US 20250265887A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2025/0265887 A1

HUR et al. (43) Pub. Date: Aug. 21, 2025

(54) **AUTOMATED TELLER MACHINE**

(71) Applicant: **HYOSUNG TNS INC.**, Seoul (KR)

(72) Inventors: **Sung Chang HUR**, Seoul (KR); **Myungwoo LEE**, Seoul (KR); **Seungin LEE**, Seoul (KR); **Hyeram CHO**, Seoul (KR); **Seungsik JEONG**, Seoul (KR); **Youngho HAN**, Seoul (KR)

(21) Appl. No.: **19/056,952**

(22) Filed: **Feb. 19, 2025**

(30) **Foreign Application Priority Data**

Feb. 19, 2024 (KR) 10-2024-0023715
Nov. 29, 2024 (KR) 10-2024-0175492

Publication Classification

(51) **Int. Cl.**

G07D 11/18	(2019.01)
B65H 3/06	(2006.01)
B65H 7/02	(2006.01)
G07D 11/14	(2019.01)
G07D 11/235	(2019.01)

(52) **U.S. Cl.**

CPC ***G07D 11/18*** (2019.01); ***B65H 3/0669*** (2013.01); ***B65H 7/02*** (2013.01); ***G07D 11/14*** (2019.01); ***G07D 11/235*** (2019.01); *B65H 2403/41* (2013.01); *G07D 2207/00* (2013.01); *G07D 2211/00* (2013.01)

(57) **ABSTRACT**

An automated teller machine includes: a deposit and withdrawal unit configured to allow deposit and withdrawal of a medium, which allows a bundle of media including multiple stacked media to be deposited; a discrimination unit that discriminates the medium; a storage unit in which the medium is stored; a conveyance path that transfers the medium between the deposit and withdrawal unit, the discrimination unit, and the storage unit. The deposit and withdrawal unit includes: a push plate unit on which the bundle of media is placed; a first pick-up roller for transferring the bundle of media in a deposit direction toward the discrimination unit when the bundle of media is placed on the push plate unit; and a second pick-up roller, disposed to be spaced apart from the first pick-up roller in the deposit direction, for transferring the medium from the bundle of media in the deposit direction.

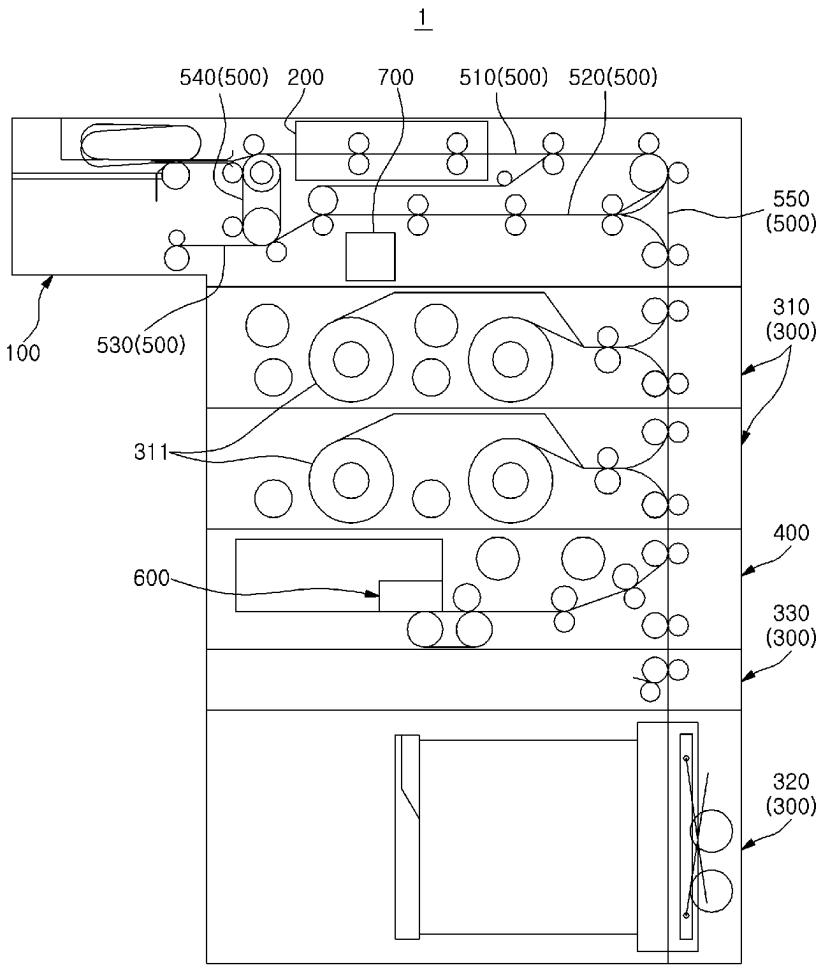

FIG. 1

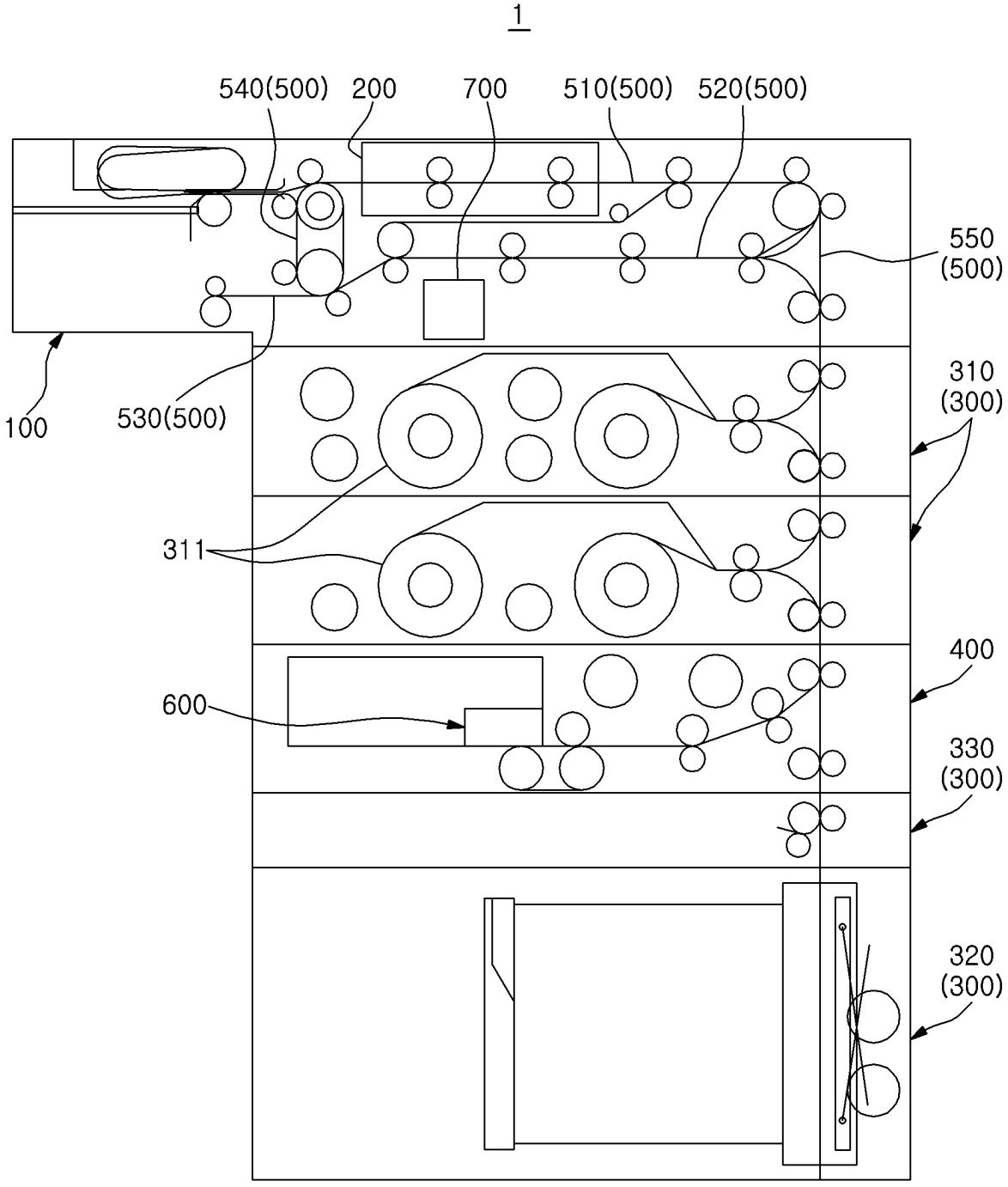
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FIG.2

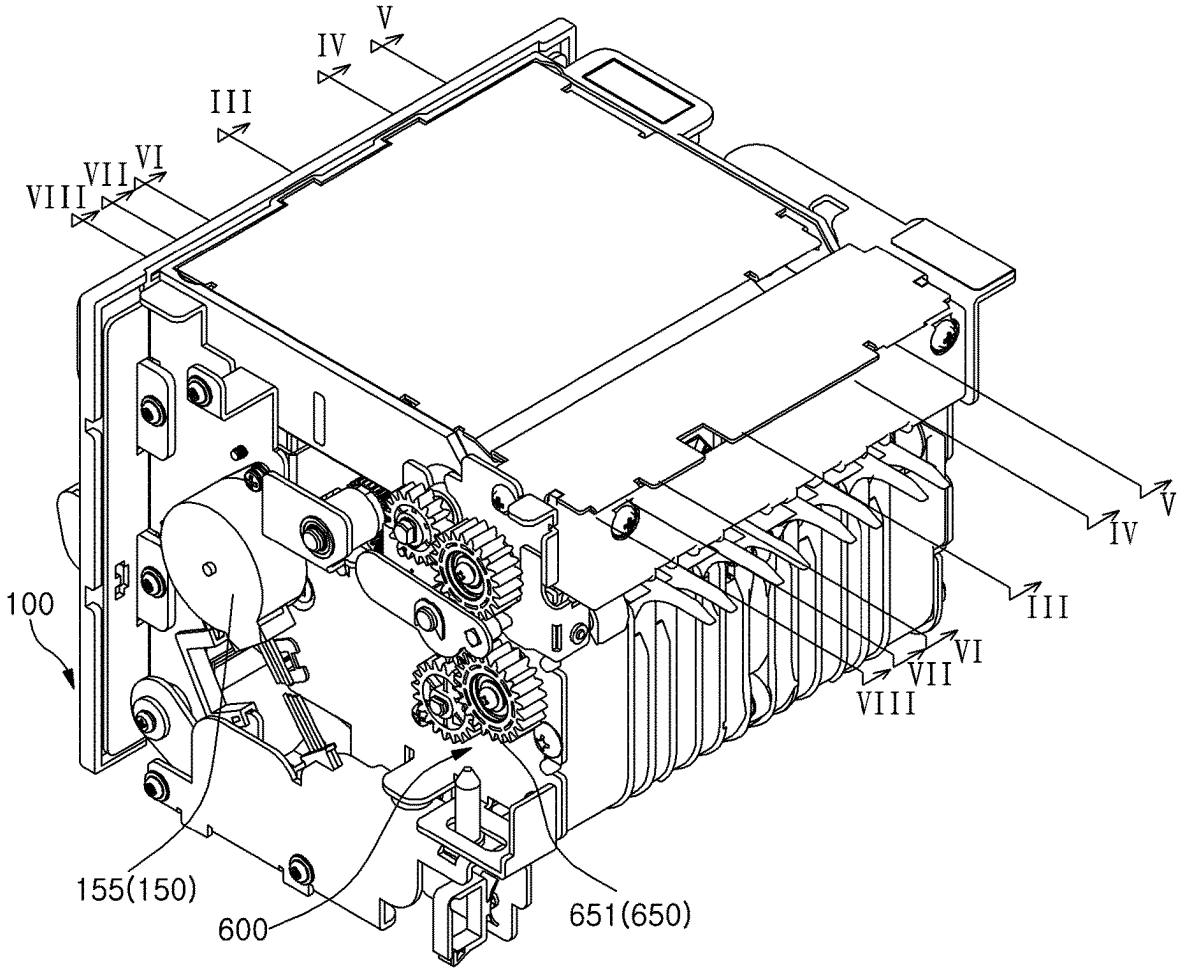

FIG. 3

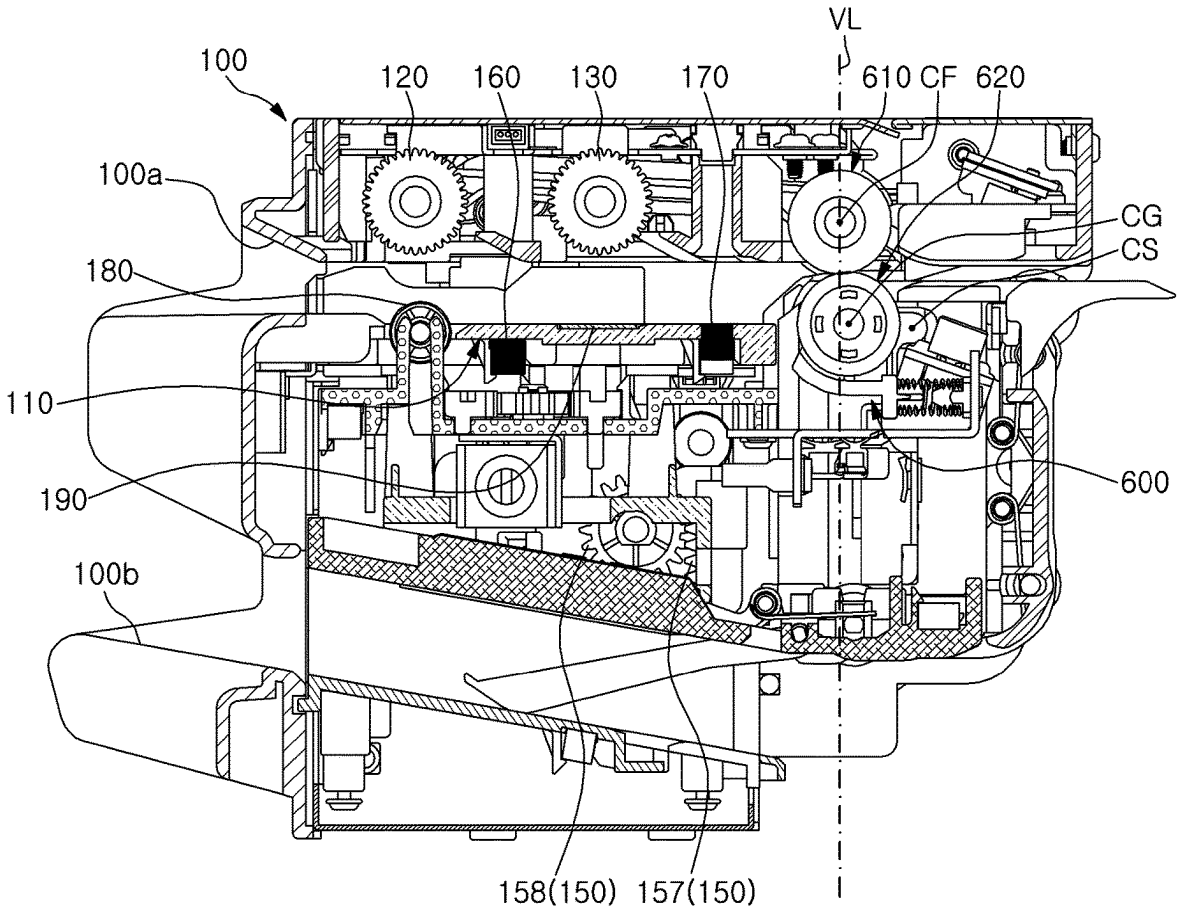
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FIG. 4

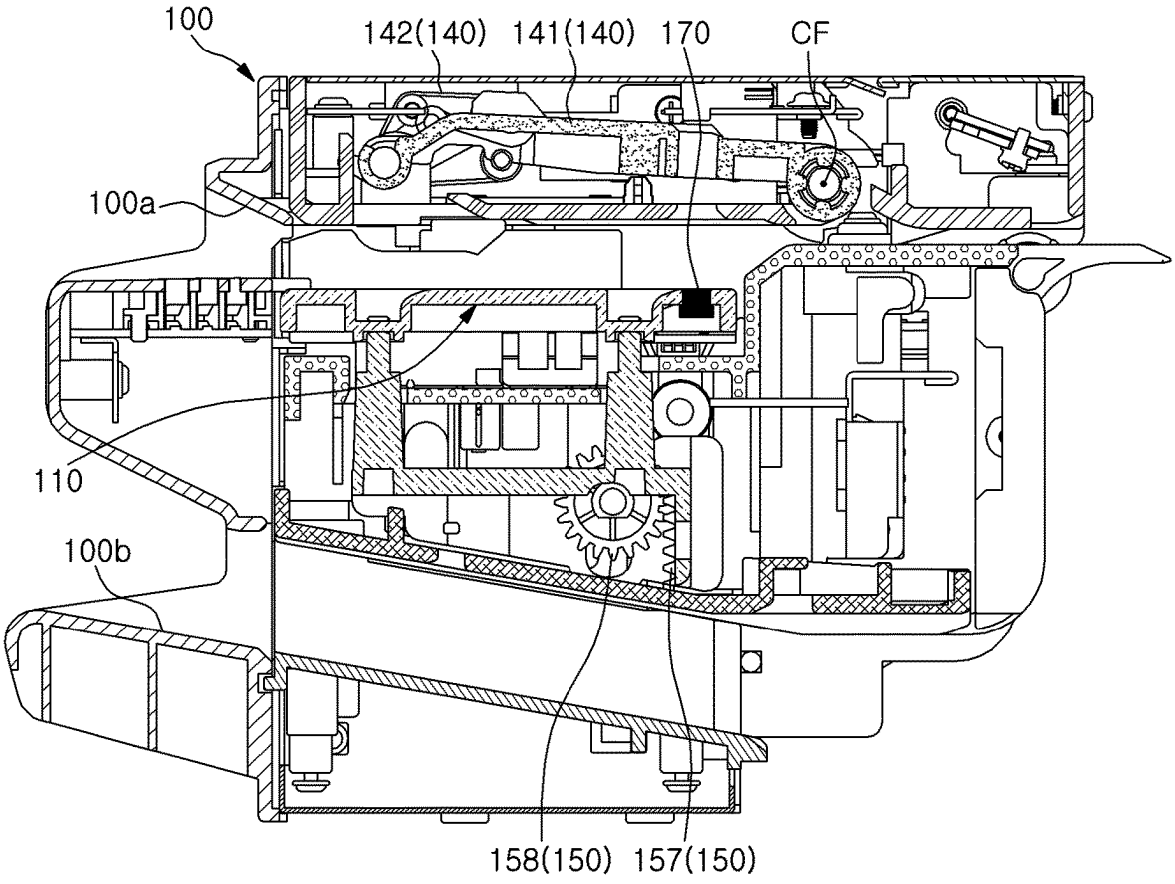

FIG.5

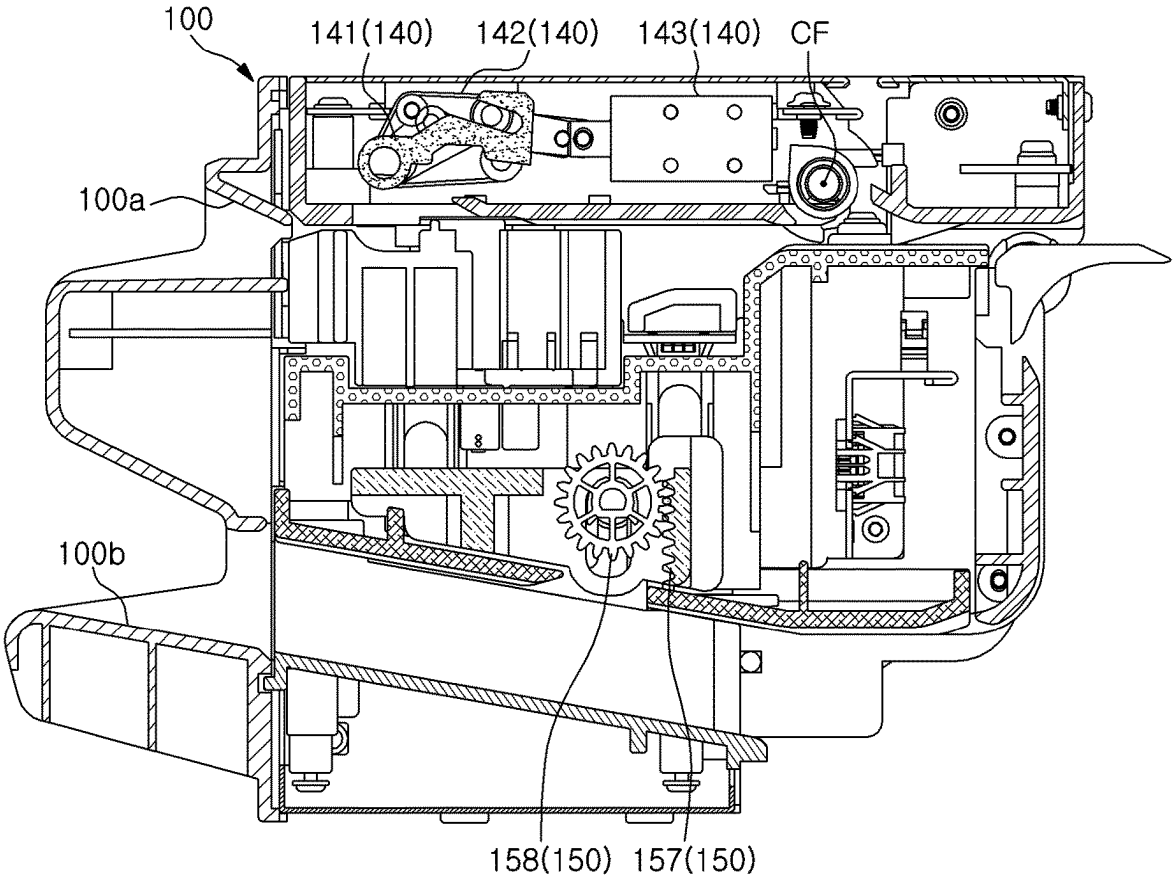

FIG. 6

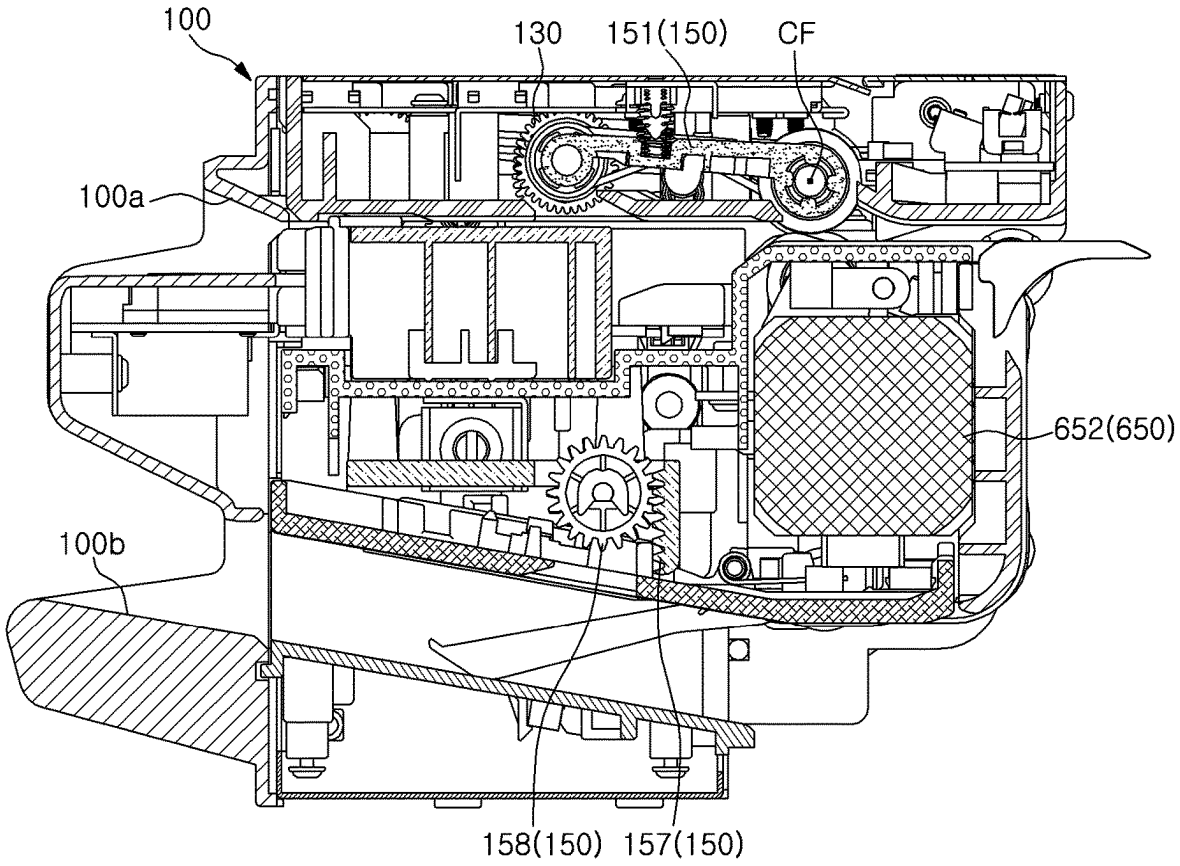

FIG. 7

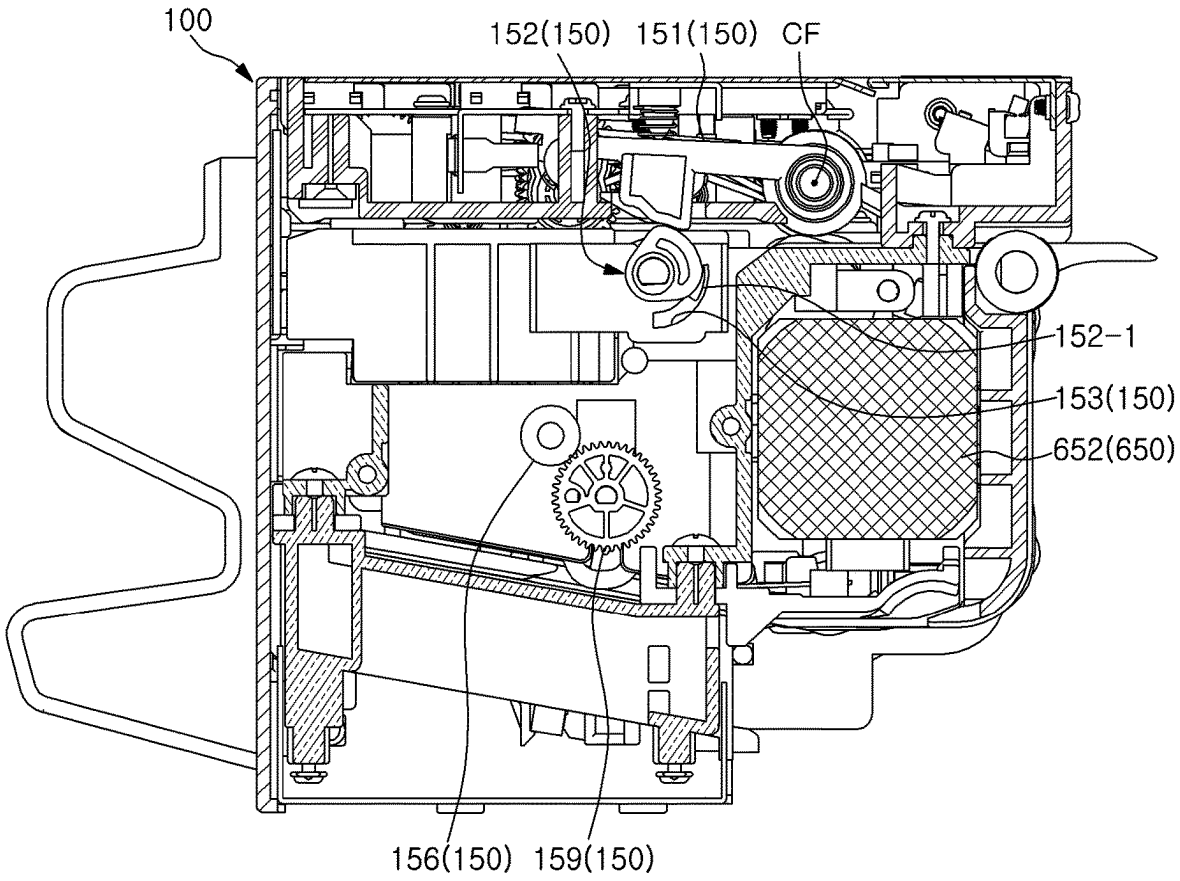

FIG.8

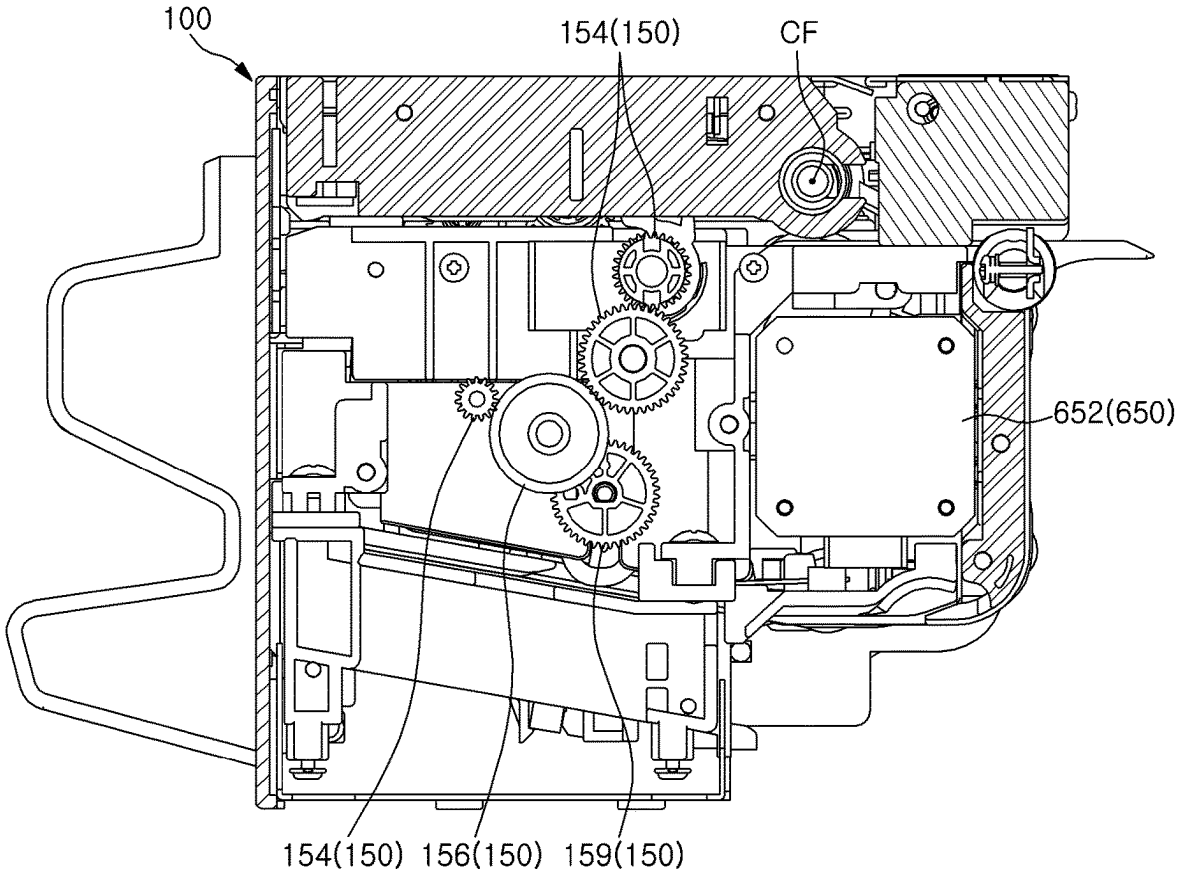

FIG. 9

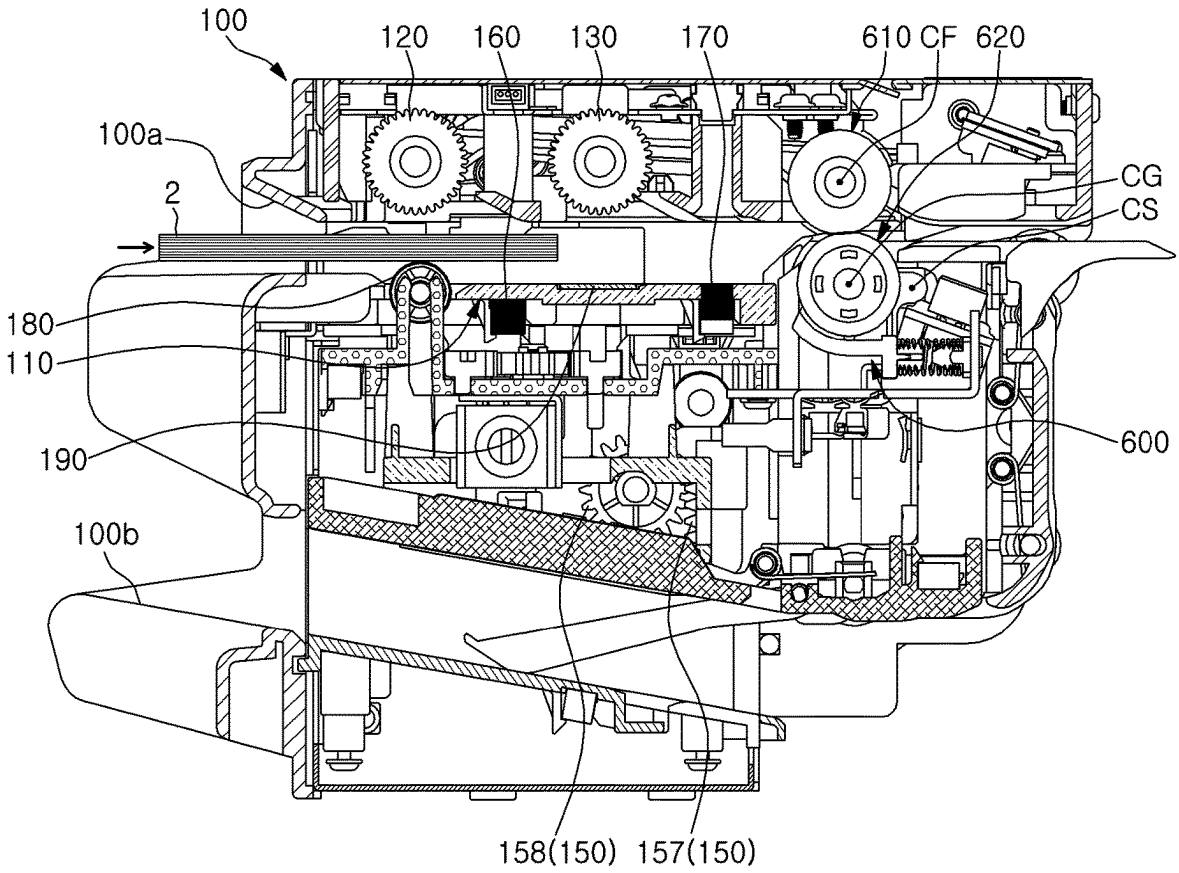
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FIG. 10

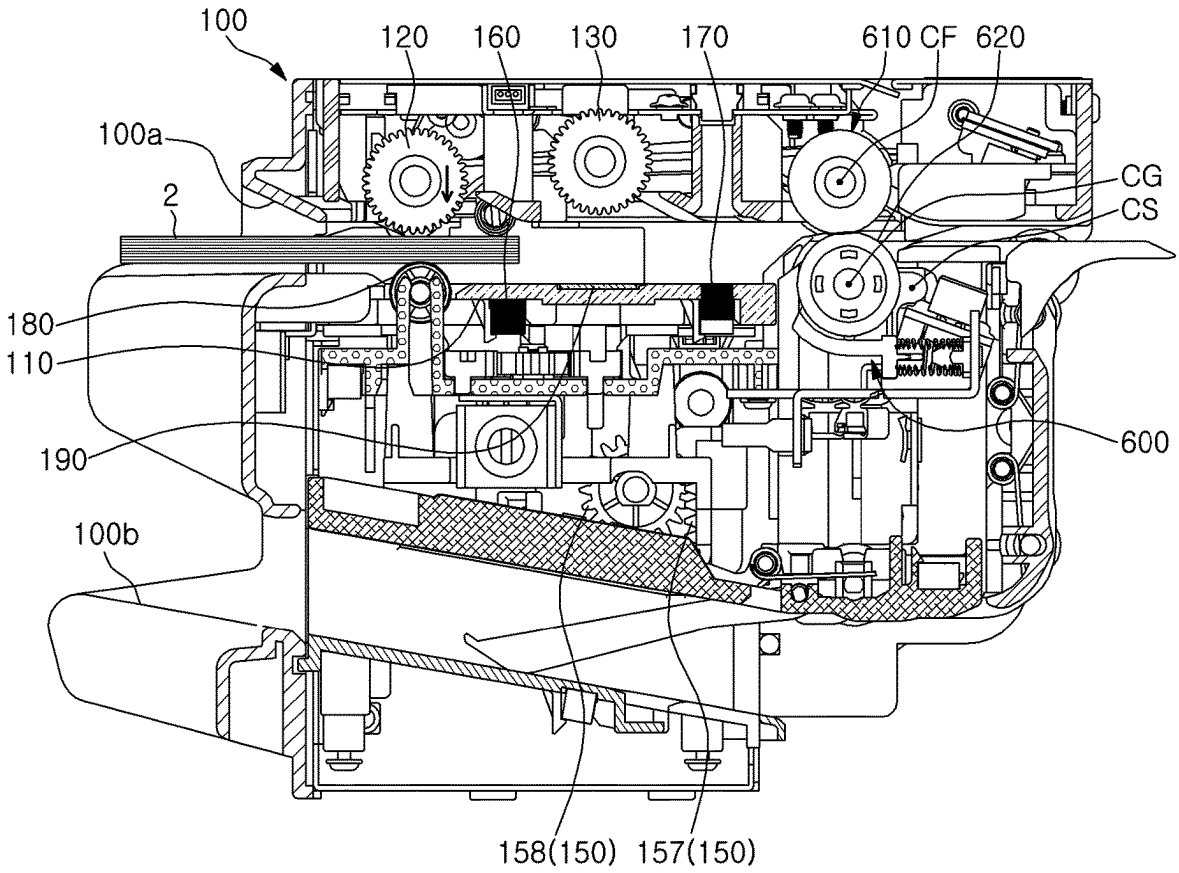
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FIG. 11

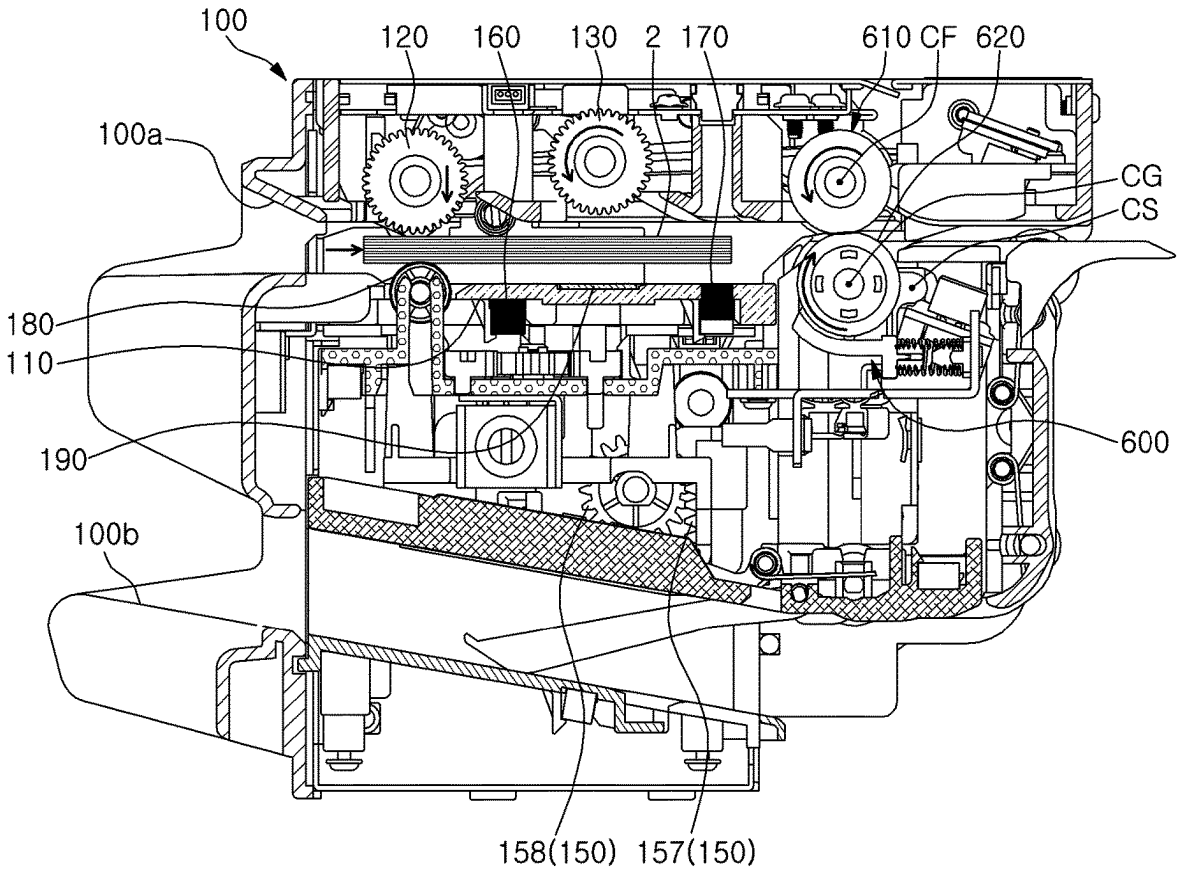
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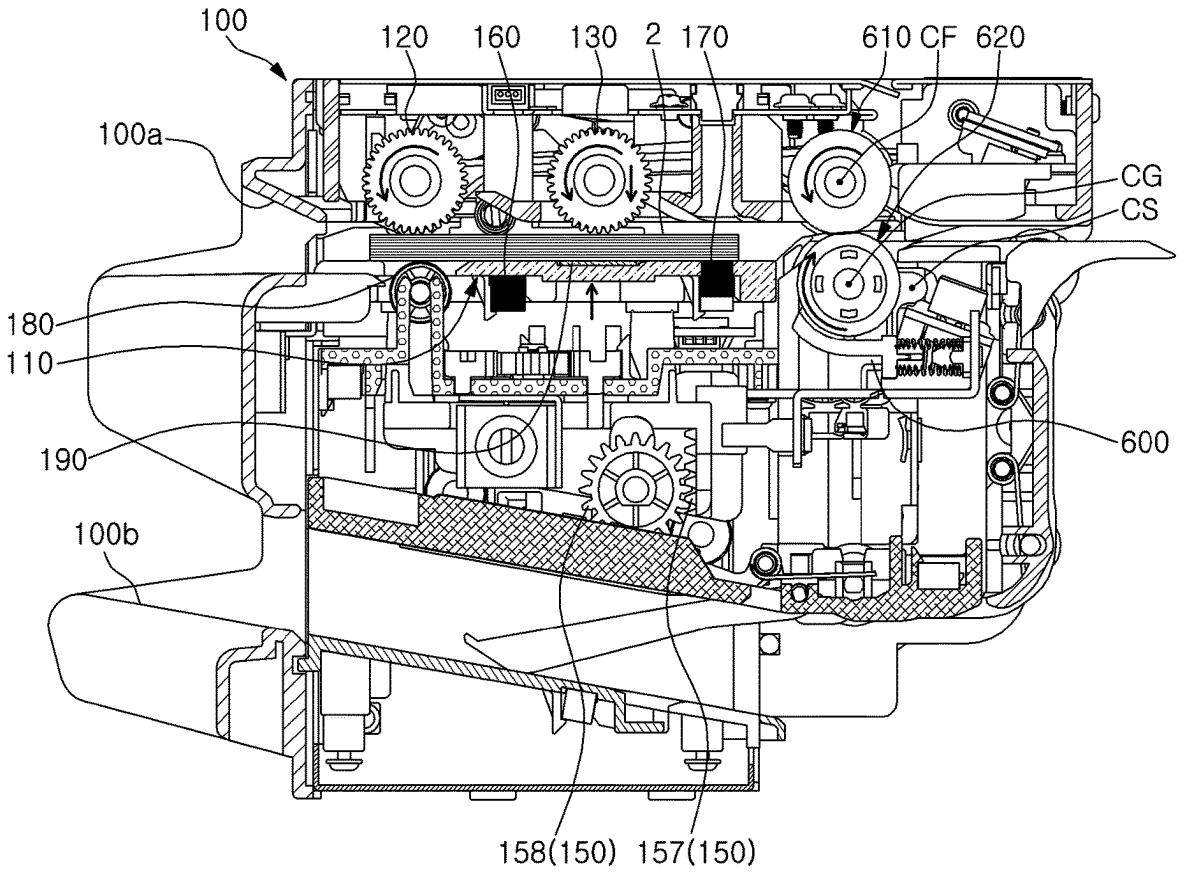
FIG. 12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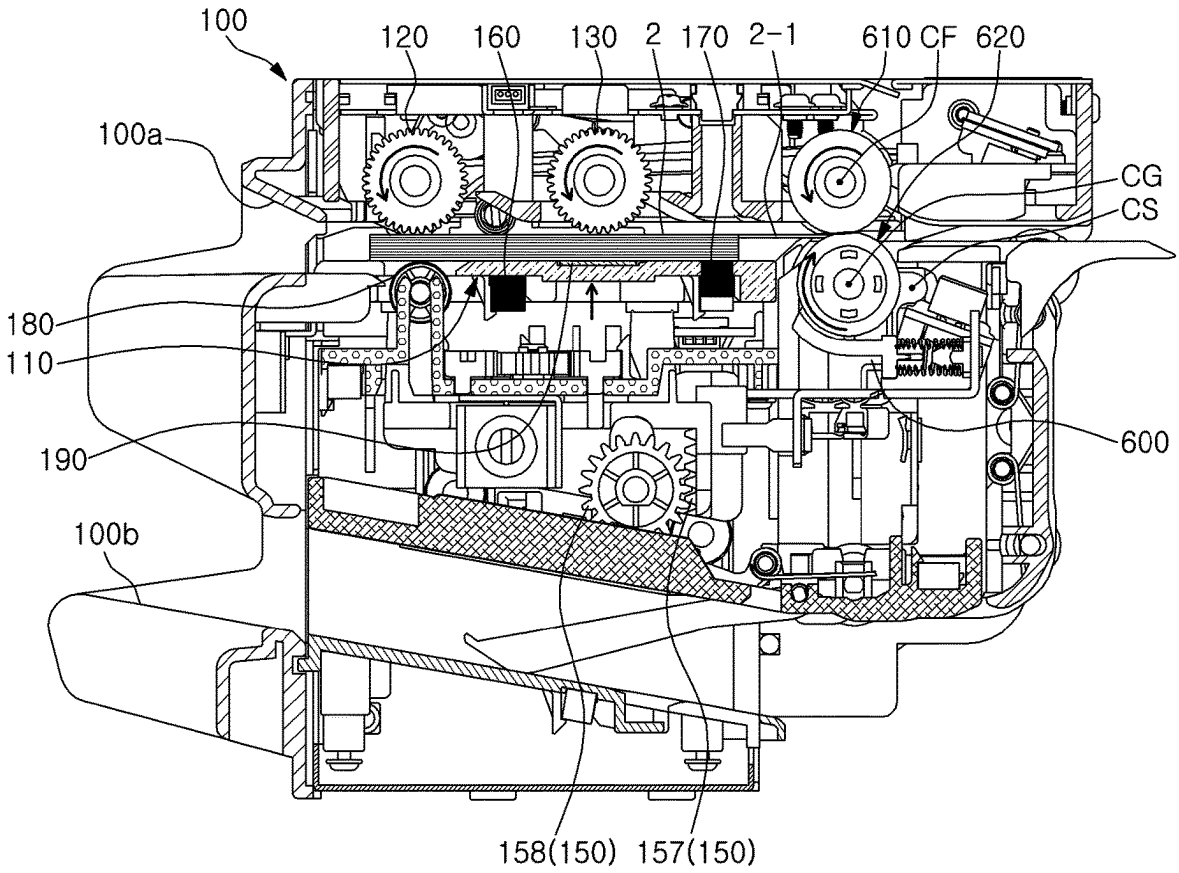
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FIG. 14

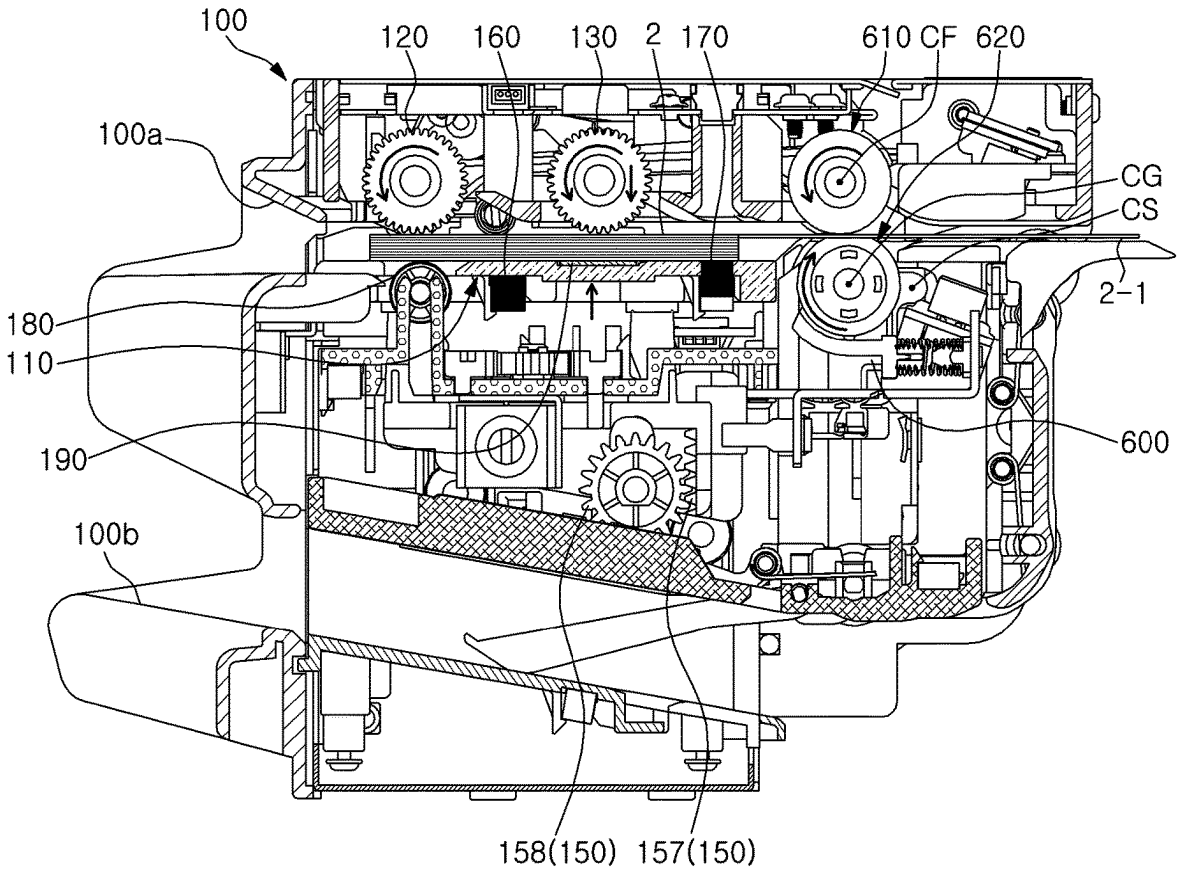
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FIG. 15

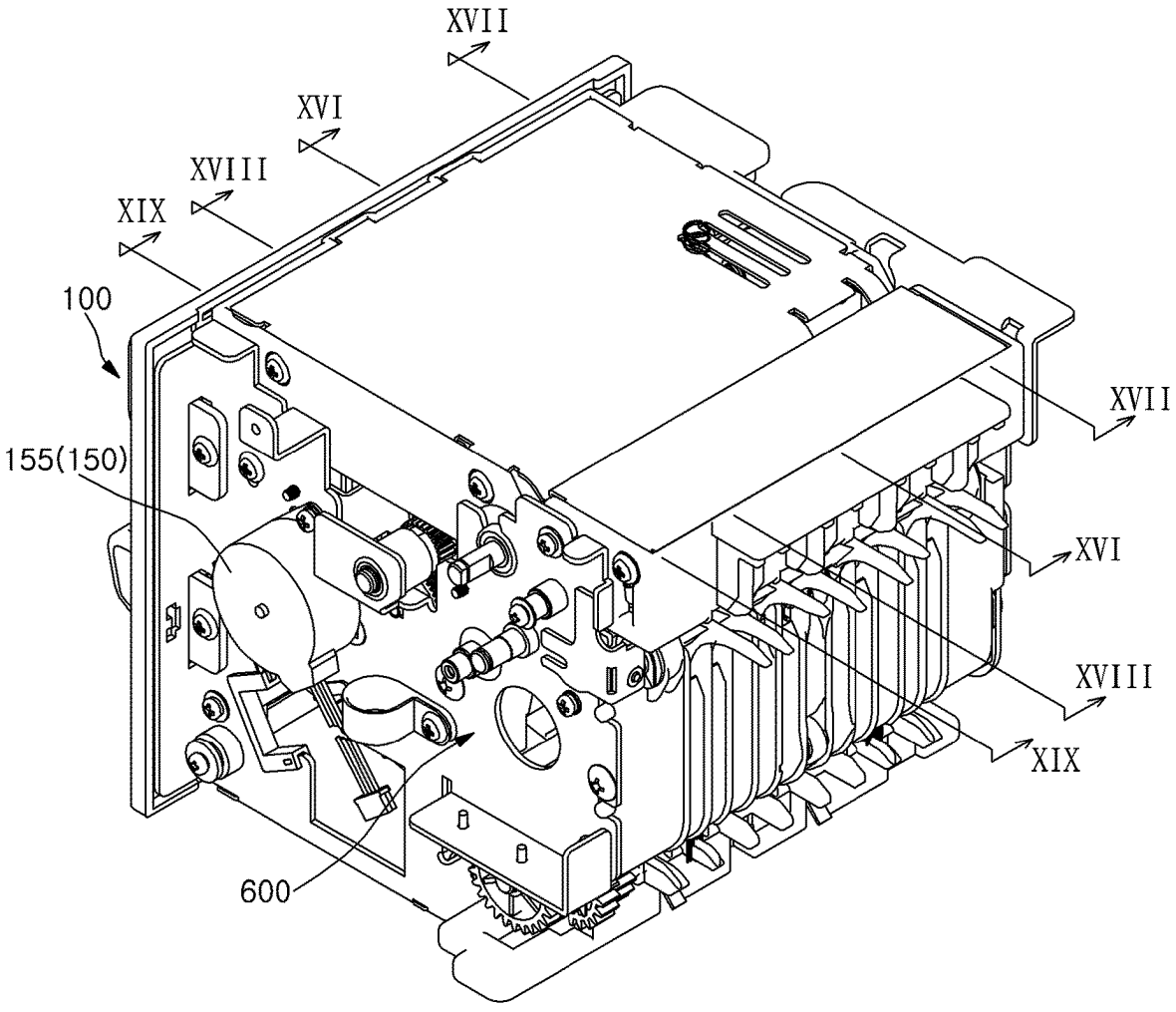

FIG. 16

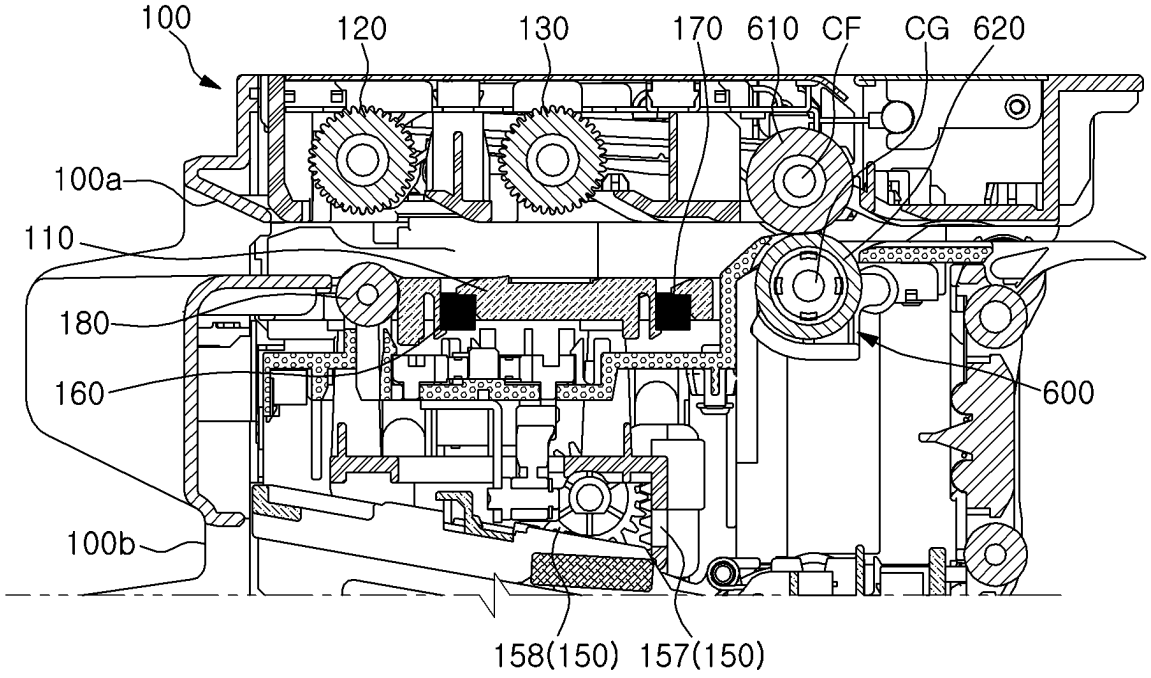
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FIG. 17

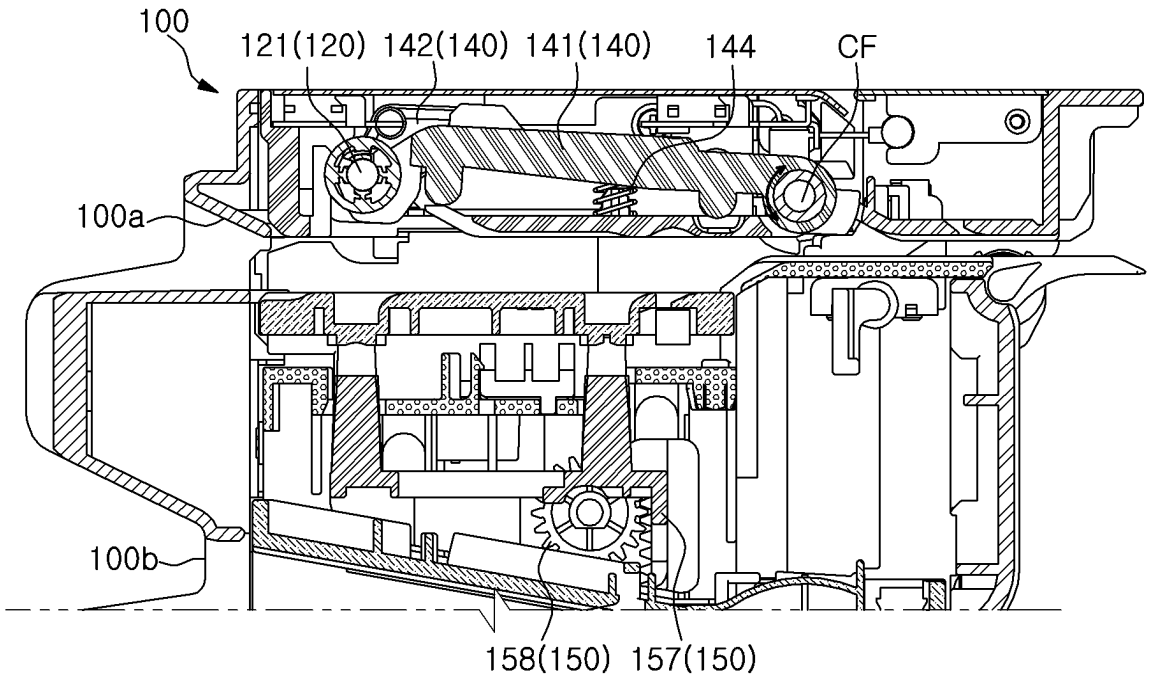

FIG. 18

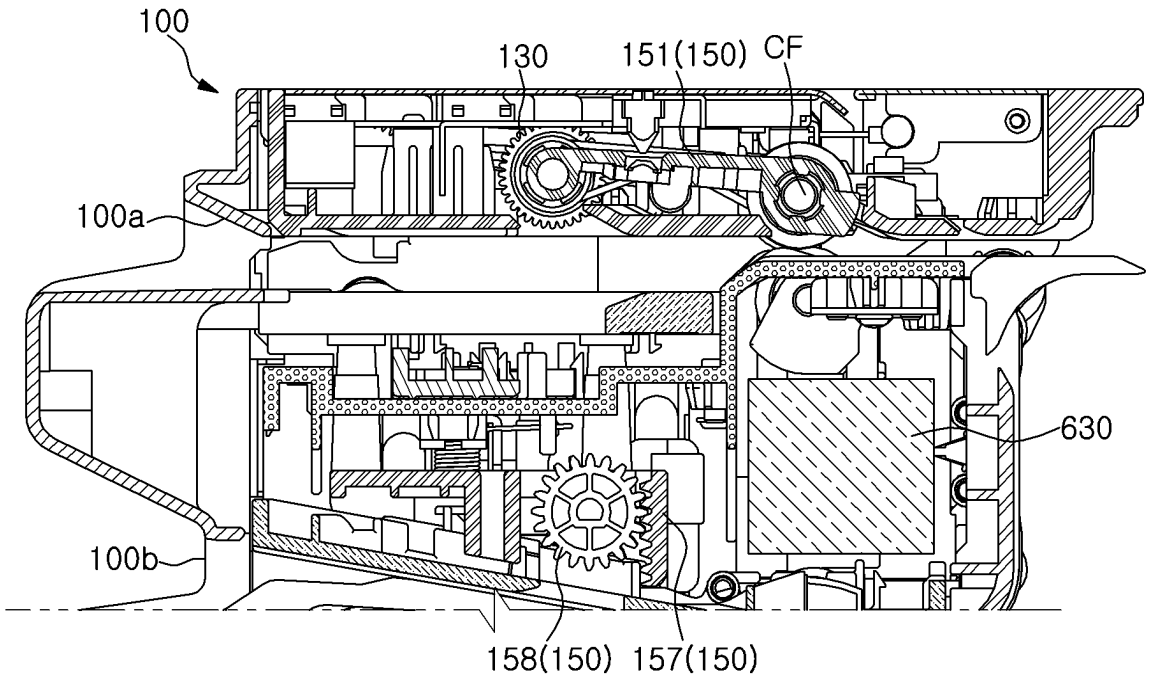

FIG. 19

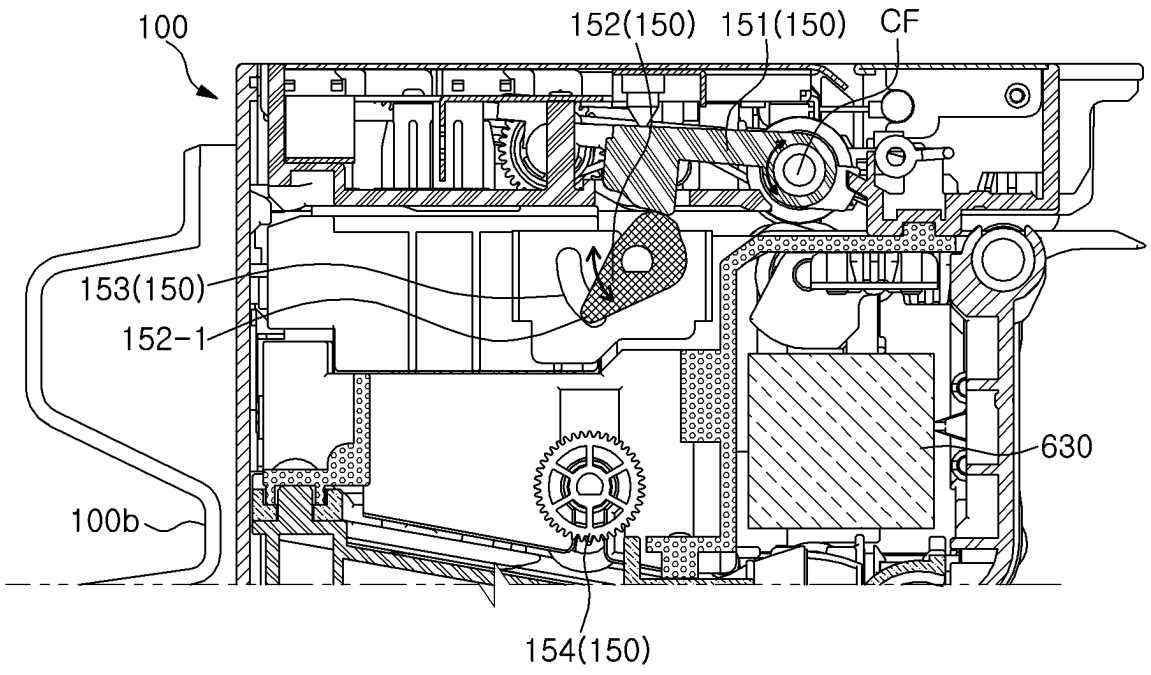

FIG.20

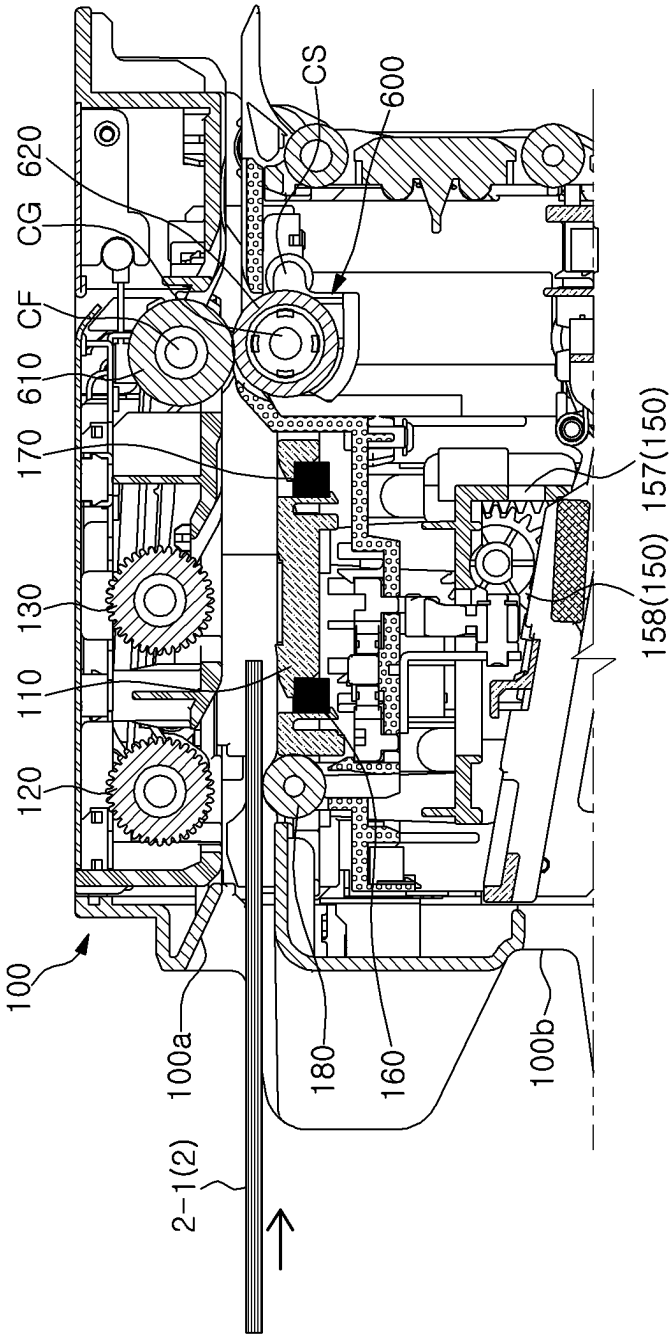
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FIG.21

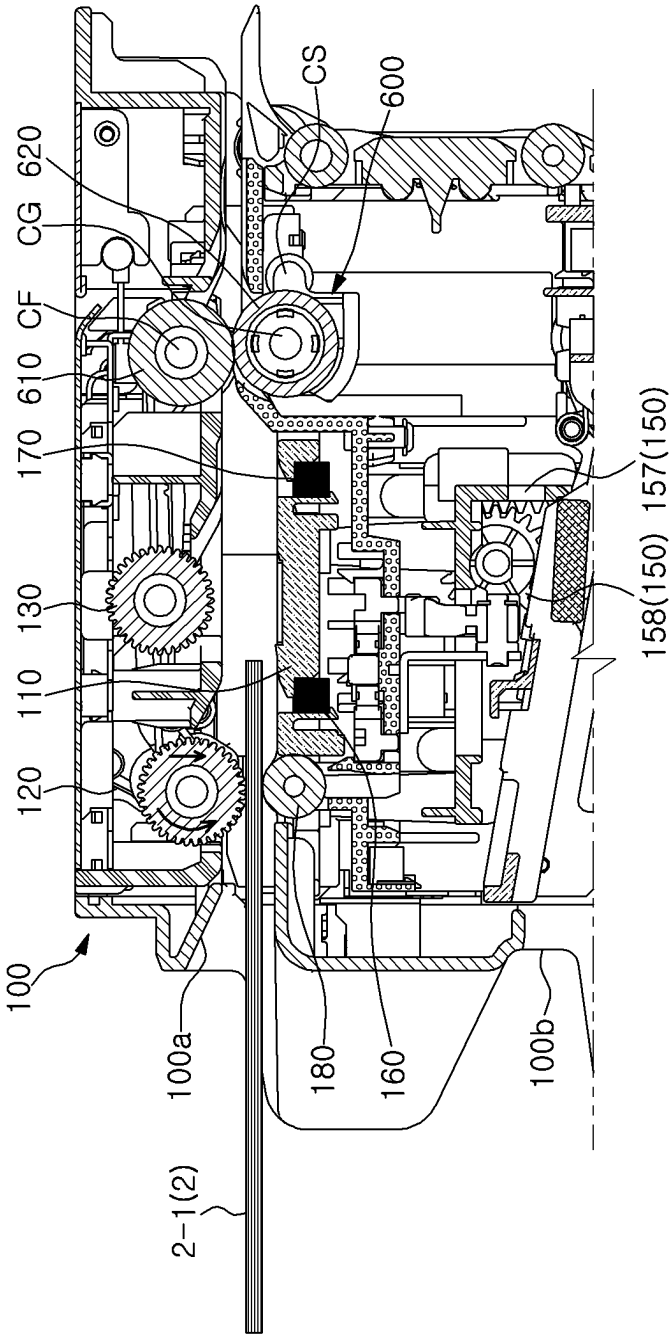
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FIG.22

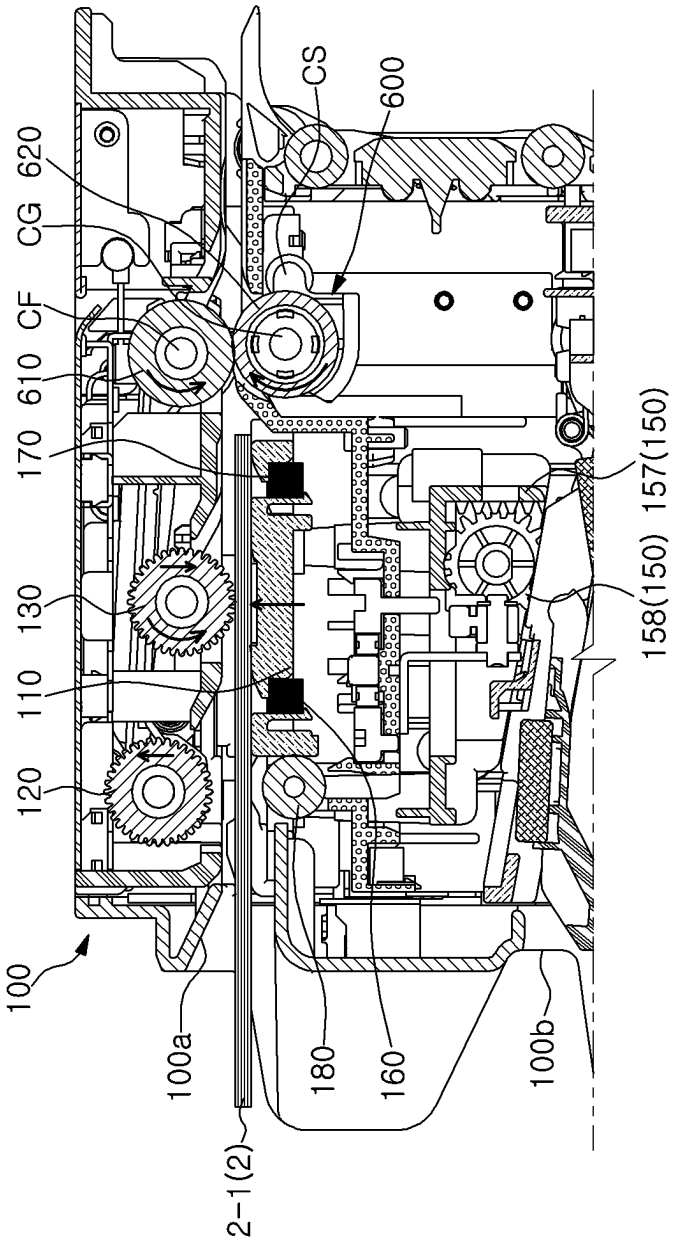
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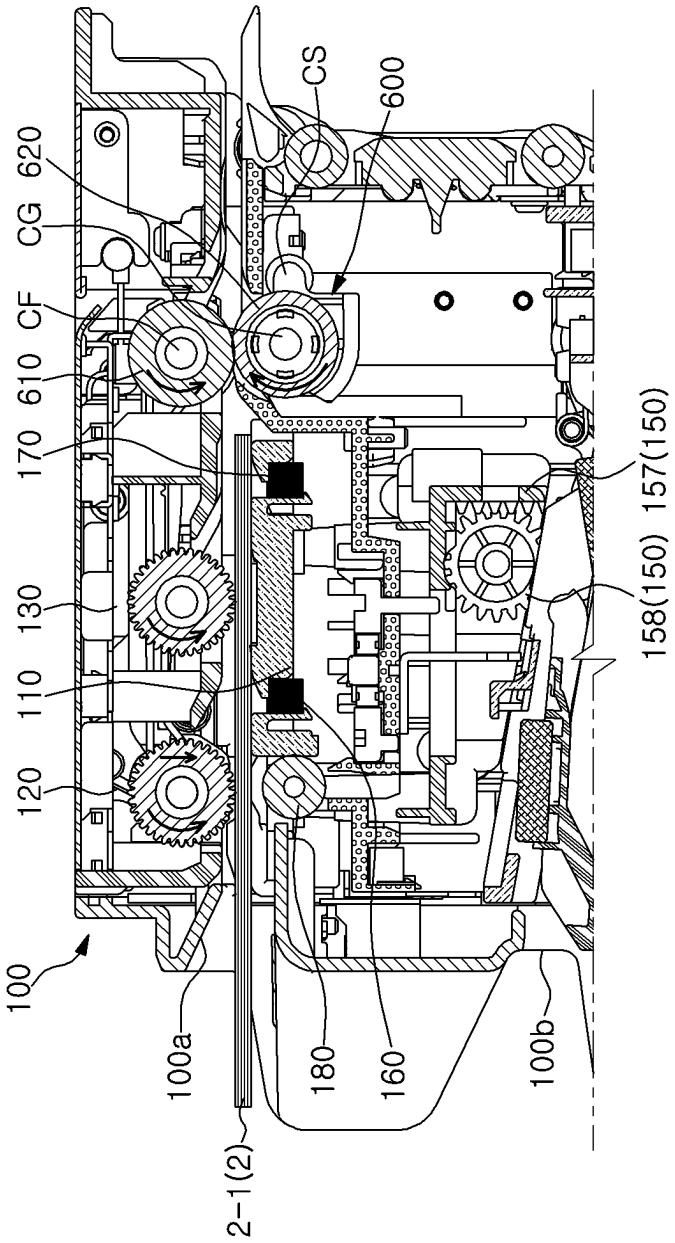
FIG. 23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AUTOMATED TELLER MACHINE

TECHNICAL FIELD

[0001] The present disclosure relates to an automated teller machine.

BACKGROUND

[0002] In general, in relation to financial services, an automated teller machine (ATM) refers to an automated teller machine, such as a cash dispenser unit (CDU), a bill recycling machine (BRM) or the like, which is developed to provide most financial services unmanned, except for consultation services, quickly and conveniently without time constraints.

[0003] The automated teller machine has various additional functions, such as card processing, passbook processing, and check deposit machines, depending on the function of the financial service, in addition to the automatic cash deposit/withdrawal function.

[0004] The automated teller machine may allow media such as banknotes to be deposited in a bundle of multiple stacked media, and when the bundle of media is deposited, the automated teller machine needs to separate the bundled media into individual sheets and transfer them.

[0005] Meanwhile, the bundled media can be deposited vertically or horizontally in an automated teller machine. However, conventional automated teller machines in which a bundle of media is deposited horizontally have a relatively complex configuration for separating the deposited bundled media and transferring individual sheets. In addition, when the bundled media are separated through feed rollers and gate rollers in a deposit and withdrawal unit, the phenomenon in which the individual sheets are twisted may occur.

SUMMARY

[0006] In view of the above, the present disclosure provides an automated teller machine having a relatively simple configuration for separating bundled media in which multiple media such as banknotes are stacked and transferring individual sheets.

[0007] Further, the present disclosure provides an automated teller machine capable of effectively preventing twisting of media in a deposit and withdrawal unit.

[0008] In accordance with a first embodiment of the present disclosure, there is provided an automated teller machine including: a deposit and withdrawal unit configured to allow deposit and withdrawal of a medium, which allows a bundle of media including multiple stacked media to be deposited; a discrimination unit that discriminates the medium; a storage unit in which the medium is stored; a conveyance path that transfers the medium between the deposit and withdrawal unit, the discrimination unit, and the storage unit, wherein the deposit and withdrawal unit includes: a push plate unit on which the bundle of media is placed; a first pick-up roller for transferring the bundle of media in a deposit direction toward the discrimination unit when the bundle of media is placed on the push plate unit; and a second pick-up roller, disposed to be spaced apart from the first pick-up roller in the deposit direction, for transferring the medium from the bundle of media in the deposit direction.

[0009] Further, the automated teller machine may further include a controller configured to control the deposit and withdrawal unit, wherein the deposit and withdrawal unit may further include: a first lifting and lowering drive unit configured to raise and lower the first pickup roller; and a second lifting and lowering drive unit configured to raise and lower the second pickup roller, and the controller may control the first lifting and lowering drive unit and the second lifting and lowering drive unit.

[0010] Further, the deposit and withdrawal unit may further include: a first medium detection sensor for detecting whether the bundle of media has reached a region directly above the push plate unit; and a second medium detection sensor, disposed to be spaced apart from the first medium detection sensor in the deposit direction, for detecting the bundle of media, and the controller may control the first lifting and lowering drive unit and the second lifting and lowering drive unit based on detection of one or both of the first medium detection sensor and the second medium detection sensor.

[0011] Further, the first pickup roller and the second pickup roller may be disposed above the push plate unit, and the controller may control the first lifting and lowering drive unit and the second lifting and lowering drive unit to lower the first pickup roller to come into contact with the bundle of media when the first medium detection sensor detects the bundle of media, and to lower the second pickup roller to come into contact with the bundle of media when the second medium detection sensor detects the bundle of media.

[0012] Further, the first lifting and lowering drive unit may include: a first lifting and lowering support arm that rotatably supports the first pickup roller at one side and is rotatable about a first arm rotation center; a lifting and lowering link connected to the first lifting and lowering support arm; and a link drive cylinder connected to the lifting and lowering link.

[0013] Further, the second lifting and lowering drive unit may include: a second lifting and lowering support arm that rotatably supports the second pickup roller at one side and is rotatable about a second arm rotation center; a lifting and lowering cam for raising and lowering the second lifting and lowering support arm; a plurality of arm lifting and lowering gears meshed with each other, one of which is connected to the lifting and lowering cam; and a lifting and lowering drive motor connected to another one of the plurality of arm lifting and lowering gears.

[0014] Further, the second lifting and lowering drive unit may further include a stopper that limits a rotation range of the lifting and lowering cam, and the lifting and lowering cam has a stopper engagement portion that moves along the stopper.

[0015] Further, the second lifting and lowering drive unit may further include at least one torque limiter configured to allow the second lifting and lowering drive unit to operate to raise the push plate unit in a state where lowering of the second pickup roller has been completed, or to allow the second lifting and lowering drive unit to operate to lower the second pickup roller in a state where lifting of the push plate unit has been completed.

[0016] Further, the second lifting and lowering drive unit may be configured to raise and lower the push plate unit while raising and lowering the second pickup roller.

[0017] Further, when the second medium detection sensor detects the bundle of media, the controller may control the second lifting and lowering drive unit to lower the second

pickup roller to contact an upper surface of the bundle of media, and to raise the push plate unit to push the bundle of media upward.

[0018] Further, the second lifting and lowering drive unit may further include: a rack gear disposed on the push plate unit; a pinion gear meshed with the rack gear to move along the rack gear; and a plate lifting and lowering gear connected to the pinion gear and the torque limiter.

[0019] Further, the deposit and withdrawal unit may further include a transfer assistance roller for working together with the first pickup roller to transfer the bundle of media in the deposit direction.

[0020] Further, the deposit and withdrawal unit may further include a friction member disposed on the push plate unit below the second pickup roller.

[0021] In accordance with a second embodiment of the present disclosure, there is provided an automated teller machine including: a deposit and withdrawal unit configured to allow deposit and withdrawal of media as a bundle of media in which multiple media are stacked; a discrimination unit that discriminates the media; a sheet transfer unit that transfers media separated into individual sheets from the bundle of media to the discrimination unit; and a controller configured to control the deposit and withdrawal unit, the discrimination unit, and the sheet transfer unit, wherein the deposit and withdrawal unit includes: a push plate unit on which the bundle of media is placed; a first pick-up roller for transferring the bundle of media in a deposit direction of the media when the bundle of media is placed on the push plate unit; and a second pick-up roller, disposed to be spaced apart from the first pick-up roller in the deposit direction, for providing the media of the bundle of media to the sheet transfer unit, and wherein the controller controls the first pick-up roller and the second pick-up roller to operate together when the media are conveyed to the sheet transfer unit.

[0022] Further, the deposit and withdrawal unit may further include: a first medium detection sensor disposed between the first pickup roller and the second pickup roller to detect whether at least a portion of the bundle of media has reached a region directly above the push plate unit; a second medium detection sensor disposed between the second pickup roller and the sheet transfer unit to detect whether at least a portion of the bundle of media has reached a standby position before being fed into the sheet transfer unit; a first lifting and lowering drive unit configured to raise and lower the first pickup roller; and a second lifting and lowering drive unit configured to raise and lower the second pickup roller, and the controller may control the first lifting and lowering drive unit and the second lifting and lowering drive unit to lower the first pickup roller to come into contact with the bundle of media when the first medium detection sensor detects the bundle of media, and to lower the second pickup roller to come into contact with the bundle of media when the second medium detection sensor detects the bundle of media.

[0023] Further, the first lifting and lowering drive unit may include: a first lifting and lowering support arm that rotatably supports the first pickup roller at one side and is rotatable about a first arm rotation center; a lifting and lowering link connected to the first lifting and lowering support arm; a link drive cylinder connected to the lifting and lowering link; and a first elastic spring that provides elastic force to the first lifting and lowering support arm to move the first pickup roller to its initial position when the link drive cylinder is not operated.

[0024] Further, the controller may control the first lifting and lowering drive unit to lower the first pickup roller to come into contact with the bundle of media when the first medium detection sensor detects the bundle of media, to raise the first pickup roller to be separated from the bundle of media when the second medium detection sensor detects the bundle of media, and to lower and raise the first pickup roller for a preset period of time to repeatedly contact and separate from the bundle of media.

[0025] Further, the second lifting and lowering drive unit may include: a second lifting and lowering support arm that rotatably supports the second pickup roller at one side and is rotatable about a second arm rotation center; a lifting and lowering cam for lifting and lowering the second lifting and lowering support arm; a plurality of arm lifting and lowering gears meshed with each other, one of which is connected to the lifting and lowering cam; a lifting and lowering drive motor connected to another one of the plurality of arm lifting and lowering gears; and a second elastic spring that provides elastic force to the second lifting and lowering support arm in a direction to press the second pickup roller against the bundle of media.

[0026] Further, the second lifting and lowering drive unit may raise and lower the second pickup roller and the push plate unit together so that the second pickup roller and the push plate unit move away from or closer to each other.

[0027] Further, when the second medium detection sensor detects the bundle of media, the controller may control the second lifting and lowering drive unit to lower the second pickup roller to contact an upper surface of the bundle of media, and to raise the push plate unit to push the bundle of media upward.

[0028] According to embodiments of the present disclosure, bundled media in which multiple media such as banknotes are stacked can relatively easily be separated and transferred as individual sheets.

[0029] According to embodiments of the present disclosure, when the medium is transferred to a position where the individual sheet transfer unit (feed roller and gate roller) is located, the first pickup roller and the second pickup roller contact the front and rear portions of the medium at two points to transport it, which ensures the prevention of intermittent twisting of the media in advance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] FIG. **1** is a schematic diagram showing an automated teller machine according to a first embodiment of the present disclosure.

[0031] FIG. **2** is a perspective view showing a deposit and withdrawal unit of the automated teller machine in FIG. **1** with one side cover removed.

[0032] FIG. **3** is a cross-sectional view taken along line III-III of FIG. **2**.

[0033] FIG. **4** is a cross-sectional view taken along line IV-IV of FIG. **2**.

[0034] FIG. **5** is a cross-sectional view taken along line V-V of FIG. **2**.

[0035] FIG. **6** is a cross-sectional view taken along line VI-VI of FIG. **2**.

[0036] FIG. **7** is a cross-sectional view taken along line VII-VII of FIG. **2**.

[0037] FIG. **8** is a cross-sectional view taken along line VIII-VIII of FIG. **2**.

[0038] FIG. **9** is a drawing showing the operation of the deposit and withdrawal unit of FIG. **2**, showing that a bundle of media in which multiple media such as banknotes are stacked is deposited in the deposit and withdrawal unit and placed on a push plate unit.

[0039] FIG. **10** is a drawing showing the operation of the deposit and withdrawal unit of FIG. **2**, showing that a first pickup roller is lowered to contact the bundle of media.

[0040] FIG. **11** is a drawing showing the operation of the deposit and withdrawal unit of FIG. **2**, showing that the bundle of media is transferred in the deposit direction from the push plate unit by the first pickup roller and a transfer assistance roller.

[0041] FIG. **12** is a drawing showing the operation of the deposit and withdrawal unit of FIG. **2**, showing that a second pickup roller is lowered to contact the bundle of media and the push plate unit is raised.

[0042] FIG. **13** is a drawing showing the operation of the deposit and withdrawal unit of FIG. **2**, showing that an upper medium in the bundle of media is transferred in the deposit direction by the second pickup roller and transferred to a sheet transfer unit.

[0043] FIG. **14** is a drawing showing the operation of the deposit and withdrawal unit of FIG. **2**, showing that the medium transferred to the sheet transfer unit is transferred in the deposit direction by the sheet transfer unit.

[0044] FIG. **15** is a perspective view showing a deposit and withdrawal unit of an automated teller machine according to a second embodiment of the present disclosure.

[0045] FIG. **16** is a cross-sectional view taken along line XVI-XVI of FIG. **15**.

[0046] FIG. **17** is a cross-sectional view taken along line XVII-XVII of FIG. **15**.

[0047] FIG. **18** is a cross-sectional view taken along line XVIII-XVIII of FIG. **15**.

[0048] FIG. **19** is a cross-sectional view taken along line XIX-XIX of FIG. **15**.

[0049] FIG. **20** is a drawing showing a state in which a bundle of media in which multiple media are stacked is deposited in the deposit and withdrawal unit and placed on a transfer assistance roller.

[0050] FIG. **21** is a drawing showing a state in which the first pickup roller is lowered to contact the bundle of media.

[0051] FIG. **22** is a drawing showing a state in which the second pickup roller is lowered to contact the bundle of media and a push plate unit is raised.

[0052] FIG. **23** is a drawing showing a state in which the first pickup roller and the second pickup roller contact the bundle of media at two points.

DETAILED DESCRIPTION

[0053] Hereinafter, specific embodiments for implementing a spirit of the present disclosure will be described in detail with reference to the drawings.

[0054] In describing the present disclosure, detailed descriptions of known configurations or functions may be omitted to clarify the present disclosure.

[0055] When an element is referred to as being 'connected' to, 'supported' by, or 'coupled' to another element, it should be understood that the element may be directly connected to, supported by, or coupled another element, but that other elements may exist in the middle.

[0056] The terms used in the present disclosure are only used for describing specific embodiments, and are not intended to limit the present disclosure. Singular expressions include plural expressions unless the context clearly indicates otherwise.

[0057] Terms including ordinal numbers, such as first and second, may be used for describing various elements, but the corresponding elements are not limited by these terms. These terms are only used for the purpose of distinguishing one element from another element.

[0058] In the present specification, it is to be understood that the terms such as "including" are intended to indicate the existence of the certain features, areas, integers, steps, actions, elements, combinations, and/or groups thereof disclosed in the specification, and are not intended to preclude the possibility that one or more other certain features, areas, integers, steps, actions, elements, combinations, and/or groups thereof may exist or may be added.

[0059] In the present specification, expressions such as upper side, lower side and the like are described based on the drawings, but it is to be noted that when the orientation of the corresponding subject is changed, it may be expressed differently.

[0060] Hereinafter, with reference to FIGS. **1** to **14**, a specific configuration of an automated teller machine **1** according to a first embodiment of the present disclosure will be described. A medium **2-1**, such as a banknote, can be deposited into the automated teller machine **1**. Further, a bundle of media **2** (see FIG. **9**) in which multiple media **2-1** are stacked can be deposited into the automated teller machine **1**. While separating the deposited bundled media **2** into individual sheets and transferring the individual sheets, the automated teller machine **1** can discriminate the media **2-1**, and can classify and store the media **2-1** or return the media **2-1** to a user (not shown) based on the discrimination results. In addition, the automated teller machine **1** can transfer the stored media **2-1** for withdrawal by a user. The automated teller machine **1** may include a deposit and withdrawal unit **100**, a discrimination unit **200**, a storage unit **300**, a medium replenishment unit **400**, a conveyance path **500**, a sheet transfer unit **600**, and a controller **700**.

[0061] Referring to FIGS. **2** and **3**, a medium **2-1** such as banknotes can be deposited and withdrawn through the deposit and withdrawal unit **100**. The deposit and withdrawal unit **100** may be configured so that, when media **2-1** are deposited, they can be deposited as a bundle of media **2** in which multiple media **2-1** are stacked. The bundle of media **2** may be deposited horizontally longitudinally in the deposit and withdrawal unit **100**. In other words, the bundle of media **2** may be deposited horizontally along its longer longitudinal dimension in the deposit and withdrawal unit **100**. The deposit and withdrawal unit **100** may have a first entry and exit port **100***a* and a second entry and exit port **100***b*. The first entry and exit port **100***a* may be a deposit-only port, and the bundle of media **2** may be deposited in the first entry and exit port **100***a*. The second entry and exit port **100***b* may be a withdrawal-only port, and a medium **2-1** may be withdrawn therethrough. The deposit and withdrawal unit **100** may include a push plate unit **110**, a first pickup roller **120**, a second pickup roller **130**, a first lifting and lowering drive unit **140**, a second lifting and lowering drive unit **150**, a first medium detection sensor **160**, a second medium detection sensor **170**, a transfer assistance roller **180**, and a friction member **190**.

[0062] A bundle of media **2** may be placed on the push plate unit **110**. The push plate unit **110** may extend in a deposit direction toward the discrimination unit **200**. The bundle of media **2** may be placed on the push plate unit **110** by a user (not shown) through the first entry and exit port **100***a*. For example, the bundle of media **2** may be placed on an upper surface of the push plate unit **110**. The push plate unit **110** may be raised and lowered by the second lifting and lowering drive unit **150**.

[0063] The first pickup roller **120** can transfer the bundle of media **2** in the deposit direction when the bundle of media **2** is placed on the push plate unit **110**. The first pickup roller **120** works together with the transfer assistance roller **180** to move the bundle of media **2** in the deposit direction. The first pickup roller **120** is disposed above the push plate unit **110** and can be raised and lowered by the first lifting and lowering drive unit **140**. In addition, the first pickup roller **120** can be rotated by a roller rotation drive unit **650** included in the sheet transfer unit **600** to be described later. The first pickup roller **120** may be arranged closer to the first entry and exit port **100***a* than the second pickup roller **130**. The second pickup roller **130** can transfer a medium **2-1** from the bundle of media **2** in the deposit direction. The second pickup roller **130** can transfer the medium **2-1** from the bundle of media **2** transferred in the deposit direction from the push plate unit **110** by the first pickup roller **120** in the deposit direction. The second pickup roller **130** may be disposed to be spaced apart from the first pickup roller **120** in the deposit direction. The second pickup roller **130** may be disposed farther from the first entry and exit port **100***a* than the first pickup roller **120**. The second pickup roller **130** is disposed above the push plate unit **110** and can be raised and lowered by the second lifting and lowering drive unit **150**. In addition, the second pickup roller **130** can be rotated by the roller rotation drive unit **650**.

[0064] Referring to FIGS. **4** and **5**, the first lifting and lowering drive unit **140** can lift and lower the first pickup roller **120**. The first pickup roller **120** may not contact or may come into contact with the bundle of media **2** placed on the push plate unit **110** due to the lifting or lowering of the first pickup roller **120** by the first lifting and lowering drive unit **140**. In other words, when the first pickup roller **120** is raised by the first lifting and lowering drive unit **140**, the first pickup roller **120** may not come into contact with the bundle of media **2** placed on the push plate unit **110**. In addition, when the first pickup roller **120** is lowered by the first lifting and lowering drive unit **140**, the first pickup roller **120** may come into contact with the bundle of media **2** placed on the push plate unit **110**. The first lifting and lowering drive unit **140** may be connected to the controller **700** and controlled by the controller **700**. The first lifting and lowering drive unit **140** may include a first lifting and lowering support arm **141**, a lifting and lowering link **142**, and a link drive cylinder **143**.

[0065] The first pickup roller **120** may be rotatably supported by one side of the first lifting and lowering support arm **141**. In addition, the other side of the first lifting and lowering support arm **141** may be configured to be rotatable about a first arm rotation center. As the other side of the first lifting and lowering support arm **141** rotates about the first arm rotation center, the first pickup roller **120** may be raised/lowered. For example, the first arm rotation center may be the same as a rotation center CF of a feed roller **610** included in the sheet transfer unit **600**, which will be described later. In other words, the other side of the first lifting and lowering support arm **141** may be rotatably disposed on a rotation shaft of the feed roller **610**.

[0066] The lifting and lowering link **142** may be connected to the first lifting and lowering support arm **141**. A plurality of lifting and lowering links **142** may be provided. In addition, the plurality of lifting and lowering links **142** are connected to each other, and any one of the plurality of lifting and lowering links **142** may be connected to the first lifting and lowering support arm **141**. Further, another one of the plurality of lifting and lowering links **142** may be connected to the link drive cylinder **143**.

[0067] The link drive cylinder **143** can drive the lifting and lowering link **142**. By driving the lifting and lowering link **142** by the link drive cylinder **143**, the other side of the first lifting and lowering support arm **141** can rotate about the first arm rotation center, and the first pickup roller **120** can be raised or lowered. The link drive cylinder **143** may be connected to the lifting and lowering link **142**. A cylinder rod of the link drive cylinder **143** may be connected to the lifting and lowering link **142**. In the case where a plurality of lifting and lowering links **142** are provided, the link drive cylinder **143** may be connected to one of the lifting and lowering links **142** except for the lifting and lowering link **142** connected to the first lifting and lowering support arm **141** among the plurality of lifting and lowering links **142**. The link drive cylinder **143** may be connected to and controlled by the controller **700**.

[0068] Referring to FIGS. **6** to **8**, the second lifting and lowering drive unit **150** can lift and lower the second pickup roller **130**. The second pickup roller **130** may not contact or may come into contact with the bundle of media **2** on the push plate unit **110** due to the lifting or lowering of the second pickup roller **130** by the second lifting and lowering drive unit **150**. In other words, when the second pickup roller **130** is raised by the second lifting and lowering drive unit **150**, the second pickup roller **130** may not come into contact with the bundle of media **2** placed on the push plate unit **110**. In addition, when the second pickup roller **130** is lowered by the second lifting and lowering drive unit **150**, the second pickup roller **130** can come into contact with the bundle of media **2** placed on the push plate unit **110**. The second lifting and lowering drive unit **150** may be configured to raise/lower the push plate unit **110** while raising/lowering the second pickup roller **130**. The lifting/lowering of the push plate unit **110** by the second lifting and lowering drive unit **150** can cause the push plate unit **110** to come closer to the first pickup roller **120** and the second pickup roller **130** or to move away from the first pickup roller **120** and the second pickup roller **130**. The second lifting and lowering drive unit **150** may be connected to and controlled by the controller **700**. The second lifting and lowering drive unit **150** may include a second lifting and lowering support arm **151**, a lifting and lowering cam **152**, a stopper **153**, an arm lifting and lowering gear **154**, a lifting and lowering drive motor **155**, a torque limiter **156**, a rack gear **157**, a pinion gear **158**, and a plate lifting and lowering gear **159**.

[0069] The second pickup roller **130** may be rotatably supported by one side of the second lifting and lowering support arm **151**. In addition, the other side of the second lifting and lowering support arm **151** may be configured to be rotatable about a second arm rotation center. As the other side of the second lifting and lowering support arm **151** rotates about the second arm rotation center, the second pickup roller **130** may be raised or lowered. For example, the

second arm rotation center may be the same as the rotation center of the feed roller **610**. In other words, the other side of the first lifting and lowering support arm **141** may be rotatably disposed on the rotation shaft of the feed roller **610**.

[0070] The lifting and lowering cam **152** can lift and lower the second lifting and lowering support arm **151**. The lifting and lowering cam **152** can be rotated, and the second lifting and lowering support arm **151** can be moved up or down depending on the rotational position of the lifting and lowering cam **152**. The lifting and lowering cam **152** may have a stopper engagement portion **152-1** that moves along the stopper **153**. In addition, the rotation range of the lifting and lowering cam **152** can be limited by the stopper **153** and the stopper engagement portion **152-1**. In other words, the lifting and lowering cam **152** can be rotated within a predetermined rotation range.

[0071] The stopper **153** can limit the rotation range of the lifting and lowering cam **152**. In other words, the stopper **153** can limit the lifting and lowering cam **152** to rotate within the predetermined rotation range. For example, the stopper **153** may have an arc shape and may be a groove into which the stopper engagement portion **152-1** of the lifting and lowering cam **152** can be inserted.

[0072] The arm lifting and lowering gear **154** can transmit rotational force of the lifting and lowering drive motor **155**. A plurality of arm lifting and lowering gears **154** may be provided. The plurality of arm lifting and lowering gears **154** are meshed with each other, and one of the plurality of arm lifting and lowering gears **154** may be connected to the lifting and lowering cam **152** and another one may be connected to the lifting and lowering drive motor **155**. One of the plurality of arm lifting and lowering gears **154** may be connected to a rotation shaft of the lifting and lowering cam **152** and another one may be connected to a rotation shaft of the lifting and lowering drive motor **155**. In addition, any two of the plurality of arm lifting and lowering gears **154** that are not connected to the lifting and lowering cam **152** and the lifting and lowering drive motor **155** may be connected to the torque limiter **156**.

[0073] The lifting and lowering drive motor **155** can provide rotational force. The lifting and lowering drive motor **155** can provide rotational force to rotate the lifting and lowering cam **152** so that the second lifting and lowering support arm **151** moves up or down. In addition, the lifting and lowering drive motor **155** can provide rotational force to rotate the pinion gear **158** so that the push plate unit **110** is raised or lowered. The lifting and lowering drive motor **155** may be connected to one of the plurality of arm lifting and lowering gears **154**. The lifting and lowering drive motor **155** may be connected to one of the plurality of arm lifting and lowering gears **154** excluding the arm lifting and lowering gear **154** connected to the lifting and lowering cam **152** among the plurality of arm lifting and lowering gears **154**. The ascending and descending drive motor **155** may be connected to and controlled by the controller **700**.

[0074] The torque limiter **156** may be configured to allow the second lifting and lowering drive unit **150** to operate to raise the push plate unit **110** in a state where the lowering of the second pickup roller **130** has been completed, or to lower the second pickup roller **130** in a state where the lifting of the push plate unit **110** has been completed. In other words, the torque limiter **156** may allow the second lifting and lowering drive unit **150** to raise or lower the push plate unit **110** while raising or lowering the second pickup roller **130**. In addition, even if the rotation range of the lifting and lowering cam **152** is limited by the stopper **153**, the torque limiter **156** may allow the pinion gear **158** to rotate. The torque limiter **156** may be connected to any two of the plurality of arm lifting and lowering gears **154**. Further, the torque limiter **156** may be connected to the plate lifting and lowering gear **159**.

[0075] The rack gear **157** can work together with the pinion gear **158** to raise and lower the push plate unit **110**. The rack gear **157** may be disposed on the push plate unit **110**. The rack gear **157** may be disposed on the push plate unit **110** to extend in the lifting and lowering direction of the push plate unit **110**.

[0076] The pinion gear **158** can work together with the rack gear **157** to raise and lower the push plate unit **110**. The pinion gear **158** may be meshed with the rack gear **157** to move along the rack gear **157**.

[0077] The plate lifting and lowering gear **159** can transmit the rotational force of the lifting and lowering drive motor **155** transmitted through the torque limiter **156** to the pinion gear **158**. The plate lifting and lowering gear **159** may be connected to the pinion gear **158** and the torque limiter **156**. The plate lifting and lowering gear **159** may be connected to a rotation shaft of the pinion gear **158**.

[0078] Referring again to FIG. **3**, the first medium detection sensor **160** can detect whether the bundle of media **2** has reached a region directly above the push plate unit **110**. The first medium detection sensor **160** may be disposed on the push plate unit **110**. The first medium detection sensor **160** may be positioned on the push plate unit **110** between the first pickup roller **120** and the second pickup roller **130**. The first medium detection sensor **160** may be connected to the controller **700** and transmit information to indicate whether the bundle of media **2** has reached a region directly above the push plate unit **110** to the controller **700**.

[0079] The second medium detection sensor **170** may be disposed to be spaced apart from the first medium detection sensor **160** in the deposit direction to detect the bundle of media **2**. The second medium detection sensor **170** may be disposed on the push plate unit **110** to be spaced apart from the first medium detection sensor **160** in the deposit direction. In other words, the second medium detection sensor **170** may be disposed on the push plate unit **110** farther from the first entry and exit port **100***a* than the first medium detection sensor **160**. In addition, the second medium detection sensor **170** may be disposed on the push plate unit **110** closer to the discrimination unit **200** than the first medium detection sensor **160**. The second medium detection sensor **170** may be disposed on the push plate unit **110** to be spaced apart from the second pickup roller **130** in the deposit direction. The first medium detection sensor **160** may be connected to the controller **700** and transmit detection signals to the controller **700** when it detects the bundle of media **2**.

[0080] The transfer assistance roller **180** can work together with the first pickup roller **120** to transfer the bundle of media **2** in the deposit direction. The transfer assistance roller **180** may be rotatably disposed below the first pickup roller **120** so as not to interfere with the lifting or lowering of the push plate unit **110**.

[0081] The friction member **190** can apply frictional force to the lower medium **2-1** in the bundle of media **2** placed on the push plate unit **110**. The friction member **190** may be

disposed on the push plate unit **110** below the second pickup roller **130**. In addition, the friction member **190** may be disposed on the push plate unit **110** between the first medium detection sensor **160** and the second medium detection sensor **170**. By the frictional force applied by the friction member **190** to the lowermost medium **2-1** in the bundle of media **2** placed on the push plate unit **110**, the lower medium **2-1** in the bundle of media **2** can be prevented from being dragged by the upper medium **2-1** that is moved in the deposit direction by the second pickup roller **130**. In other words, even if the upper medium **2-1** of the bundle of media **2** is moved in the deposit direction by the second pickup roller **130**, the lower medium **2-1** may not be moved in the deposit direction. At least a portion of the friction member **190**, which comes into contact with the medium **2-1**, is formed of a material with a friction coefficient greater than that of the medium **2-1**, which allows it to apply friction to the lower medium **2-1** in the bundle of media **2** placed on the push plate unit **110**.

[0082] Referring back to FIG. **1**, the discrimination unit **200** can discriminate the medium **2-1**. The discrimination unit **200** can discriminate the medium **2-1** that is transferred individually from the deposit and withdrawal unit **100** through the conveyance path **500**. In addition, the discrimination unit **200** can discriminate the medium **2-1** before the medium **2-1** is stored in the storage unit **300** when the medium **2-1** is replenished in the storage unit **300** through the medium replenishment unit **400**. In other words, the medium **2-1** discharged from the medium replenishment unit **400** may first be discriminated in the discrimination unit **200** and then stored in the storage unit **300**. The discrimination unit **200** may discriminate the medium **2-1** for abnormalities, type, etc., and count the medium **2-1**. The discrimination unit **200** may divide the medium **2-1** into normal and abnormal notes based on the discrimination results, and the normal notes may be divided into non-recyclable notes and recyclable notes.

[0083] In this case, the abnormal note refers to a medium **2-1** that cannot be processed for deposit, and may include an old medium **2-1** whose image cannot be read, a folded medium **2-1**, a counterfeit note, and a suspicious note. A non-recyclable note refers to a medium **2-1** that is used only for deposits and not for withdrawals, and a recyclable note refers to a medium **2-1** that is used for both deposits and withdrawals. The non-recyclable note and the recyclable note may be distinguished based on the denomination of the medium **2-1**. The recyclable note may be set as a relatively low denomination note compared to the non-recyclable note, and the non-recyclable note may be set as a relatively high denomination note compared to the recyclable note. Meanwhile, a user may also designate a non-recyclable note.

[0084] The medium **2-1** may be stored in the storage unit **300**. The storage unit **300** may store the medium **2-1** based on the discrimination result by the discrimination unit **200**. The storage unit **300** may include a recyclable note storage unit **310**, a non-recyclable note storage unit **320**, and a counterfeit note storage unit **330**.

[0085] The recyclable note storage unit **310** may store a medium **2-1** discriminated as a recyclable note in the discrimination unit **200**. The recyclable note storage unit **310** may be configured to include a medium storage drum **311** so that the recyclable note is wound and stored on the medium storage drum **311** using a tape (not shown) or the like. A plurality of recyclable note storage units **310** may be provided. The plurality of recyclable note storage units **310** may be stacked.

[0086] The non-recyclable note storage unit **320** may store a medium **2-1** discriminated as a non-recyclable note in the discrimination unit **200**. The non-recyclable note storage unit **320** may be disposed below the counterfeit note storage unit **330**.

[0087] The counterfeit note storage unit **330** may store a medium **2-1** discriminated as a counterfeit note among media **2-1** that have been discriminated as an abnormal note in the discrimination unit **200**. The counterfeit note storage unit **330** may be disposed below the medium replenishment unit **400**.

[0088] The medium replenishment unit **400** can replenish media **2-1** to the storage unit **300**. The medium replenishment unit **400** can replenish the recyclable note storage unit **310** of the storage unit **300**. The medium replenishment unit **400** may be disposed below the recyclable note storage unit **310**.

[0089] The conveyance path **500** can convey the medium **2-1** between the deposit and withdrawal unit **100**, the discrimination unit **200**, the storage unit **300**, and the sheet transfer unit **600**. The conveyance path **500** may include a deposit conveyance path **510**, a withdrawal conveyance path **520**, a discharge conveyance path **530**, a return conveyance path **540**, and a gate **550**.

[0090] The deposit conveyance path **510** can convey the medium **2-1** between the deposit and withdrawal unit **100**, the discrimination unit **200**, the storage unit **300**, and the sheet transfer unit **600**. The deposit conveyance path **510** may be connected to the deposit and withdrawal unit **100**, the discrimination unit **200**, the storage unit **300**, and the sheet transfer unit **600**.

[0091] The withdrawal conveyance path **520** can convey the medium **2-1** between the deposit and withdrawal unit **100** and the storage unit **300**. The withdrawal conveyance path **520** may be connected to the deposit and withdrawal unit **100** and the storage unit **300**. The withdrawal conveyance path **520** may be connected to the storage unit **300** through the gate **550**.

[0092] The discharge conveyance path **530** can convey the medium **2-1** so that the medium **2-1** transferred through the withdrawal conveyance path **520** is discharged outside the deposit and withdrawal unit **100**. The discharge conveyance path **530** may be connected to the deposit and withdrawal unit **100** and the withdrawal conveyance path **520**.

[0093] When a medium **2-1** is discriminated in the discrimination unit **200** before the medium **2-1** is replenished in the storage unit **300** through the medium replenishment unit **400**, the medium **2-1** discriminated in the discrimination unit **200** may stay on the return conveyance path **540** to be returned back to the discrimination unit **200**. The return conveyance path **540** may be extended between the deposit conveyance path **510** and the withdrawal conveyance path **520** toward the withdrawal conveyance path **520**.

[0094] The gate **550** may connect the deposit conveyance path **510** to the storage unit **300**, the withdrawal conveyance path **520** to the storage unit **300**, or the deposit conveyance path **510** to the withdrawal conveyance path **520**. When the deposit conveyance path **510** is connected to the storage unit **300** by the gate **550**, the medium **2-1** discriminated in the discrimination unit **200** can be transferred to the storage unit **300**. In addition, the medium stored in the medium replen-

ishment unit **400** can be transferred to the discrimination unit **200** after passing through the storage unit **300**. When the withdrawal conveyance path **520** is connected to the storage unit **300** by the gate **550**, the medium **2-1** stored in the storage unit **300** can be transferred to the withdrawal conveyance path **520**. When the deposit conveyance path **510** is connected to the withdrawal conveyance path **520** by the gate **550**, the medium **2-1** discriminated by the discrimination unit **200** can be transferred to the withdrawal conveyance path **520**. The gate **550** may be connected to the deposit conveyance path **510**, the withdrawal conveyance path **520**, and the storage unit **300**.

[0095] Referring again to FIG. **3**, the sheet transfer unit **600** can transfer the medium **2-1** as a single sheet. The sheet transfer unit **600** can transfer the medium **2-1** deposited in the deposit and withdrawal unit **100** as a single sheet to the discrimination unit **200**. The sheet transfer unit **600** is disposed between the deposit and withdrawal unit **100** and the discrimination unit **200** to be closer to the deposit and withdrawal unit **100** than to the discrimination unit **200**. In addition, the sheet transfer unit **600** can transfer the medium **2-1** moved by the second pickup roller **130** of the deposit and withdrawal unit **100** as a single sheet to the discrimination unit **200**. Further, when the medium **2-1** accommodated in the medium replenishment unit **400** is discharged from the medium replenishment unit **400**, the sheet transfer unit **600** can transfer the medium **2-1** discharged from the medium replenishment unit **400** as a single sheet to the storage unit **300**. The sheet transfer unit **600** may be disposed in the medium replenishment unit **400**. The sheet transfer unit **600** may include a feed roller **610**, a gate roller **620**, and a roller rotation drive unit **650**.

[0096] The feed roller **610** can work together with the gate roller **620** to transfer the medium **2-1** as a single sheet. The feed roller **610** may be rotated by the roller rotation drive unit **650**.

[0097] The gate roller **620** can work together with the feed roller **610** to transfer the medium **2-1** as a single sheet. The gate roller **620** may be disposed below the feed roller **610**. In addition, a rotation center CG of the gate roller **620** may be offset in a transfer direction of the medium **2-1** from an imaginary line VL that is perpendicular to the transfer direction of the medium **2-1** while passing through the rotation center CF of the feed roller **610**.

[0098] The roller rotation drive unit **650** can rotate the feed roller **610**. In addition, the roller rotation drive unit **650** can rotate the first pickup roller **120** and the second pickup roller **130**. The roller rotation drive unit **650** may include a roller rotation gear **651**, a roller rotation belt (not shown), and a roller rotation drive motor **652**.

[0099] The roller rotation gear **651** can transmit rotational force of the roller rotation drive motor **652**. A plurality of roller rotation gears **651** may be provided. Some of the plurality of roller rotation gears **651** may be meshed with each other, and one of them may be connected to the rotation shaft of the feed roller **610** and another one may be connected to a rotation shaft of the roller rotation drive motor **652**, so that the rotational force of the roller rotation drive motor **652** can be transmitted to the feed roller **610**. In addition, other some of the plurality of roller rotation gears **651** may connected to the rotation shaft of the feed roller **610**, the rotation shaft of the first pickup roller **120**, and one roller rotation belt (not shown) to transmit the rotational force of the roller rotation drive motor **652** to the first pickup roller **120** in conjunction with the corresponding roller rotation belt. In addition, still other some of the plurality of roller rotation gears **651** may be connected to the rotation shaft of the feed roller **610**, the rotation shaft of the second pickup roller **130**, and another roller rotation belt to transmit the rotational force of the roller rotation drive motor **652** to the second pickup roller **130** in conjunction with the corresponding roller rotation belt.

[0100] The roller rotation belt can transmit the rotational force of the roller rotation drive motor **652** to the first pickup roller **120** or the second pickup roller **130** in conjunction with the roller rotation gear **651**. A plurality of roller rotation belts may be provided. For example, two roller rotation belts may be provided. In addition, one of the two roller rotation belts may be connected to the roller rotation gear **651** connected to the rotation shaft of the feed roller **610** and the roller rotation gear **651** connected to the rotation shaft of the first pickup roller **120**. Further, the other of the two roller rotation belts may be connected to the roller rotation gear **651** connected to the rotation shaft of the feed roller **610** and the roller rotation gear **651** connected to the rotation shaft of the second pickup roller **130**.

[0101] The roller rotation drive motor **652** can provide rotational force to rotate the feed roller **610**. In addition, the roller rotation drive motor **652** can provide rotational force to rotate the first pickup roller **120** and the second pickup roller **130**. The roller rotation drive motor **652** may be connected to any one of the plurality of roller rotation gears **651**. The roller rotation drive motor **652** may be connected to and controlled by the controller **700**.

[0102] The controller **700** can control the deposit and withdrawal unit **100**, the discrimination unit **200**, the storage unit **300**, the medium replenishment unit **400**, the conveyance path **500**, and the sheet transfer unit **600**. The controller **700** can control the first lifting and lowering drive unit **140** and the second lifting and lowering drive unit **150** of the deposit and withdrawal unit **100**. In addition, the controller **700** can control the roller rotation drive unit **650**. The controller **700** may be connected to the link drive cylinder **143** of the first lifting and lowering drive unit **140** to control the link drive cylinder **143**. Further, the controller **700** may be connected to the roller rotation drive motor **652** of the roller rotation drive unit **650** to control the roller rotation drive motor **652**.

[0103] The controller **700** can control the first lifting and lowering drive unit **140** and the second lifting and lowering drive unit **150** based on detection of one or both of the first medium detection sensor **160** and the second medium detection sensor **170** of the deposit and withdrawal unit **100**. When the first medium detection sensor **160** detects the bundle of media **2**, the controller **700** can control the first lifting and lowering drive unit **140** to lower the first pickup roller **120** to come into contact with the bundle of media **2**. In other words, the controller **700** can control the link drive cylinder **143** of the first lifting and lowering drive unit **140**. In addition, when the second medium detection sensor **170** detects the bundle of media **2**, the controller **700** can control the second lifting and lowering drive unit **150** to lower the second pickup roller **130** to come into contact with the medium **2-1**. In other words, the controller **700** can control the lifting and lowering drive motor **155** of the second lifting and lowering drive unit **150**. Further, when the second medium detection sensor **170** detects the bundle of media **2**, the controller **700** can control the second lifting and lower-

ing drive unit **150** to lower the second pickup roller **130** to contact the upper surface of the bundle of media **2**, and to raise the push plate unit **110** to push the bundle of media **2**. In other words, the controller **700** can control the lifting and lowering drive motor **155** of the second lifting and lowering drive unit **150**. In addition, when the first medium detection sensor **160** detects the bundle of media **2**, the controller **700** can control the roller rotation drive unit **650** to rotate the first pickup roller **120**, the second pickup roller **130**, and the feed roller **610**. In other words, the controller **700** can control the roller rotation drive motor **652** of the roller rotation drive unit **650**. The controller **700** may be implemented by a computing device including a microprocessor, a memory, etc., and since the implementation method is obvious to those skilled in the art, a detailed description thereof will be omitted.

[0104] Hereinafter, with reference to FIGS. **9** to **14**, the operation and effects of the automated teller machine **1** according to the first embodiment of the present disclosure will be described.

[0105] Referring to FIG. **9**, a user can place a bundle of media **2** on the push plate unit **110** of the deposit and withdrawal unit **100** through the first entry and exit port **100***a* of the deposit and withdrawal unit **100**. When the bundle of media **2** is placed on the push plate unit **110** by the user, the first medium detection sensor **160** can detect the bundle of media **2** and transmit a detection signal for the bundle of media **2** to the controller **700**.

[0106] Referring to FIG. **10**, when the first medium detection sensor **160** detects the bundle of media **2** placed on the push plate unit **110** and transmits the detection signal to the controller **700**, the controller **700** can control the first lifting and lowering drive unit **140** to lower the first pickup roller **120** to contact the bundle of media **2**. The controller **700** can control the link drive cylinder **143** of the first lifting and lowering drive unit **140** to lower the first pickup roller **120** to contact the bundle of media **2**. In addition, the controller **700** can control the roller rotation drive unit **650** to rotate the first pickup roller **120**. The controller **700** can control the roller rotation drive motor **652** of the roller rotation drive unit **650** to rotate the first pickup roller **120**. By the controller **700** controlling the roller rotation drive motor **652** of the roller rotation drive unit **650** to rotate the first pickup roller **120**, the second pickup roller **130** and the feed roller **610** can also rotate.

[0107] Referring to FIG. **11**, due to the rotation of the first pickup roller **120**, the bundle of media **2** placed on the push plate unit **110** can be transferred in the deposit direction by the first pickup roller **120** and the transfer assistance roller **180**. When the bundle of media **2** is moved by a predetermined distance on the push plate unit **110** by the first pickup roller **120** and the transfer assistance roller **180**, the second medium detection sensor **170** can detect the bundle of media **2** and transmit the detection signal to the controller **700**.

[0108] Referring to FIG. **12**, when the bundle of media **2** is detected by the second medium detection sensor **170** and the detection signal is transmitted to the controller **700**, the controller **700** can control the second lifting and lowering drive unit **150** to lower the second pickup roller **130** to come into contact with the bundle of media **2**, and to raise the push plate unit **110**. The controller **700** can control the lifting and lowering drive motor **155** of the second lifting and lowering drive unit **150** to lower the second pickup roller **130** to contact the bundle of media **2**, and to raise the push plate unit **110**.

[0109] Referring to FIG. **13**, when the push plate unit **110** is raised while the second pickup roller **130** is in contact with the bundle of media **2**, the first pickup roller **120** can also be raised. In addition, the height of the top sheet in the bundle of media **2** becomes aligned with the gap between the feed roller **610** and the gate roller **620** of the sheet transfer unit **600**.

[0110] In addition, the upper medium **2-1** of the bundle of media **2** can be transferred between the feed roller **610** and the gate roller **620** by the rotation of the first pickup roller **120** and the second pickup roller **130**.

[0111] Referring to FIG. **14**, the medium **2-1** transferred between the feed roller **610** and the gate roller **620** can be moved between the feed roller **610** and the gate roller **620** by the rotation of the feed roller **610** to be transferred to the discrimination unit **200** in the deposit direction.

[0112] The transfer of the medium **2-1** from the bundle of media **2** to the discrimination unit **200** can be performed until all the media **2-1** in the bundle of media **2** are transferred to the discrimination unit **200** while the push plate unit **110** is raised. Once all the media **2-1** in the bundle of media **2** have been transferred to the discrimination unit **200**, the first pickup roller **120** and the second pickup roller **130** are raised and the push plate unit **110** is lowered, thereby forming a space for another bundle of media **2** to be placed on the push plate unit **110** by a user through the first entry and exit port **100***a*. In other words, the state of the automated teller machine **1** can be returned to the state shown in FIG. **9**.

[0113] As described above, according to the embodiments of the present disclosure, there is provided a relatively simple configuration for separating bundled media **2** in which a plurality of media **2-1** such as banknotes are stacked and transferring them as individual sheets.

[0114] Hereinafter, an automated teller machine according to a second embodiment of the present disclosure will be described with reference to FIG. **1** and FIGS. **15** to **23**. Hereinafter, in describing the automated teller machine according to the second embodiment of the present disclosure, descriptions of the same components as those of the first embodiment will be omitted, and the description will focus on the differences from the first embodiment.

[0115] The automated teller machine **1** according to the second embodiment of the present disclosure may include a deposit and withdrawal unit **100**, a discrimination unit **200**, a storage unit **300**, a medium replenishment unit **400**, a conveyance path **500**, a sheet transfer unit **600**, and a controller **700**, and the deposit and withdrawal unit **100** may include a push plate unit **110**, a first pickup roller **120**, a second pickup roller **130**, a first lifting and lowering drive unit **140**, a second lifting and lowering drive unit **150**, a first medium detection sensor **160**, a second medium detection sensor **170**, and a transfer assistance roller **180**. Since these components are the same as those described in the first embodiment, a description thereof will be omitted.

[0116] Referring to FIGS. **17** to **19**, the first lifting and lowering drive unit **140** can lift and lower the first pickup roller **120**. The first lifting and lowering drive unit **140** may include a first lifting and lowering support arm **141**, a lifting and lowering link **142**, a link drive cylinder **143**, and a first elastic spring **144**. In addition, a first roller shaft **121** of the

first pickup roller **120** may be rotatably disposed on one side of the first lifting and lowering support arm **141**.

[0117] The second lifting and lowering drive unit **150** can lift and lower the second pickup roller **130** using a lifting and lowering cam **152**. The second lifting and lowering drive unit **150** can lift and lower the push plate unit **110** using a rack gear **157** and a pinion gear **158**. The pushing plate unit **110** can be moved toward or away from the first pickup roller **120** and the second pickup roller **130** due to the lifting/lowering of the push plate unit **110** by the second lifting and lowering drive unit **150**. The second lifting and lowering drive unit **150** may be connected to and controlled by the controller **700**. The second lifting and lowering drive unit **150** may include a second lifting and lowering support arm **151**, a lifting and lowering cam **152**, a stopper **153**, an arm lifting and lowering gear **154**, a lifting and lowering drive motor **155**, a rack gear **157**, a pinion gear **158**, and a second elastic spring (not shown).

[0118] The second elastic spring can provide elastic force to the second lifting and lowering support arm **151** in a direction to press the second pickup roller **130** against the bundle of media. For example, when the second lifting and lowering support arm **151** rotates downward by the rotation of the lifting and lowering cam **152**, the second pickup roller **130** can be brought into contact with the bundle of media by the elastic force of the second elastic spring to press against it.

[0119] The arm lifting and lowering gear **154** can transmit rotational force of the lifting and lowering drive motor **155** to the pinion gear **158**. The arm lifting and lowering gear **154** may be connected to the pinion gear **158** and a torque limiter **156**. The arm lifting and lowering gear **154** may be connected to a rotation shaft of the pinion gear **158**.

[0120] The lifting and lowering drive motor **155** can provide rotational force. The lifting and lowering drive motor **155** can provide rotational force to rotate the lifting and lowering cam **152** so that the second lifting and lowering support arm **151** moves up or down. The rotational force of the lifting and lowering drive motor **155** can be transmitted to the lifting and lowering cam **152** through an arm lifting and lowering gear. A plurality of arm lifting and lowering gears may be provided. The plurality of arm lifting and lowering gears are meshed with each other, and one of the plurality of arm lifting and lowering gears may be connected to the lifting and lowering cam **152** and another one may be connected to the lifting and lowering drive motor **155**. One of the plurality of arm lifting and lowering gears may be connected to a rotation shaft of the lifting and lowering cam **152** and another one may be connected to a rotation shaft of the lifting and lowering drive motor **155**.

[0121] The controller **700** can control the first lifting and lowering drive unit **140** and the second lifting and lowering drive unit **150** of the deposit and withdrawal unit **100** so that the first pickup roller **120** and the second pickup roller **130** operate together when the medium is transferred to the sheet transfer unit **600**. When the first medium detection sensor **160** detects a bundle of media, the controller **700** can control the first lifting and lowering drive unit **140** to lower the first pickup roller **120** to contact the bundle of media, and when the second medium detection sensor **170** detects the bundle of media, the controller **700** can control the second lifting and lowering drive unit **150** to lower the second pickup roller **130** to contact the bundle of media.

[0122] The controller **700** can control the first lifting and lowering drive unit **140** and the second lifting and lowering drive unit **150** so that the first pickup roller **120** and the second pickup roller **130** respectively contact a front portion and a rear portion of a medium at two points when the medium is transferred to a position where the sheet transfer unit **600** is located. When the medium is transferred to the position where the sheet transfer unit **600** is located, the medium is transferred while the first pickup roller **120** and the second pickup roller **130** respectively contact the front and rear portions of the medium, so that intermittent twisting phenomenon of the medium can be prevented in advance.

[0123] Hereinafter, the operation and effects of the automated teller machine according to the second embodiment of the present disclosure will be described.

[0124] Referring to FIG. **20**, when a bundle of media **2** is placed on the push plate unit **110** of the deposit and withdrawal unit **100** through the first entry and exit port **100***a* of the deposit and withdrawal unit **100**, the first medium detection sensor **160** can detect the bundle of media **2** and transmit a detection signal for the bundle of media **2** to the controller **700**.

[0125] Referring to FIG. **21**, when the bundle of media **2** is detected by the first medium detection sensor **160**, the controller **700** can control the link drive cylinder **143** of the first lifting and lowering drive unit **140** to lower the first pickup roller **120** to come into contact with the bundle of media **2**. In addition, the controller **700** can control the roller rotation drive unit **630** to rotate the first pickup roller **120**. The controller **700** can control the roller rotation drive motor **652** of the roller rotation drive unit **630** to rotate the first pickup roller **120**. By controlling the roller rotation drive motor **652**, the second pickup roller **130** and the feed roller **610** can also rotate together with the first pickup roller **120**.

[0126] Referring to FIG. **22**, due to the rotation of the first pickup roller **120**, the bundle of media **2** placed on the push plate unit **110** can be transferred in the deposit direction by the first pickup roller **120** and the transfer assistance roller **180**. When the bundle of media **2** is moved by a predetermined distance on the push plate unit **110** by the first pickup roller **120** and the transfer assistance roller **180**, the second medium detection sensor **170** can detect the bundle of media **2** and transmit a detection signal for the bundle of media **2** to the controller **700**. When the bundle of media **2** is detected by the first medium detection sensor **160**, the controller **700** can control the lifting and lowering drive motor **155** of the second lifting and lowering drive unit **150** to lower the second pickup roller **130** to contact the bundle of media **2**, and to raise the push plate unit **110**. In this case, the height of the top sheet of the bundle of media **2** becomes aligned with the gap between the feed roller **610** and the gate roller **620** of the sheet transfer unit **600**. In addition, the controller **700** can control the link drive cylinder **143** of the first lifting and lowering drive unit **140** to raise the first pickup roller **120** to be separated from the bundle of media **2**.

[0127] Referring to FIG. **23**, the controller **700** can control the link drive cylinder **143** of the first lifting and lowering drive unit **140** to lower and lift the first pickup roller **120** to repeatedly contact and separate from the bundle of media **2**. The controller **700** can control the link drive cylinder **143** of the first lifting and lowering drive unit **140** to lower and lift the first pickup roller **120** repeatedly as many times as the number of media **2-1** of the bundle of media **2**. For example, when the number of media **2-1** of the bundle of media **2** is

50, the controller **700** can repeat the descending and ascending operation of the first pickup roller **120** 50 times. When the first pickup roller **120** and the second pickup roller **130** contact the front and rear portions of the medium at two points, and the medium is transferred to the sheet transfer unit **600**, the single sheet of medium **2-1** can be fed between the feed roller **610** and the gate roller **620** of the sheet transfer unit **600**. The medium **2-1** fed between the feed roller **610** and the gate roller **620** can be transferred to the discrimination unit **200** in the deposit direction by passing between the feed roller **610** and the gate roller **620**. The transfer of the medium **2-1** from the bundle of media **2** to the discrimination unit **200** can be performed until all the media **2-1** of the bundle of media **2** are transferred to the discrimination unit **200** as the push plate unit **110** is gradually raised.

[0128] As described above, according to the present disclosure, it is possible to prevent intermittent twisting of the medium in advance by having the first pickup roller and the second pickup roller contact the front and rear portions of the medium at two points when the medium is transferred to the position where the sheet transfer unit is located. In addition, according to the present disclosure, there is provided a relatively simple configuration for separating bundled media in which multiple media such as banknotes are stacked and transferring them as individual sheets.

[0129] While the present disclosure has been shown and described with respect to the preferred embodiments, the scope of the present disclosure does not limited to the particular embodiments described, and those skilled in the art may variously change and substitute components within the scope of the present disclosure, which also belong to the scope of the present disclosure.

What is claimed is:

1. An automated teller machine comprising:

a deposit and withdrawal unit configured to allow deposit and withdrawal of a medium, which allows a bundle of media including multiple stacked media to be deposited;

a discrimination unit that discriminates the medium;

a storage unit in which the medium is stored;

a conveyance path that transfers the medium between the deposit and withdrawal unit, the discrimination unit, and the storage unit,

wherein the deposit and withdrawal unit includes:

a push plate unit on which the bundle of media is placed;

a first pick-up roller for transferring the bundle of media in a deposit direction toward the discrimination unit when the bundle of media is placed on the push plate unit; and

a second pick-up roller, disposed to be spaced apart from the first pick-up roller in the deposit direction, for transferring the medium from the bundle of media in the deposit direction.

2. The automated teller machine of claim **1**, further comprising a controller configured to control the deposit and withdrawal unit,

wherein the deposit and withdrawal unit further includes:

a first lifting and lowering drive unit configured to raise and lower the first pickup roller; and

a second lifting and lowering drive unit configured to raise and lower the second pickup roller, and

wherein the controller controls the first lifting and lowering drive unit and the second lifting and lowering drive unit.

3. The automated teller machine of claim **2**, wherein the deposit and withdrawal unit further includes:

a first medium detection sensor for detecting whether the bundle of media has reached a region directly above the push plate unit; and

a second medium detection sensor, disposed to be spaced apart from the first medium detection sensor in the deposit direction, for detecting the bundle of media, and

wherein the controller controls the first lifting and lowering drive unit and the second lifting and lowering drive unit based on detection of one or both of the first medium detection sensor and the second medium detection sensor.

4. The automated teller machine of claim **3**, wherein the first pickup roller and the second pickup roller are disposed above the push plate unit, and

the controller controls the first lifting and lowering drive unit and the second lifting and lowering drive unit to lower the first pickup roller to come into contact with the bundle of media when the first medium detection sensor detects the bundle of media, and to lower the second pickup roller to come into contact with the bundle of media when the second medium detection sensor detects the bundle of media.

5. The automated teller machine of claim **4**, wherein the first lifting and lowering drive unit includes:

a first lifting and lowering support arm that rotatably supports the first pickup roller at one side and is rotatable about a first arm rotation center;

a lifting and lowering link connected to the first lifting and lowering support arm; and

a link drive cylinder connected to the lifting and lowering link.

6. The automated teller machine of claim **4**, wherein the second lifting and lowering drive unit includes:

a second lifting and lowering support arm that rotatably supports the second pickup roller at one side and is rotatable about a second arm rotation center;

a lifting and lowering cam for raising and lowering the second lifting and lowering support arm;

a plurality of arm lifting and lowering gears meshed with each other, one of which is connected to the lifting and lowering cam; and

a lifting and lowering drive motor connected to another one of the plurality of arm lifting and lowering gears.

7. The automated teller machine of claim **6**, wherein the second lifting and lowering drive unit further includes a stopper that limits a rotation range of the lifting and lowering cam, and

the lifting and lowering cam has a stopper engagement portion that moves along the stopper.

8. The automated teller machine of claim **6**, wherein the second lifting and lowering drive unit further includes at least one torque limiter configured to allow the second lifting and lowering drive unit to operate to raise the push plate unit in a state where lowering of the second pickup roller has been completed, or to allow the second lifting and lowering drive unit to operate to lower the second pickup roller in a state where lifting of the push plate unit has been completed.

9. The automated teller machine of claim 8, wherein the second lifting and lowering drive unit is configured to raise and lower the push plate unit while raising and lowering the second pickup roller.

10. The automated teller machine of claim 9, wherein when the second medium detection sensor detects the bundle of media, the controller controls the second lifting and lowering drive unit to lower the second pickup roller to contact an upper surface of the bundle of media, and to raise the push plate unit to push the bundle of media upward.

11. The automated teller machine of claim 10, wherein the second lifting and lowering drive unit further includes:

a rack gear disposed on the push plate unit;

a pinion gear meshed with the rack gear to move along the rack gear; and

a plate lifting and lowering gear connected to the pinion gear and the torque limiter.

12. The automated teller machine of claim 1, wherein the deposit and withdrawal unit further includes a transfer assistance roller for working together with the first pickup roller to transfer the bundle of media in the deposit direction.

13. The automated teller machine of claim 4, wherein the deposit and withdrawal unit further includes a friction member disposed on the push plate unit below the second pickup roller.

14. An automated teller machine comprising:

a deposit and withdrawal unit configured to allow deposit and withdrawal of media as a bundle of media in which multiple media are stacked;

a discrimination unit that discriminates the media;

a sheet transfer unit that transfers media separated into individual sheets from the bundle of media to the discrimination unit; and

a controller configured to control the deposit and withdrawal unit, the discrimination unit, and the sheet transfer unit,

wherein the deposit and withdrawal unit includes:

a push plate unit on which the bundle of media is placed;

a first pick-up roller for transferring the bundle of media in a deposit direction of the media when the bundle of media is placed on the push plate unit; and

a second pick-up roller, disposed to be spaced apart from the first pick-up roller in the deposit direction, for providing the media of the bundle of media to the sheet transfer unit, and

wherein the controller controls the first pick-up roller and the second pick-up roller to operate together when the media are conveyed to the sheet transfer unit.

15. The automated teller machine of claim 14, wherein the deposit and withdrawal unit further includes:

a first medium detection sensor disposed between the first pickup roller and the second pickup roller to detect whether at least a portion of the bundle of media has reached a region directly above the push plate unit;

a second medium detection sensor disposed between the second pickup roller and the sheet transfer unit to detect whether at least a portion of the bundle of media has reached a standby position before being fed into the sheet transfer unit;

a first lifting and lowering drive unit configured to raise and lower the first pickup roller; and

a second lifting and lowering drive unit configured to raise and lower the second pickup roller, and

wherein the controller controls the first lifting and lowering drive unit and the second lifting and lowering drive unit to lower the first pickup roller to come into contact with the bundle of media when the first medium detection sensor detects the bundle of media, and to lower the second pickup roller to come into contact with the bundle of media when the second medium detection sensor detects the bundle of media.

16. The automated teller machine of claim 15, wherein the first lifting and lowering drive unit includes:

a first lifting and lowering support arm that rotatably supports the first pickup roller at one side and is rotatable about a first arm rotation center;

a lifting and lowering link connected to the first lifting and lowering support arm;

a link drive cylinder connected to the lifting and lowering link; and

a first elastic spring that provides elastic force to the first lifting and lowering support arm to move the first pickup roller to its initial position when the link drive cylinder is not operated.

17. The automated teller machine of claim 16, wherein the controller controls the first lifting and lowering drive unit to lower the first pickup roller to come into contact with the bundle of media when the first medium detection sensor detects the bundle of media, to raise the first pickup roller to be separated from the bundle of media when the second medium detection sensor detects the bundle of media, and to lower and raise the first pickup roller for a preset period of time to repeatedly contact and separate from the bundle of media.

18. The automated teller machine of claim 15, wherein the second lifting and lowering drive unit includes:

a second lifting and lowering support arm that rotatably supports the second pickup roller at one side and is rotatable about a second arm rotation center;

a lifting and lowering cam for lifting and lowering the second lifting and lowering support arm;

a plurality of arm lifting and lowering gears meshed with each other, one of which is connected to the lifting and lowering cam;

a lifting and lowering drive motor connected to another one of the plurality of arm lifting and lowering gears; and

a second elastic spring that provides elastic force to the second lifting and lowering support arm in a direction to press the second pickup roller against the bundle of media.

19. The automated teller machine of claim 15, wherein the second lifting and lowering drive unit raises and lowers the second pickup roller and the push plate unit together so that the second pickup roller and the push plate unit move away from or closer to each other.

20. The automated teller machine of claim 19, wherein when the second medium detection sensor detects the bundle of media, the controller controls the second lifting and lowering drive unit to lower the second pickup roller to contact an upper surface of the bundle of media, and to raise the push plate unit to push the bundle of media upward.

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