referred to as "escape unit".

40 [Variation 2]

[0093] Banknotes to be dispensed to the dispensing unit 13 may be dispensed to the dispensing unit 13 in decreasing order of the denominations or may be dispensed to the dispensing unit 13 in increasing order of the denominations.

[0094] The order of denominations of banknotes, in which the banknotes are dispensed to the dispensing unit 13, may be instructed from, for example, a terminal apparatus. For example, in accordance with an instruction from the terminal apparatus, the control unit 18 may cause banknotes stored in the first storage unit 24a to be dispensed to the dispensing unit 13 in decreasing order of the denominations or may cause banknotes stored in the first storage unit 24a to be dispensed to the dispensing unit 13 in decreasing order of the denominations. Further, the order of denominations of banknotes, in

which the banknotes are dispensed to the dispensing unit 13, may be an order set in advance and stored in the memory unit, for example.

[Variation 3]

[0095] In the middle of dispensing processing, a situation may occur in which a banknote of a target denomination is not stored in the first storage unit 24a, but is temporarily stored in the temporary storage unit 17. In this case, the control unit 18 may cause the banknote temporarily stored in the temporary storage unit 17 to be returned to the first storage unit 24a. In addition, the control unit 18 may cause banknotes fed out from the first storage unit 24a to be transported to the temporary storage unit 17 in accordance with the denominations such that the banknotes stored in the first storage unit 24a are grouped for each denomination and dispensed to the dispensing unit 13.

[0096] Note that, the control unit 18 may cause all banknotes temporarily stored in the temporary storage unit 17 to be returned to the first storage unit 24a. Further, the control unit 18 may cause banknotes temporarily stored in the temporary storage unit 17 to be returned to the first storage unit 24a until every banknote of a target denomination to be dispensed to the dispensing unit 13 is in the first storage unit 24a.

[Variation 4]

[0097] In the dispensing processing, the control unit 18 determines whether a banknote fed out from the first storage unit 24a is a banknote of a target denomination by referring to the storage information on the first storage unit 24a, but the present disclosure is not limited thereto. For example, the control unit 18 may cause the recognition unit 16 to recognize the denomination of a banknote fed out from the first storage unit 24a and determine whether the banknote is a banknote of a target denomination.

(Embodiment 2)

[0098] In the dispensing processing, a banknote of a target denomination may not be stored in the first storage unit 24a, but may be temporarily stored in the temporary storage unit 17. With respect to the situation described above, the banknote temporarily stored in the temporary storage unit 17 is returned to the first storage unit 24a in Variation 3 of Embodiment 1, whereas in Embodiment 2, the banknote temporarily stored in the temporary storage unit 17 is not returned to the first storage unit 24a, but is transported to either the dispensing unit 13 or the first storage unit 24a in accordance with the denomination.

[0099] FIG. 6 illustrates an example of a banknote transport route in dispensing processing of the money processing apparatus 1 according to Embodiment 2. The

same elements in FIG. 6 as those in FIG. 1 are denoted by the same reference signs.

[0100] In a case where a banknote of a target denomination is not stored in the first storage unit 24a, but is temporarily stored in the temporary storage unit 17, the control unit 18 may cause the banknote to be fed out from the temporary storage unit 17.

[0101] For example, the control unit 18 controls the temporary storage unit 17 such that a banknote temporarily stored in the temporary storage unit 17 is fed out to the transport unit 15. In a case where the denomination of the banknote fed out from the temporary storage unit 17 to the transport unit 15 is a target denomination, the control unit 18 causes the fed-out banknote to be transported to the dispensing unit 13 as indicated by an arrow A11 in FIG. 6. In a case where the denomination of the banknote fed out from the temporary storage unit 17 to the transport unit 15 is a non-target denomination, on the other hand, the control unit 18 causes the fed-out banknote to be transported to the first storage unit 24a as indicated by an arrow A12 with a dotted line in FIG. 6.

[0102] FIG. 7 is a diagram describing an operation example of the money processing apparatus 1. In FIG. 7, two five euro banknotes and three ten euro banknotes are dispensed. The state of (j) of FIG. 7 corresponds to the state of (h) of FIG. 4.

[0103] The first storage unit 24a of (j) of FIG. 7 does not store any ten euro banknote of a target denomination. The temporary storage unit 17 temporarily stores a ten euro banknote. Accordingly, the control unit 18 causes the ten euro banknote temporarily stored in the temporary storage unit 17 to be dispensed to the dispensing unit 13. Note that, the control unit 18 is capable of grasping that the first storage unit 24a does not store any ten euro banknote of the target denomination by referring to the storage information on the first storage unit 24a in the memory unit. Further, the control unit 18 is capable of grasping that the temporary storage unit 17 stores the ten euro banknote of the target denomination by referring to the temporary storage information on the temporary storage unit 17 in the memory unit.

[0104] In (j) of FIG. 7, the banknote most recently temporarily stored in the temporary storage unit 17 is a five euro banknote. The five euro banknote is a banknote of a non-target denomination. The control unit 18 controls the temporary storage unit 17 such that the five euro banknote is fed out from the temporary storage unit 17 to the transport unit 15. The control unit 18 controls the transport unit 15 such that the five euro banknote fed out to the transport unit 15 is transported to the first storage unit 24a. Thus, the first storage unit 24a stores the five euro banknote as illustrated in (k) of FIG. 4.

[0105] In (k) of FIG. 7, the banknote most recently temporarily stored in the temporary storage unit 17 is a ten euro banknote. The ten euro banknote is a banknote of the target denomination. The control unit 18 controls the temporary storage unit 17 such that the ten euro banknote is fed out from the temporary storage unit 17 to the

transport unit 15. The control unit 18 controls the transport unit 15 such that the ten euro banknote fed out to the transport unit 15 is transported to the dispensing unit 13. Thus, the ten euro banknote is dispensed to the dispensing unit 13 as illustrated in (1) of FIG. 7.

[0106] Note that, the number of ten euro banknotes dispensed to the dispensing unit 13 has reached the dispensing number of three ten euro banknotes. Accordingly, the two five euro banknotes and the three ten euro banknotes are grouped for each denomination and dispensed to the dispensing unit 13.

[0107] When the dispensing of the two five euro banknotes and the three ten euro banknotes is completed, the control unit 18 controls the temporary storage unit 17 and the transport unit 15 such that a banknote temporarily stored in the temporary storage unit 17 is returned to the first storage unit 24a. For example, the control unit 18 causes the twenty euro banknote in the temporary storage unit 17 illustrated in (1) of FIG. 7 to be returned to the first storage unit 24a. Thus, the temporary storage unit 17 becomes empty, and returns to the state before the start of the dispensing processing.

[0108] As described above, in a case where a banknote fed out from the first storage unit 24a is a banknote of a first denomination (for example, a five euro banknote), the control unit 18 of the money processing apparatus 1 causes the banknote fed out from the first storage unit 24a to be transported to the dispensing unit 13. At this time, the target denomination is the first denomination. In a case where a banknote fed out from the first storage unit 24a is a banknote of a second denomination (for example, a ten euro banknote), the control unit 18 causes the banknote fed out from the first storage unit 24a to be transported to the temporary storage unit 17. The second denomination is a non-target denomination. When these pieces of processing are repeated and the number of banknotes of the first denomination transported to the dispensing unit 13 reaches its dispensing number, the processing which transports banknotes of the first denomination to the dispensing unit 13 is completed. Subsequently, the control unit 18 causes a banknote of the second denomination to be transported to the dispensing unit 13. At this time, the target denomination is changed to the second denomination. Then, in the processing which transports banknotes of the second denomination to the dispensing unit 13, the control unit 18 causes a banknote fed out from the temporary storage unit 17 to be transported to the dispensing unit 13. Thus, the control unit 18 is capable of causing banknotes, which are dispensed to the dispensing unit 13, to be grouped for each denomination and dispensed to the dispensing unit 13. Further, banknotes are grouped for each denomination and dispensed to the dispensing unit 13, thereby making it easy for a user to confirm the number of dispensed banknotes for each denomination, for example.

[Variation 1]

[0109] In a case where banknotes of a target denomination are stored in both the temporary storage unit 17 and the first storage unit 24a, the control unit 18 may select a banknote stored in either the first storage unit 24a or the temporary storage unit 17 and cause the banknote to be transported to the dispensing unit 13 in accordance with the denomination. The control unit 18 first causes a banknote stored in the temporary storage unit 17 to be transported to the dispensing unit 13 in accordance with the denomination. Then, when there is no banknote of the target denomination in the temporary storage unit 17, the control unit 18 may cause a banknote stored in the first storage unit 24a to be transported to the dispensing unit 13 in accordance with the denomination. Further, the control unit 18 first causes a banknote stored in the first storage unit 24a to be transported to the dispensing unit 13 in accordance with the denomination. Then, when there is no banknote of the target denomination in the first storage unit 24a, the control unit 18 may cause a banknote stored in the temporary storage unit 17 to be dispensed to the dispensing unit 13 in accordance with the denomination. That is, when there is no banknote of the target denomination in the first storage unit 24a and the temporary storage unit 17 (the fact that there is no banknote of the target denomination serves as a trigger), the control unit 18 may switch the banknote feeding source between the first storage unit 24a and the temporary storage unit 17.

[Variation 2]

[0110] In a case where a banknote of a target denomination is not stored in the first storage unit 24a, but is temporarily stored in the temporary storage unit 17, the control unit 18 causes the banknote temporarily stored in the temporary storage unit 17 to be dispensed to the dispensing unit 13 in accordance with the denomination. When there is no banknote of the target denomination in the temporary storage unit 17, the control unit 18 may cause a banknote stored in the first storage unit 24a to be dispensed to the dispensing unit 13 in accordance with the denomination. Alternatively, when there is no banknote of the target denomination in the first storage unit 24a, the control unit 18 may cause a banknote stored in the temporary storage unit 17 to be dispensed to the dispensing unit 13 in accordance with the denomination. That is, when there is no banknote of the target denomination in the first storage unit 24a and the temporary storage unit 17 (the fact that there is no banknote of the target denomination serves as a trigger), the control unit 18 may switch the banknote feeding source between the first storage unit 24a and the temporary storage unit 17.

(Embodiment3)

[0111] In a case where the dispensing processing is

continuously performed, after first dispensing processing, second dispensing processing may be performed without returning a banknote temporarily stored in the temporary storage unit 17 to the first storage unit 24a. Hereinafter, parts different from those in Embodiment 1 will be described.

[0112] FIG. 8 is a diagram describing an operation example of the money processing apparatus 1 according to Embodiment 3. The states of the first storage unit 24a, the dispensing unit 13, and the temporary storage unit 17 when the first dispensing processing is completed are illustrated by (m) of FIG. 8. The states in (m) of FIG. 8 corresponds to the states in (h) of FIG. 4.

[0113] In the first dispensing processing, two ten euro banknotes and two five euro banknotes are dispensed to the dispensing unit 13 as illustrated in (m) of FIG. 8. A user takes out the banknotes dispensed to the dispensing unit 13 from the outlet 131, whereby the dispensing information is cleared.

[0114] The user takes out the banknote from the outlet 131, and then performs second dispensing. For example, the user performs the second dispensing without performing any other processing such as depositing processing. In the second dispensing, the user dispenses one ten euro banknote and two twenty euro banknotes.

[0115] In (n) of FIG. 8, the banknote most recently temporarily stored in the temporary storage unit 17 is a ten euro banknote. The ten euro banknote is a banknote of a target denomination. The control unit 18 controls the temporary storage unit 17 such that the ten euro banknote is fed out from the temporary storage unit 17 to the transport unit 15. The control unit 18 controls the transport unit 15 such that the ten euro banknote fed out to the transport unit 15 is transported to the dispensing unit 13. Thus, the ten euro banknote is dispensed to the dispensing unit 13 as illustrated in (o) of FIG. 8.

[0116] In (o) of FIG. 8, the banknote most recently temporarily stored in the temporary storage unit 17 is a twenty euro banknote. The twenty euro banknote is a banknote of a target denomination. The control unit 18 controls the temporary storage unit 17 such that the twenty euro banknote is fed out from the temporary storage unit 17 to the transport unit 15. The control unit 18 controls the transport unit 15 such that the twenty euro banknote fed out to the transport unit 15 is transported to the dispensing unit 13. Thus, the twenty euro banknote is stored in the dispensing unit 13 as illustrated in (p) of FIG. 8.

[0117] In (p) of FIG. 8, the banknote most recently stored in the first storage unit 24a is a five euro banknote. The five euro banknote is a banknote of a non-target denomination. The control unit 18 controls the first storage unit 24a such that the five euro banknote is fed out from the first storage unit 24a to the transport unit 15. The control unit 18 controls the transport unit 15 such that the five euro banknote fed out to the transport unit 15 is transported to the temporary storage unit 17. Thus, the five euro banknote of the non-target denomination is temporarily stored in the temporary storage unit 17 as

illustrated in (q) of FIG. 8.

[0118] In (q) of FIG. 8, the banknote most recently stored in the first storage unit 24a is a twenty euro banknote. The twenty euro banknote is a banknote of the target denomination. The control unit 18 controls the first storage unit 24a such that the twenty euro banknote is fed out from the first storage unit 24a to the transport unit 15. The control unit 18 controls the transport unit 15 such that the twenty euro banknote fed out to the transport unit 15 is transported to the dispensing unit 13. Thus, the twenty euro banknote of the target denomination is dispensed to the dispensing unit 13 as illustrated in (r) of FIG. 8. The one ten euro banknote and the two twenty euro banknotes are grouped for each denomination and dispensed to the dispensing unit 13.

[0119] As described above, after the first dispensing processing, the control unit 18 may perform the second dispensing processing following the first dispensing processing without causing a banknote temporarily stored in the temporary storage unit 17 to be returned to the first storage unit 24a. Thus, the process of returning a banknote temporarily stored in the temporary storage unit 17 to the first storage unit 24a after the first dispensing processing is reduced, and the user can immediately perform the second dispensing processing.

[Variation 1]

[0120] In a case where the second dispensing processing is performed and a banknote of an initial denomination is fed out, the control unit 18 may cause the banknote to be dispensed from, between the first storage unit 24a and the temporary storage unit 17, one capable of feeding out the banknote of the target denomination earlier than the other. When there is no banknote of the target denomination in the first storage unit 24a and the temporary storage unit 17, the control unit 18 may switch the banknote feeding source between the first storage unit 24a and the temporary storage unit 17.

[Variation 2]

[0121] The control unit 18 may perform, after the second dispensing processing, third dispensing processing without causing a banknote temporarily stored in the temporary storage unit 17 to be returned to the first storage unit 24. Similarly, the control unit 18 may perform, after the n-th dispensing processing, the (n+1)th dispensing processing without causing a banknote temporarily stored in the temporary storage unit 17 to be returned to the first storage unit 24a.

(Embodiment 4)

[0122] A banknote of a non-target denomination is temporarily stored in the temporary storage unit 17, but the present disclosure is not limited thereto. The storage unit that temporarily stores a banknote of a non-target de-

nomination may be a storage unit that stores a deposited banknote.

[0123] Further, the storage unit that stores a banknote to be dispensed to the dispensing unit 13 is not limited to the first storage unit 24a. At least one of the multipurpose storage unit 23, the first storage unit 24, the second storage unit 25, and the attachable/detachable storage unit 2 may store banknotes of different denominations. Hereinafter, the second storage unit 25b stores banknotes of different denominations.

[0124] FIG. 9 illustrates an example of a banknote transport route in dispensing processing of the money processing apparatus 1 according to Embodiment 4. The same elements in FIG. 9 as those in FIG. 1 are denoted by the same reference signs. In the money processing apparatus 1 of FIG. 9, the control unit 18 causes a banknote stored in the second storage unit 25b to be dispensed to the dispensing unit 13.

[0125] The second storage unit 25b stores banknotes of different denominations. For example, the second storage unit 25b stores banknotes of three denominations. More specifically, the second storage unit 25b may store five euro banknotes, ten euro banknotes, and twenty euro banknotes.

[0126] Banknotes to be stored in the second storage unit 25b may be banknotes to be deposited from the depositing unit 12. For example, the control unit 18 controls the transport unit 15 such that five euro banknotes, ten euro banknotes, and twenty euro banknotes that are deposited into the depositing unit 12 are transported to the second storage unit 25b.

[0127] In a case where a banknote fed out from the second storage unit 25b is a banknote of a non-target denomination in the dispensing processing, the control unit 18 may cause the banknote to be temporarily stored in a storage unit other than the temporary storage unit 17. Further, the storage unit that temporarily stores a banknote of a non-target denomination may be two or more storage units. In a case where the storage unit that temporarily stores a banknote of a non-target denomination is two or more storage units, each storage unit may temporarily store a banknote of a specific denomination (a predetermined denomination). The temporary storage information is created and updated for each storage unit.

[0128] For example, the storage unit that temporarily stores a banknote of a non-target denomination is configured as the first storage units 24a and 24b which store deposited banknotes. The first storage unit 24a temporarily stores ten euro banknotes, and the first storage unit 24b temporarily stores twenty euro banknotes.

[0129] More specifically, two five euro banknotes and two ten euro banknotes are dispensed from the second storage unit 25b which stores banknotes of three denominations. It is configured such that a denomination whose banknote is dispensed firstly is the five euro banknote, and that a denomination whose banknote is dispensed next (secondly) is the ten euro banknote. In a case where five euro banknotes are banknotes of a target denomi-

nation, ten euro banknotes and twenty euro banknotes are banknotes of non-target denominations. In a case where a denomination of a banknote fed out from the second storage unit 25b is the ten euro banknote, the control unit 18 causes the banknote fed out from the second storage unit 25b to be transported to the first storage unit 24a as indicated by an arrow A21 with a dotted line in FIG. 9. Further, in a case where the denomination of a banknote fed out from the second storage unit 25b is the twenty euro banknote, the control unit 18 causes the banknote fed out from the second storage unit 25b to be transported to the first storage unit 24b as indicated by an arrow A22 with a dotted line in FIG. 9. Further, in a case where the denomination of a banknote fed out from the second storage unit 25b is the five euro banknote, the control unit 18 causes the banknote fed out from the second storage unit 25b to be transported to the dispensing unit 13 as indicated by an arrow A23 in FIG. 9.

[0130] When the number of five euro banknotes to be dispensed to the dispensing unit 13 reaches the dispensing number (two five euro banknotes), the control unit 18 changes the target denomination to the ten euro, and causes two ten euro banknotes temporarily stored in the first storage unit 24a to be transported to the dispensing unit 13. In a case where a banknote of a first denomination (a five euro banknote) is dispensed to the dispensing unit 13, the control unit 18 causes a banknote of a non-target denomination to be temporarily stored in the first storage unit 24a or 24b predetermined in accordance with the denomination. Accordingly, when a banknote of a second denomination (a ten euro banknote) is dispensed, the control unit 18 may cause the banknote of the second denomination to be dispensed from the first storage unit 24a or 24b which temporarily stores the banknote of the second denomination (the first storage unit 24a which temporarily stores the ten euro banknote). Thus, the control unit 18 is capable of improving the efficiency of the dispensing processing.

[0131] As described above, the control unit 18 of the money processing apparatus 1 performs control to cause a banknote fed out from the second storage unit 25b to be transported to one of the first storage units 24a and 24b in accordance with the denomination. Thus, when banknotes of a specific denomination are dispensed to the dispensing unit 13, the control unit 18 is capable of causing the banknotes to be collectively dispensed from one of the first storage units 24a and 24b and improving the transport efficiency.

[Variation 1]

[0132] The first storage units 24a and 24b may be storage units that store banknotes to be deposited in the depositing processing. Further, the first storage units 24a and 24b may also be storage units that store banknotes of specific denominations different from denominations whose banknotes are stored in the second storage unit 25b that stores banknotes of different denominations.

[0133] For example, the second storage unit 25b stores five euro banknotes, ten euro banknotes, and twenty euro banknotes. In this case, the first storage unit 24a may store banknotes other than five euro banknotes, ten euro banknotes, and twenty euro banknotes, for example, fifty euro banknotes. The first storage unit 24b may store banknotes other than five euro banknotes, ten euro banknotes, and twenty euro banknotes, for example, hundred euro banknotes.

[Variation 2]

[0134] When the control unit 18 ends the dispensing processing and causes banknotes temporarily stored in the first storage units 24a and 24b to be returned to the second storage unit 25, the control unit 18 may cause banknotes in the first storage unit 24a to be collectively returned to the second storage unit 25 and cause banknotes in the first storage unit 24b to be collectively returned to the second storage unit 25. Further, when the control unit 18 causes banknotes temporarily stored in the first storage units 24a and 24b to be returned to the second storage unit 25, the control unit 18 may cause a banknote temporarily stored in the first storage unit 24a and a banknote temporarily stored in the first storage unit 24b to be alternately returned to the second storage unit 25.

[0135] Note that, the respective embodiments described above may be combined. Further, the respective variations described above may be combined.

Reference Signs List

[0136]

1	Money processing apparatus
10	Processing unit
11	Upper housing
12	Depositing unit
121	Inlet (Opening)
13	Dispensing unit
131	Outlet (Opening)
14	Second dispensing unit
15	Transport unit
150	Loop-shaped transport path
151	First diversion path
152	Second diversion path
153	Third diversion path
154	Fourth diversion path
155	Fifth diversion path
156	Sixth diversion path
16	Recognition unit
17	Temporary storage unit
18	Control unit
20	Storage box
21	Lower housing
22	Storage box door
23	Multipurpose storage unit

24	First storage unit
25	Second storage unit
26	Vertical transport path
30	Second storage box
5 31	Bottom housing
32	Second storage box door
33	Collection unit
40	Attachment unit
2	Attachable/detachable storage unit
10 S	Storage area

Claims

1. A money processing apparatus, comprising:
 - a dispensing unit;
 - an escape unit,
 - a storage unit that stores banknotes which include a banknote of a first denomination and a banknote of a second denomination; and
 - a control unit that performs control to cause a banknote fed out from the storage unit to be transported to the escape unit in accordance with a denomination thereof such that the banknotes are grouped for each of the denominations and dispensed to the dispensing unit, when the banknotes stored in the storage unit are dispensed.
2. The money processing apparatus according to claim 1, wherein
 - the control unit performs first dispensing processing including processing that transports the banknote fed out from the storage unit to the dispensing unit in a case where the banknote fed out from the storage unit is the banknote of the first denomination and that transports the banknote fed out from the storage unit to the escape unit in a case where the banknote fed out from the storage unit is not the banknote of the first denomination, the processing being repeated until a number of banknotes of the first denomination transported to the dispensing unit reaches a dispensing number.
3. The money processing apparatus according to claim 2, wherein the control unit performs, after performing the first dispensing processing, second dispensing processing that transports the banknote of the second denomination to the dispensing unit.
4. The money processing apparatus according to claim 3, wherein in a case where the banknote of the second denomination is transported to the escape unit by the first dispensing processing, the control unit causes the banknote of the second denomination fed out from the storage unit and the banknote of the second denomination fed out from the escape unit

to be transported to the dispensing unit in the second dispensing processing.

5. The money processing apparatus according to claim 4, wherein:

in the second dispensing processing, the control unit performs first transport processing and second transport processing, wherein the first transport processing transports the banknote fed out from the storage unit to the dispensing unit in a case where the banknote fed out from the storage unit is the banknote of the second denomination and transports the banknote fed out from the storage unit to the escape unit in a case where the banknote fed out from the storage unit is not the banknote of the second denomination, and the second transport processing transports a banknote fed out from the escape unit to the dispensing unit in a case where the banknote fed out from the escape unit is the banknote of the second denomination and transports the banknote fed out from the escape unit to the storage unit in a case where the banknote fed out from the escape unit is not the banknote of the second denomination, and the control unit repeats at least one processing of the first transport processing and the second transport processing until a number of banknotes of the second denomination transported to the dispensing unit reaches a dispensing number.

6. The money processing apparatus according to any one of claims 1 to 5, wherein the escape unit is a temporary storage unit that temporarily stores a banknote during depositing processing.

7. The money processing apparatus according to any one of claims 1 to 6, wherein the escape unit is a temporary storage unit that temporarily stores a banknote during reconciliation processing.

8. The money processing apparatus according to any one of claims 1 to 5, wherein the escape unit is a depositing storage unit that stores a deposited banknote.

9. The money processing apparatus according to any one of claims 1 to 5, wherein:

the escape unit is a depositing storage unit that stores a deposited banknote, and in depositing processing, the depositing storage unit stores a banknote which is neither the banknote of the first denomination nor the banknote of the second denomination.

10. The money processing apparatus according to any one of claims 1 to 5, wherein:

the escape unit is a depositing storage unit that stores a deposited banknote, and in depositing processing, the depositing storage unit stores a banknote of a predetermined denomination.

11. The money processing apparatus according to any one of claims 1 to 10, comprising a plurality of the escape units, wherein the control unit performs control to cause the banknote fed out from the storage unit to be transported to one of the plurality of escape units in accordance with the denominations.

12. The money processing apparatus according to any one of claims 1 to 11, wherein the control unit causes a banknote stored in the escape unit to be returned to the storage unit when the control unit ends dispensing of the banknotes to the dispensing unit, the banknotes being grouped for each of the denominations.

13. The money processing apparatus according to any one of claims 3 to 12, wherein after the control unit ends the first dispensing processing, the control unit starts the second dispensing processing without causing a banknote stored in the escape unit to be returned to the storage unit.

14. A dispensing method, comprising:

feeding out banknotes from a storage unit that stores banknotes of different denominations in dispensing processing; and performing control to cause the banknotes fed out from the storage unit to be transported to an escape unit in accordance with the denominations such that the banknotes fed out from the storage unit are grouped for each of the denominations and dispensed to a dispensing unit in the dispensing processing.

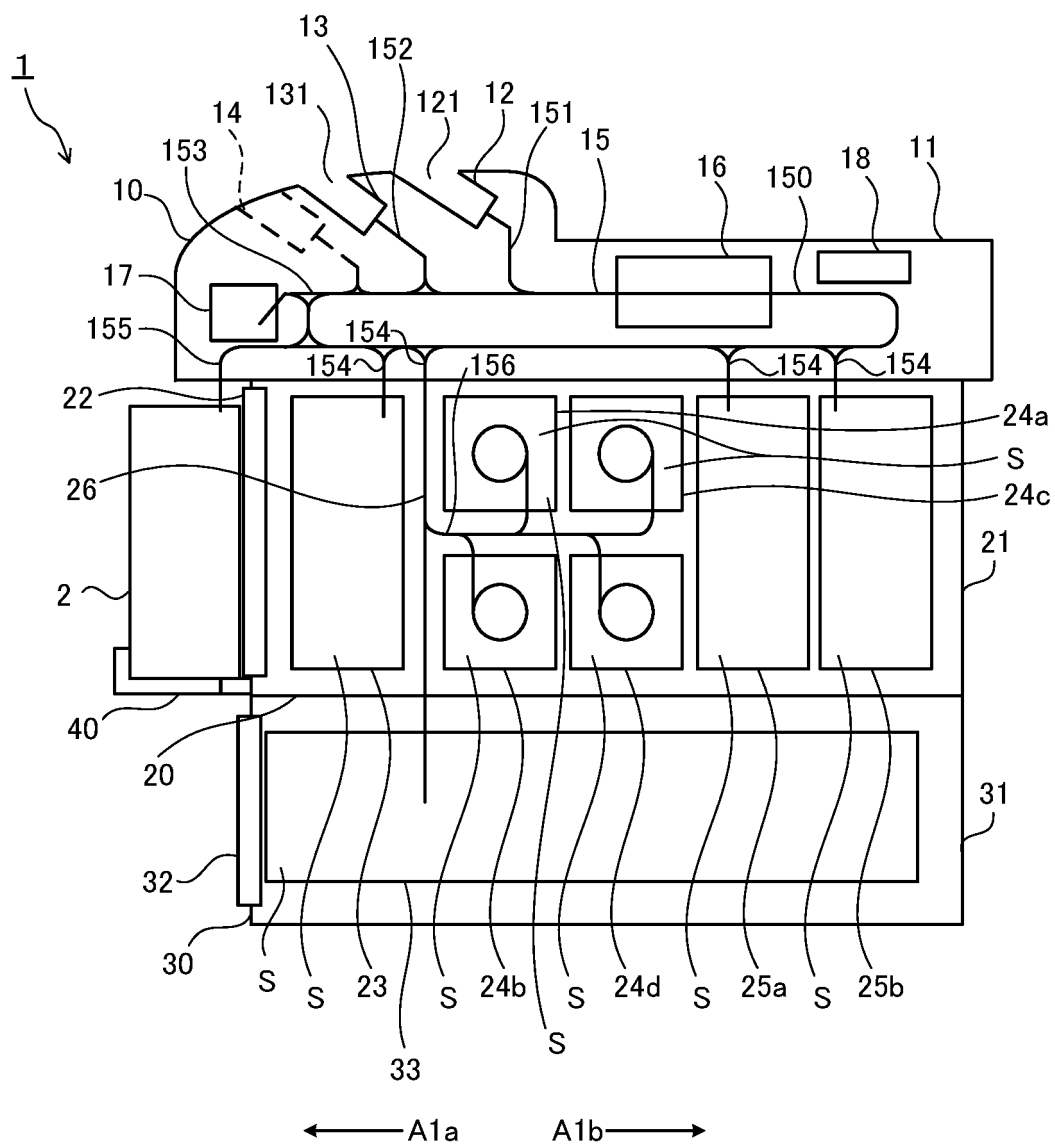


FIG. 1

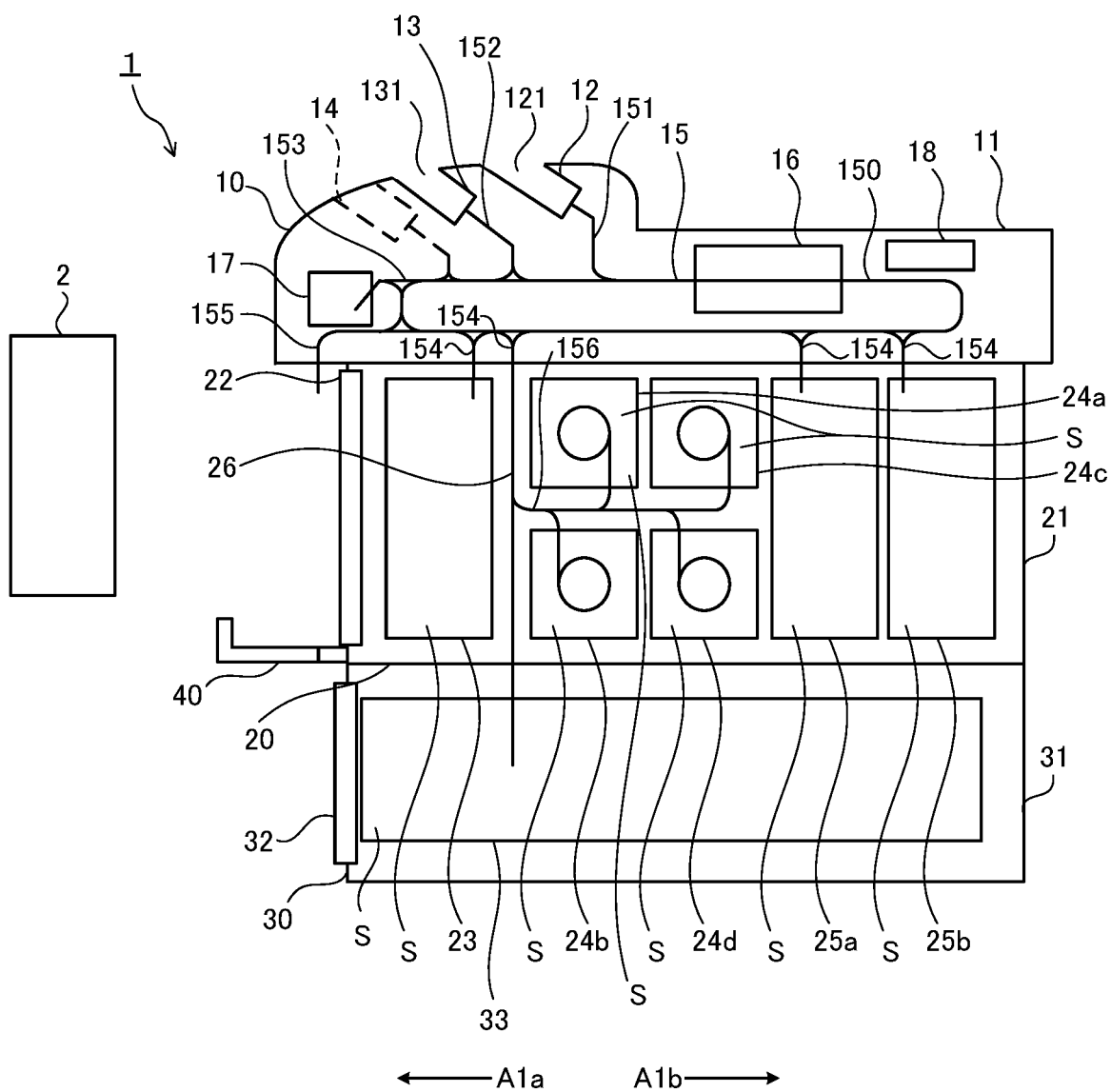


FIG. 2

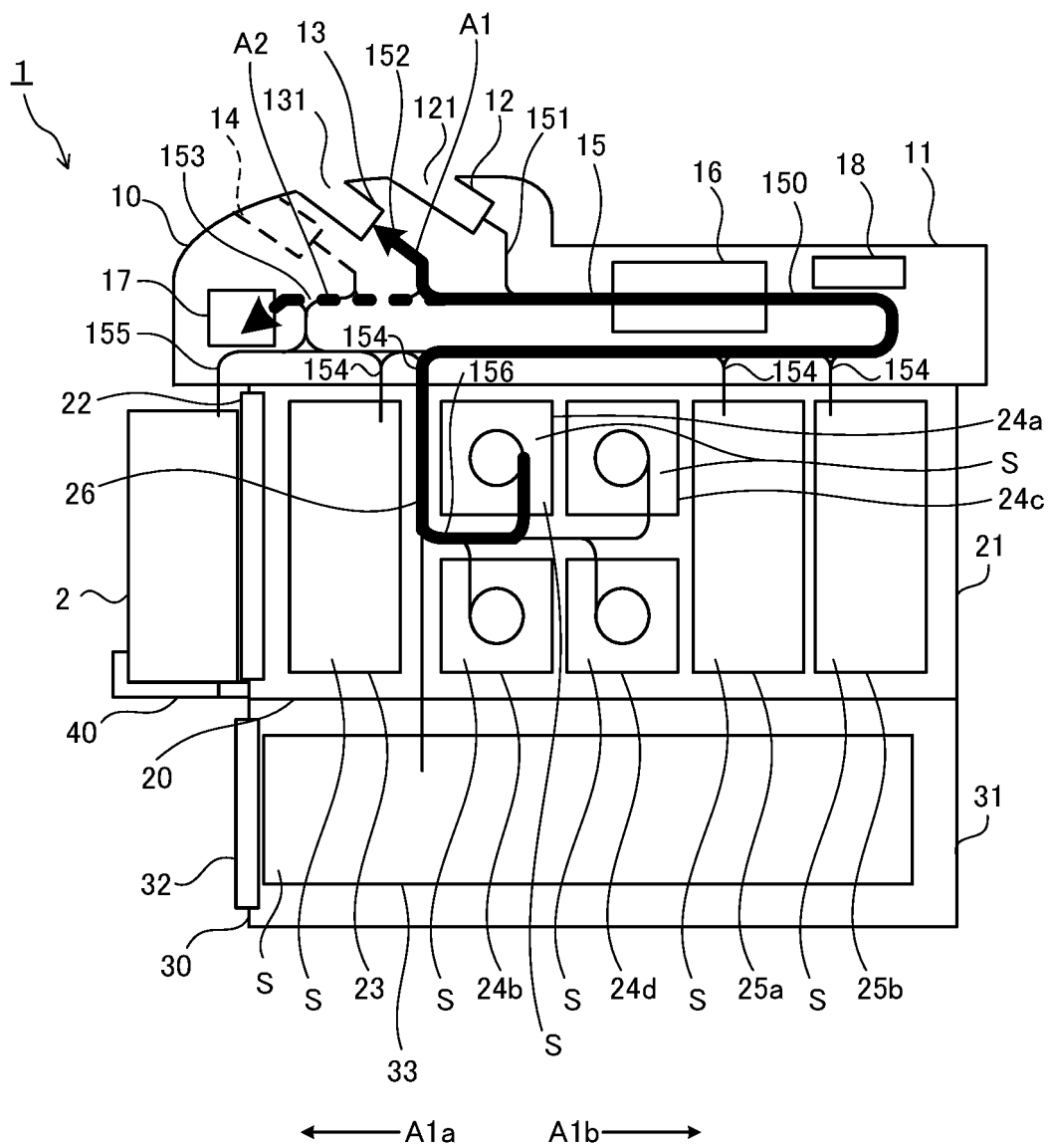


FIG. 3

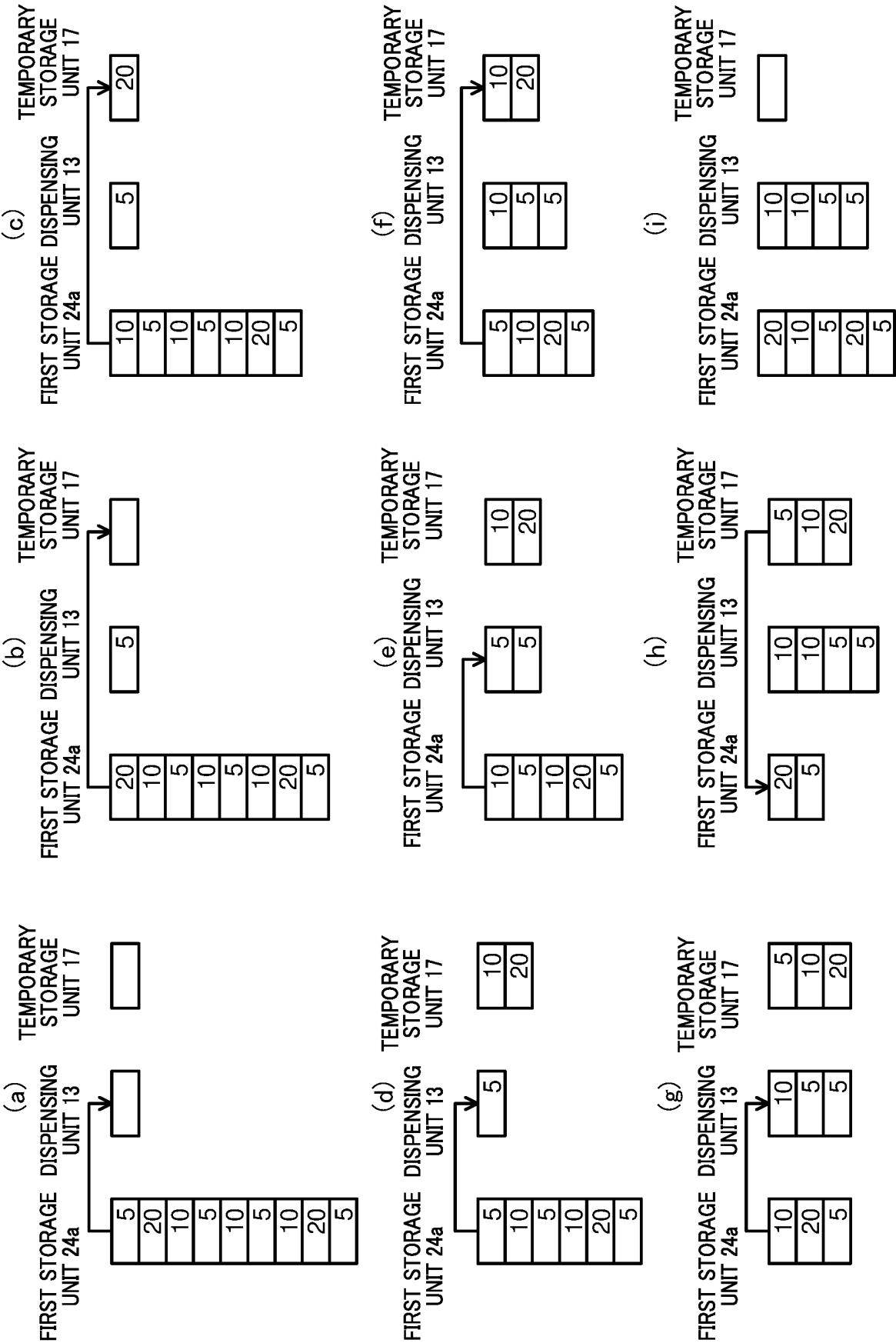


FIG. 4

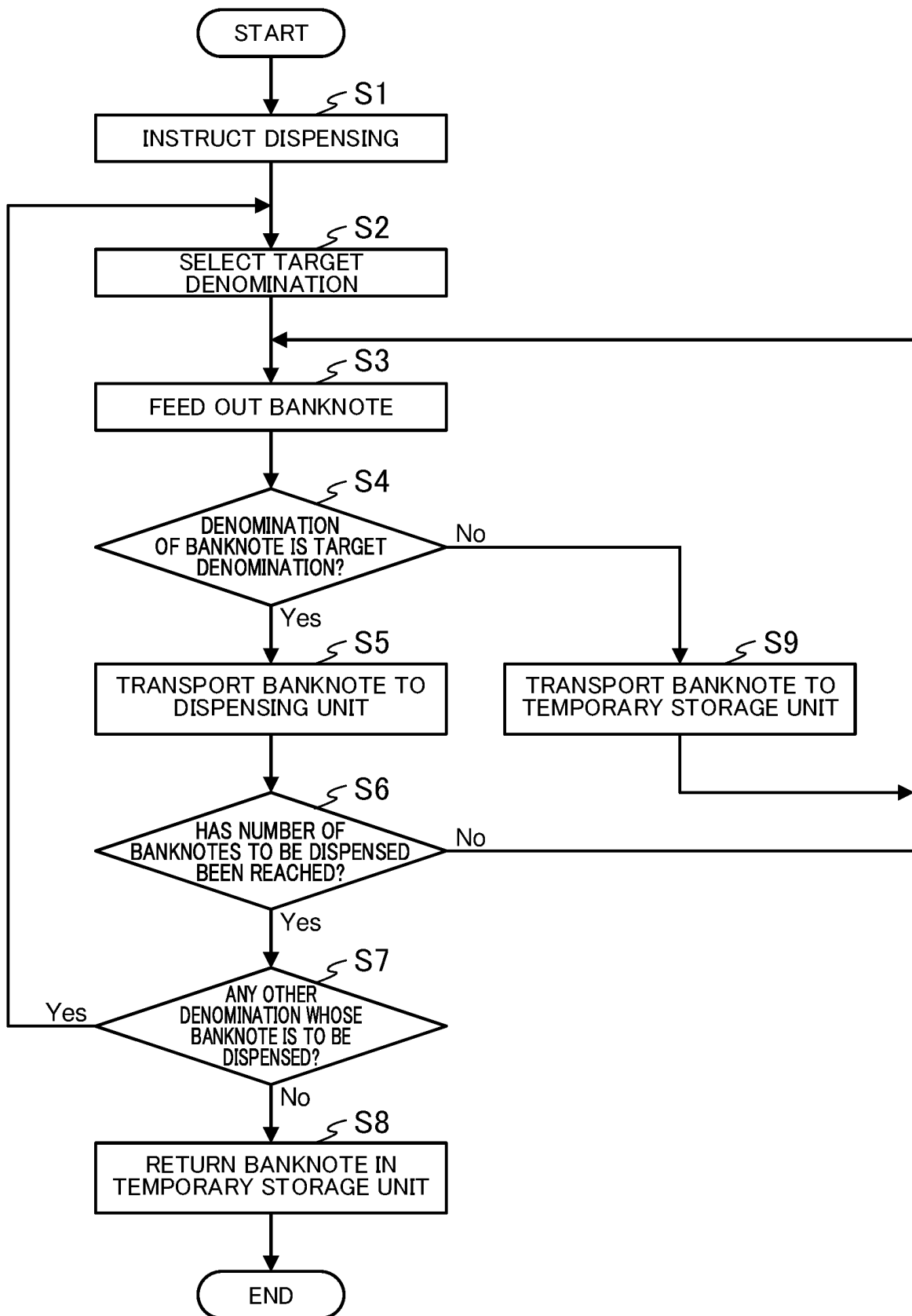


FIG. 5

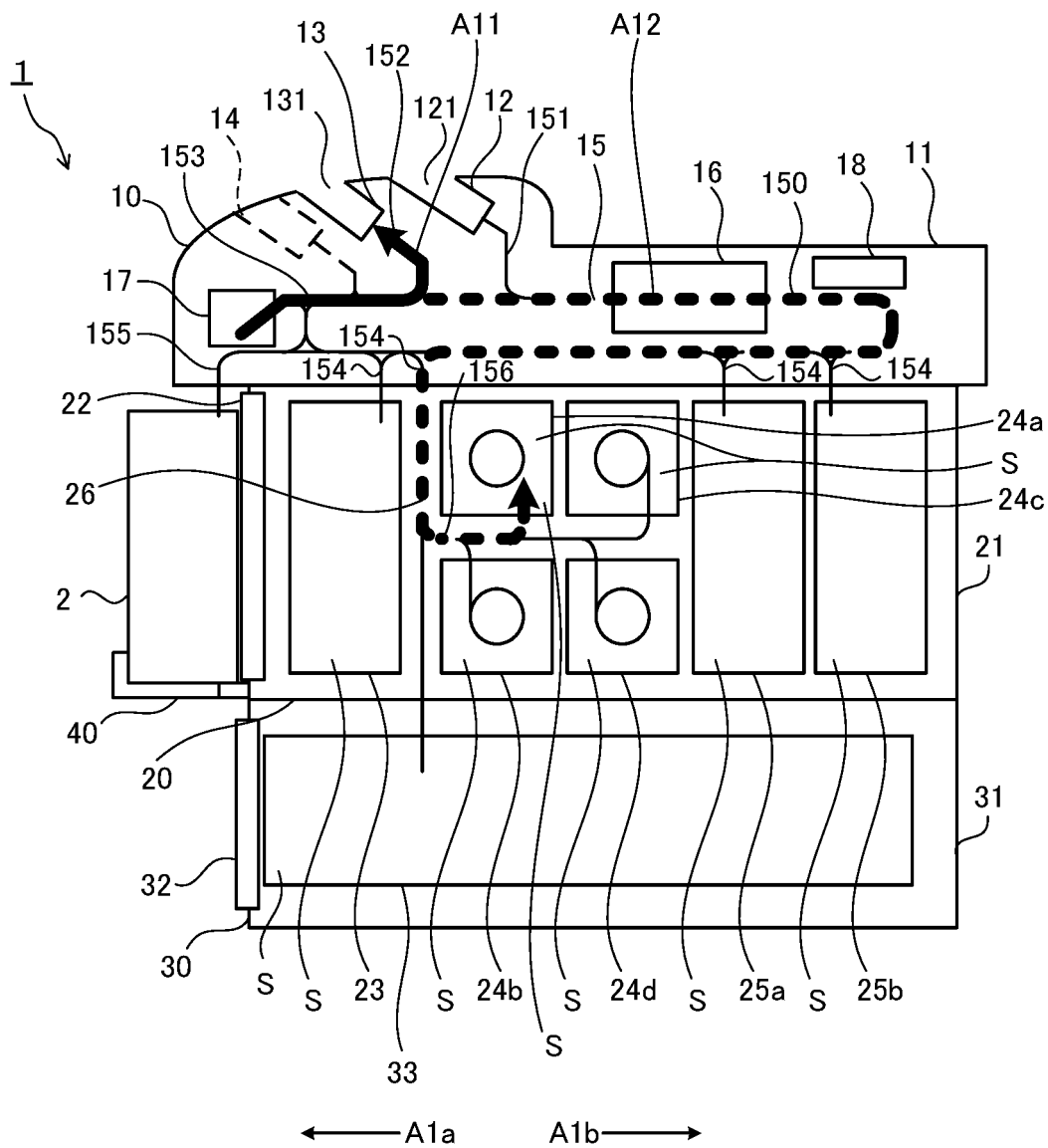


FIG. 6

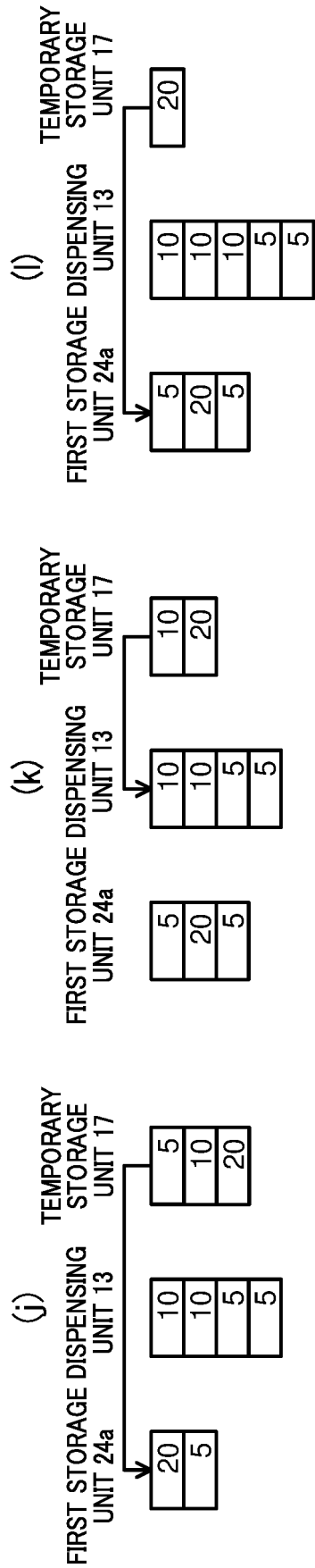


FIG. 7

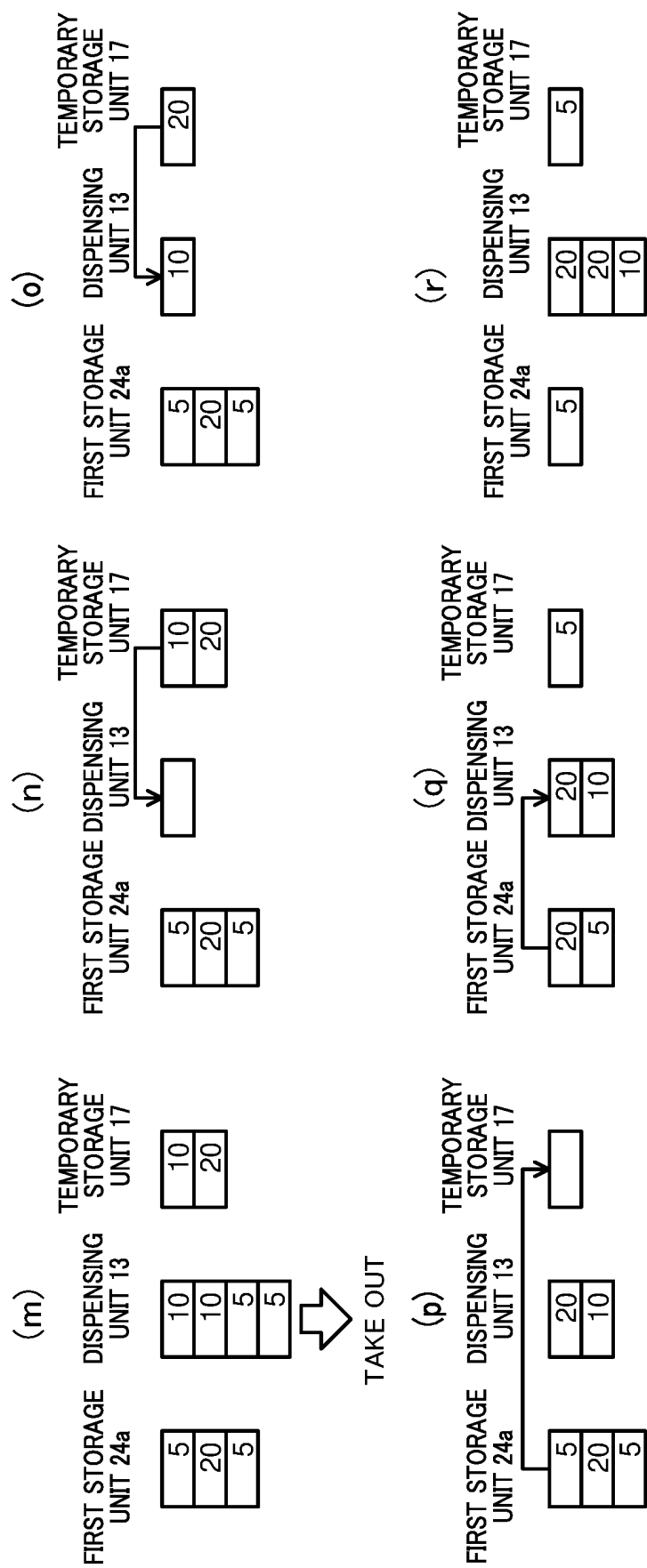


FIG. 8

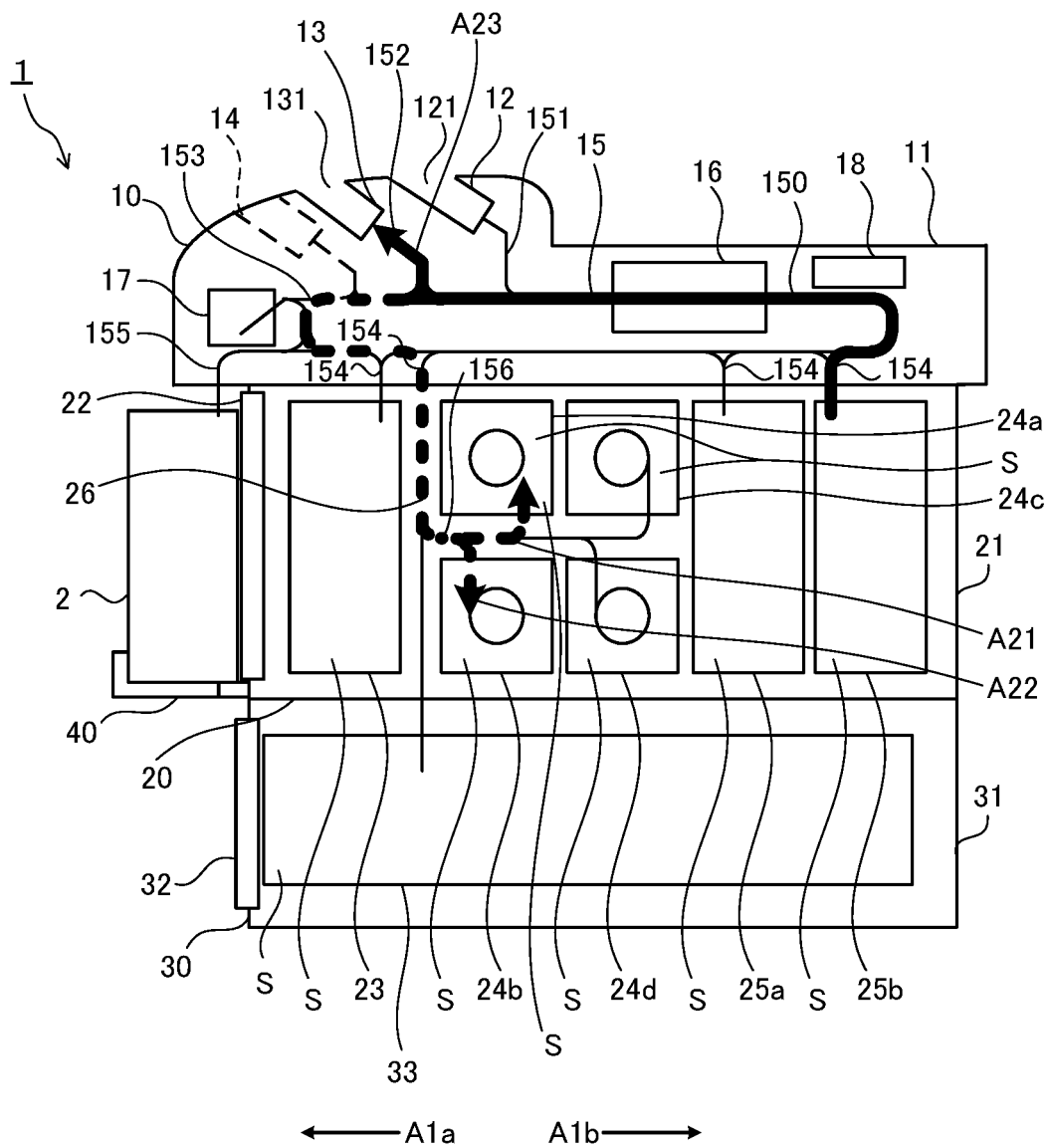


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2019/017334

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. G07D11/16 (2019.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. G07D11/16

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2019

Registered utility model specifications of Japan 1996-2019

Published registered utility model applications of Japan 1994-2019

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	JP 2002-056426 A (OKI ELECTRIC IND CO., LTD.) 22 February 2002, claim 6, paragraphs [0008], [0050] (Family: none)	1, 6-14 2-5
A	JP 2001-307175 A (OKI ELECTRIC IND CO., LTD.) 02 November 2001, paragraph [0009] (Family: none)	9, 10
A	JP 2001-357430 A (FUJI ELECTRIC CO., LTD.) 26 December 2001, paragraphs [0041]-[0048] (Family: none)	13



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

11.07.2019

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Patent documents cited in the description

- WO 2009069200 A [0003]