(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 459 580 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
**06.11.2024 Bulletin 2024/45**

(21) Application number: **22916411.6**

(22) Date of filing: **10.11.2022**

(51) International Patent Classification (IPC):
***G07D 11/13*** *(2019.01)* ***G07D 11/16*** *(2019.01)*
***G07D 11/20*** *(2019.01)* ***G07D 11/50*** *(2019.01)*
***G07F 19/00*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
**G07D 11/13; G07D 11/16; G07D 11/20; G07D 11/50; G07F 19/00**

(86) International application number:
**PCT/KR2022/017646**

(87) International publication number:
**WO 2023/128257 (06.07.2023 Gazette 2023/27)**

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

(30) Priority: **27.12.2021 KR 20210188204**

(71) Applicant: **HYOSUNG TNS INC.**
**Gangnam-gu,**
**Seoul 06349 (KR)**

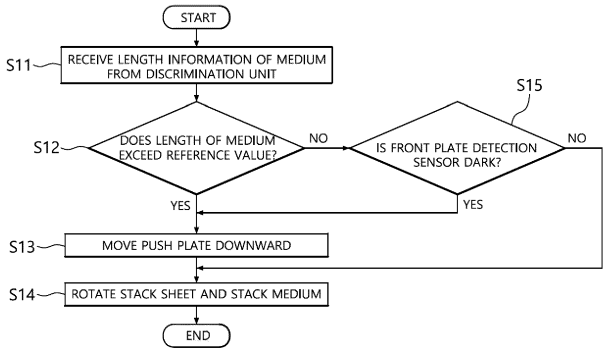
(72) Inventors:
- **PARK, Jong Seong**
  **Gwangju-si Gyeonggi-do 12765 (KR)**
- **JO, Byung Hyun**
  **Seoul 06099 (KR)**
- **AHN, Ju Il**
  **Seoul 02701 (KR)**

(74) Representative: **V.O.**
**P.O. Box 87930**
**2508 DH Den Haag (NL)**

# (54) MEDIUM STACKING METHOD OF MEDIUM STORAGE UNIT

(57) Provided is a method of stacking media in a media storage unit, the method which includes: receiving information about a length of a medium from a discrimination unit; determining whether the length of the medium received from the discrimination unit exceeds a reference value; when the length of the medium exceeds the reference value, spacing an upper surface of the medium loaded in a medium accumulation space on a push plate and a gap roller provided on a front plate located on an upper side of the push plate from each other by a set distance; and rotating a stack sheet to strike a rear end of the medium entering the media accumulation space, to allow the medium to be accumulated on the push plate by passing through a lower end of the gap roller.

[FIG. 4]




EP 4 459 580 A1

## Description

BACKGROUND

1. Field of the Invention

**[0001]** The present invention relates to a method of stacking media in a media storage unit, and more specifically, to a method of stacking media in a media storage unit for improving media stack misalignment in the media storage unit.

2. Discussion of Related Art

**[0002]** Generally, an automated teller machine is equipped with a media storage unit in which media, such as checks and banknotes, are stored for processing.

**[0003]** FIG. 1 illustrates a conventional media storage unit (RTRJC) 100 in which a retract cassette (RTC) 100a in which uncollected bills are stored is provided at an upper side, and a reject cassette (RJC) 100b in which abnormal bill media are stored is provided at a lower side.

**[0004]** The conventional media storage unit 100 is provided with a media stacking apparatus including a stack entry section A provided with a plurality of rollers 111, 112, and 113 connected to a conveyance path P and sandwiching and transporting medium, a front plate 140 provided at an upper side of a media accumulation space S to guide a medium having passed through the stack entry section A into the media accumulation space S, a push plate 150 provided at a lower side of the front plate 140 and moving up and down while supporting the medium introduced into the media accumulation space S, and a stack sheet 120 striking a rear end of the medium that has entered the stack entry section A to guide the medium into the medium accumulation space S on the push plate 150.

**[0005]** The front plate 140 has a gap roller 141 formed on a lower side thereof and configured to press media loaded on the push plate 150 downward toward the push plate 150 to prevent the loaded media from bulging upward due to an anti-counterfeiting motion strip and the like printed on the loaded media. However, as the gap roller 141 is provided, the media stacked in the media accumulation space S receive a load due to friction with the gap roller 141.

**[0006]** The stack sheet 120 provided in the stack entry section A includes only three stack sheets 120 due to the limitation on the number of stack sheets due to the limit of the allowable load caused by interference with the gap roller 141, and the stack sheet 120 is formed to be long to move and stack relatively short media among the stacked media up to a position at which the media pass through the gap roller 141.

**[0007]** When the length of the stacked medium is long, the stacked medium needs to be pushed with a great force because the medium is subject to a load from a point at which the medium moves through the gap roller 141. However, the stack sheet 120 formed to be long as described above may, during rotation, rotate while curved to the opposite side of the rotation direction due to the weak rigidity, and have insufficient force to push the medium, thus resulting in stack misalignment in which the media M may not be accumulated in an aligned state in the media accumulation space S.

**[0008]** The related art of a media storage unit of an automated teller machine is disclosed in Korean Registered Patent No. 10-1628481.

SUMMARY OF THE INVENTION

**[0009]** The present invention is directed to providing a method of stacking media in a media storage unit that may prevent jams in the media storage unit and improve media stack misalignment.

**[0010]** According to an aspect of the present invention, there is provided a method of stacking media in a media storage unit, the method comprising: receiving information about a length of a medium from a discrimination unit; determining whether the length of the medium received from the discrimination unit exceeds a reference value; when the length of the medium exceeds the reference value, spacing an upper surface of the medium loaded in a medium accumulation space on a push plate and a gap roller provided on a front plate located on an upper side of the push plate from each other at an interval of a set distance; and rotating a stack sheet to strike a rear end of the medium entering the media accumulation space, to allow the medium to be accumulated on the push plate by passing through a lower end of the gap roller.

**[0011]** When the length of the medium exceeds the reference value, moving the push plate downward by the set distance.

**[0012]** When the length of the medium exceeds the reference value, moving the front plate upward by the set distance.

**[0013]** When the length of the medium exceeds the reference value, driving a solenoid connected to the front plate to pull the front plate upward by the set distance to move the front plate upward.

**[0014]** When the length of the medium does not exceed the reference value, detecting whether the front plate is in an upwardly moved position using a front plate detection sensor; moving the push plate downward by the set distance when the front plate is detected to be in the upwardly moved position; and rotating the stack sheet to strike the rear end of the medium entering the media accumulation space, to allow the medium to be accumulated on the push plate by passing through a lower end of the gap roller.

**[0015]** When the length of the medium does not exceed the reference value, detecting whether the front plate is in an upwardly moved position using a front plate detection sensor; and rotating the stack sheet to strike the rear end of the medium entering the media accumulation

space when the front plate is detected not to be in the upwardly moved position, to allow the medium to be accumulated on the push plate by passing through a lower end of the gap roller.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0016]** The above and other objects, features and advantages of the present invention will become more apparent to those of ordinary skill in the art by describing exemplary embodiments thereof in detail with reference to the accompanying drawings, in which:

FIG. 1 is a diagram illustrating a media stacking apparatus of a conventional media storage unit;
FIG. 2 is a diagram for describing a method of stacking media in a media storage unit according to the first embodiment of the present invention;
FIG. 3 is a control block diagram illustrating a method of stacking media in a media storage unit according to the first embodiment of the present invention;
FIG. 4 is a flowchart illustrating a method of stacking media in a media storage unit according to the first embodiment of the present invention;
FIG. 5 is a diagram for describing a method of stacking media in a media storage unit according to the second embodiment of the present invention;
FIG. 6 is a control block diagram illustrating a method of stacking media in a media storage unit according to the second embodiment of the present invention; and
FIG. 7 is a flowchart illustrating a method of stacking media in a media storage unit according to the second embodiment of the present invention.

[Description of Reference Numerals]

**[0017]**

100: media storage unit (RTRJC)
100a: retract cassette (RTC)
100b: reject cassette (RJC)
111: first roller
112: second roller
113: third roller
120,120-1,120-2,120-3: stack sheets
130: return guide
140: front plate
141: gap roller
150: push plate
160: front plate detection sensor
170: push plate driving unit
180: solenoid
200: discrimination unit
300: control unit
P: return path
A: stack entry section
M: media
S: media accumulation space
G: interval

## DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

**[0018]** Hereinafter, the configuration and operations of exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings.

**[0019]** A media storage unit 100 according to the present invention includes, as the same components as those of the media storage unit 100 described with reference to FIG. 1, a stack entry section A provided with a plurality of rollers 111, 112, and 113 connected to a conveyance path P and sandwiching and transporting media, a front plate 140 provided on an upper side of a media accumulation space S to guide a medium having passed through the stack entry section A into the media accumulation space S, a push plate 150 provided on a lower side of the front plate 140 and moving up and down while supporting the medium introduced into the media accumulation space S, and a stack sheet 120 striking a rear end of the medium that has entered the stack entry section A to guide the medium into the medium accumulation space S on the push plate 150

**[0020]** The front plate 140 has a gap roller 141 formed on a lower side thereof and configured to press media loaded on the push plate 150 downward toward the push plate 150 to prevent the loaded media from bulging upward due to an anti-counterfeiting motion strip and the like that are printed on the loaded media.

**[0021]** When the number of the media M accumulated in the media accumulation space increases, the front plate 140 comes in contact with the accumulated media M and is lifted and moved upward, and a detected piece 142 protruding on an upper end of the front plate 140 is detected by a front plate detection sensor 160. In this case, the push plate 150 is moved downward by a set distance to secure a free space in which additional entering media may be accumulated.

**[0022]** However, as described in the related art, the stack sheet 120 provided at the stack entry section A is provided as only three stack sheets 120 due to the limitation on the number of stack sheets due to the limit of the allowable load caused by interference with the gap roller 141, and the stack sheet 120 is formed to be long to move and stack relatively short media among the stacked media up to a position at which the media pass through the gap roller 141.

**[0023]** When the length of the stacked medium is long, the stacked medium needs to be pushed with a great force because the medium is subject to a load from a point at which the medium moves through the gap roller 141. However, the stack sheet 120 formed to be long as described above may, during rotation, rotate while curved to the opposite side of the rotation direction due to the weak rigidity, and may have insufficient force to push the

medium, resulting in stack misalignment in which the media M may not be accumulated in an aligned state in the media accumulation space S.

**[0024]** Hereinafter, the configuration and operation of the present invention to resolve the above issues will be described.

**[0025]** A method of stacking media in a media storage unit according to the present invention includes; when the length of a medium M entering the stack entry section A exceeds a reference value, spacing an upper surface of the medium M loaded in the medium accumulation space S on the push plate 150 and the gap roller 141 provided on the front plate 140 located on the upper side of the push plate 150 from each other at an interval G of a set distance, to reduce friction with the gap roller 141 and lower a load acting on the medium M, thereby allowing even a long medium M to be stably accumulated in the medium accumulation space S.

**[0026]** The length of the medium M may be obtained from information about the denomination and length of the medium M acquired from a discrimination unit 200 provided in an automated teller machine.

**[0027]** First, a method of stacking media in a media storage unit according to the first embodiment of the present invention will be described with reference to FIGS. 2 to 4.

**[0028]** In the embodiment, information acquired from the discrimination unit 200 and the front plate detection sensor 160 is transmitted to a control unit 300, and the control unit 300 controls a push plate driving unit 170 to lift and lower the push plate 150 based on the received information

**[0029]** The method of stacking media in the media storage unit according to the first embodiment of the present invention includes receiving length information of a medium M from the discrimination unit 200 (S11), determining whether the length of the medium M received from the discrimination unit 200 exceeds a reference value (S12), when the length of the medium M exceeds the reference value, spacing the upper surface of the medium M loaded in the medium accumulation space S on the push plate 150 and the gap roller 141 provided on the front plate 140 located on the upper side of the push plate 150 from each other at an interval G of a set distance (S13), and rotating the stack sheet 120 to strike a rear end of the medium M entering the media accumulation space S, to allow the medium M to be accumulated on the push plate 150 by passing through a lower end of the gap roller 141 (S14).

**[0030]** Meanwhile, the method may include, when a result of the determination in operation S12 is that the length of the medium M does not exceed the reference value, detecting whether the front plate 140 is in an upwardly moved position using the front plate detection sensor 160 (S15), moving the push plate 150 downward by the set distance when the front plate 140 is detected to be in the upwardly moved position (S13), and rotating the stack sheet 120 to strike the rear end of the medium M entering the media accumulation space S such that the media M is accumulated on the push plate 150 by passing through the lower end of the gap roller 141 (S14).

**[0031]** The method includes, when it is found as a result of the detection in operation S15 that the front plate 140 is not in the upwardly moved position, rotating the stack sheet 120 without movement of the push plate 150, to strike the rear end of the medium M entering the media accumulation space S such that the medium M is accumulated on the push plate 150 by passing through the lower end of the gap roller 141 (S14).

**[0032]** Next, a method of stacking media in the media storage unit according to the second embodiment of the present invention will be described with reference to FIGS. 5 to 7.

**[0033]** In the embodiment, information acquired from the discrimination unit 200 and the front plate detection sensor 160 is transmitted to the control unit 300, and the control unit 300 controls a solenoid 180 connected to the front plate 140 to lift and lower the front plate 140 based on the received information.

**[0034]** The method of stacking media in the media storage unit according to the second embodiment of the present invention includes receiving length information of a medium M from the discrimination unit 200 (S21), determining whether the length of the medium M received from the discrimination unit 200 exceeds a reference value (S22), when the length of the medium M exceeds the reference value, driving the solenoid 180 connected to the front plate 140 to pull the front plate 140 upward by a set distance to move the front plate 140 upward, thereby spacing an upper surface of the medium M loaded in the medium accumulation space S on the push plate 150 and the gap roller 141 provided on the front plate 140 located on an upper side of the push plate 150 from each other at an interval G of a set distance (S23) as shown in FIG. 5, and rotating the stack sheet 120 to strike a rear end of the medium M entering the media accumulation space S, such that the medium M is accumulated on the push plate 150 by passing through a lower end of the gap roller 141 (S24).

**[0035]** Meanwhile, the method may include, when it is found as a result of the determination in operation S22 that the length of the medium M does not exceed the reference value, detecting whether the front plate 140 is in an upwardly moved position using the front plate detection sensor 160 (S25), moving the push plate 150 downward by the set distance when the front plate 140 is detected to be in the upwardly moved position (S26); and rotating the stack sheet 120 to strike the rear end of the medium M entering the media accumulation space S such that the medium M is accumulated on the push plate 150 through the lower end of the gap roller 141 (S24).

**[0036]** The method includes, when it is found as a result of the detection in operation S25 that the front plate 140 is not in the upwardly moved position, rotating the stack sheet 120 without movement of the push plate 150, to

strike the rear end of the medium M entering the media accumulation space S such that the medium M is accumulated on the push plate 150 by passing through the lower end of the gap roller 141 (S24).

**[0037]** With the method of stacking media in the media storage unit according to the present invention, when the length of a medium introduced into a media accumulation space exceeds a reference value, an upper surface of the medium loaded in the media accumulation space on a push plate and a gap roller provided on a front plate located on an upper side of the push plate are spaced from each other at an interval of a set distance, the load on the medium due to friction with the gap roller can be reduced, and jamming of the medium can be effectively prevented.

**[0038]** In addition, according to a control method of moving the push plate downward or moving the front plate upward regardless of a signal detected by a front plate detection sensor when the length of a medium introduced into the media accumulation space exceeds a reference value, stack misalignment of a long medium can be improved.

**[0039]** Although exemplary embodiments of the present invention have been described for illustrative purposes, those skilled in the art will appreciate that various modifications, variations, and additions are possible without departing from the scope and spirit of the present invention, and thus these various modifications, variations, and additions fall within the scope of the claims.

## Claims

1. A method of stacking media in a media storage unit, the method comprising:

   receiving information about a length of a medium from a discrimination unit;
   determining whether the length of the medium received from the discrimination unit exceeds a reference value;
   when the length of the medium exceeds the reference value, spacing an upper surface of the medium loaded in a medium accumulation space on a push plate and a gap roller provided on a front plate located on an upper side of the push plate from each other at an interval of a set distance; and
   rotating a stack sheet to strike a rear end of the medium entering the media accumulation space, to allow the medium to be accumulated on the push plate by passing through a lower end of the gap roller.

2. The method of claim 1, further comprising, when the length of the medium exceeds the reference value, moving the push plate downward by the set distance.

3. The method of claim 1, further comprising, when the length of the medium exceeds the reference value, moving the front plate upward by the set distance.

4. The method of claim 3, further comprising, when the length of the medium exceeds the reference value, driving a solenoid connected to the front plate to pull the front plate upward by the set distance to move the front plate upward.

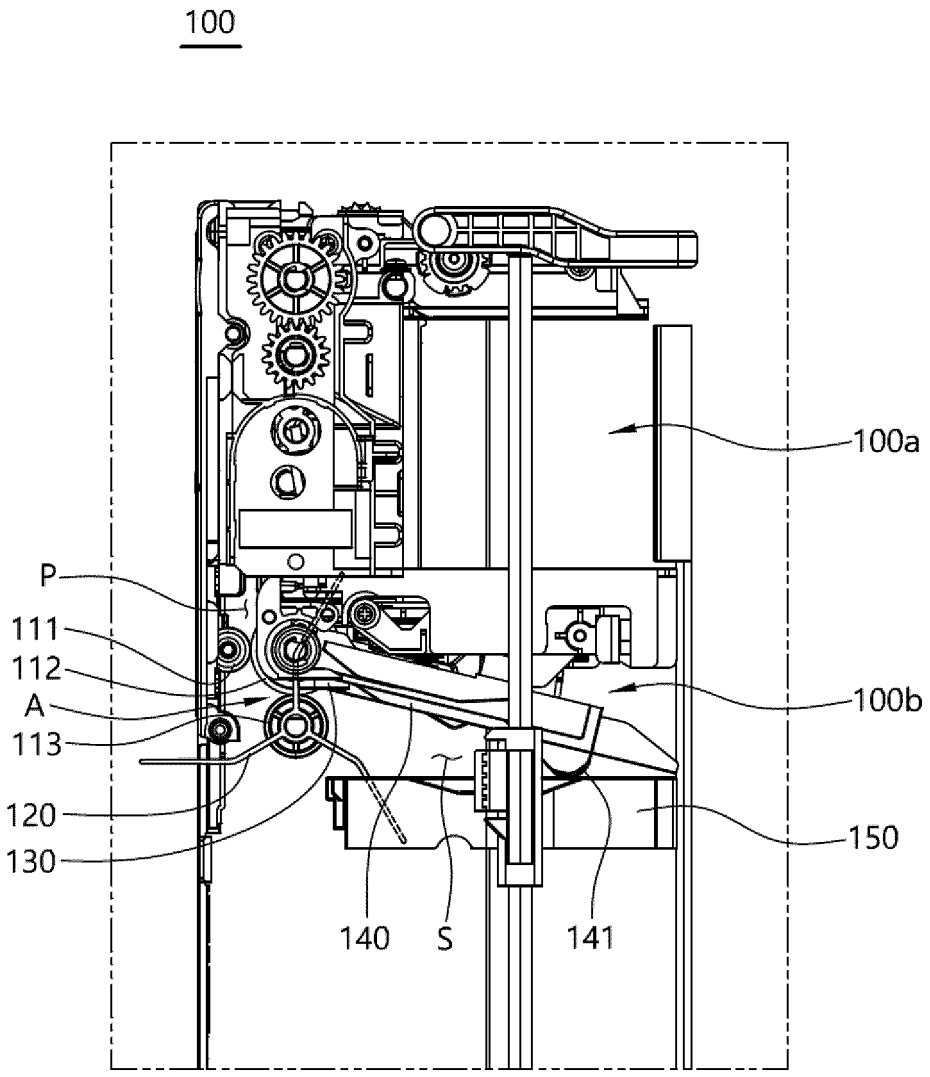
5. The method of claim 1, further comprising, when the length of the medium does not exceed the reference value,

   detecting whether the front plate is in an upwardly moved position using a front plate detection sensor;
   moving the push plate downward by the set distance when the front plate is detected to be in the upwardly moved position; and
   rotating the stack sheet to strike the rear end of the medium entering the media accumulation space, to allow the medium to be accumulated on the push plate by passing through a lower end of the gap roller.

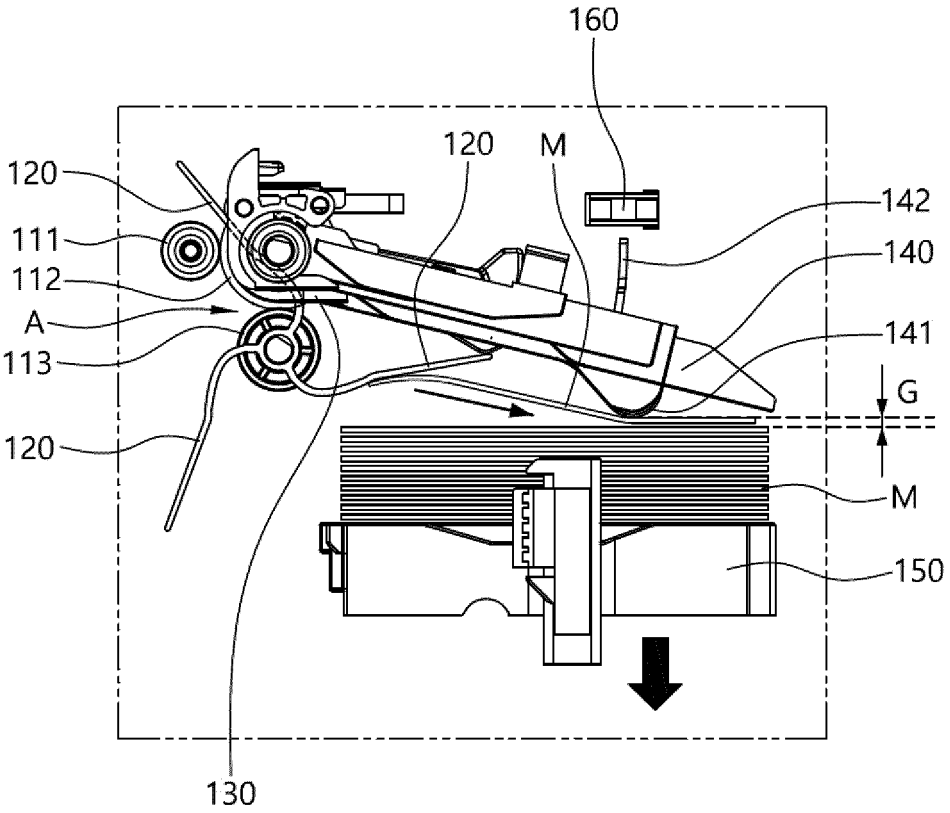
6. The method of claim 1, further comprising, when the length of the medium does not exceed the reference value,

   detecting whether the front plate is in an upwardly moved position using a front plate detection sensor; and
   rotating the stack sheet to strike the rear end of the medium entering the media accumulation space when the front plate is detected not to be in the upwardly moved position, to allow the medium to be accumulated on the push plate by passing through a lower end of the gap roller.

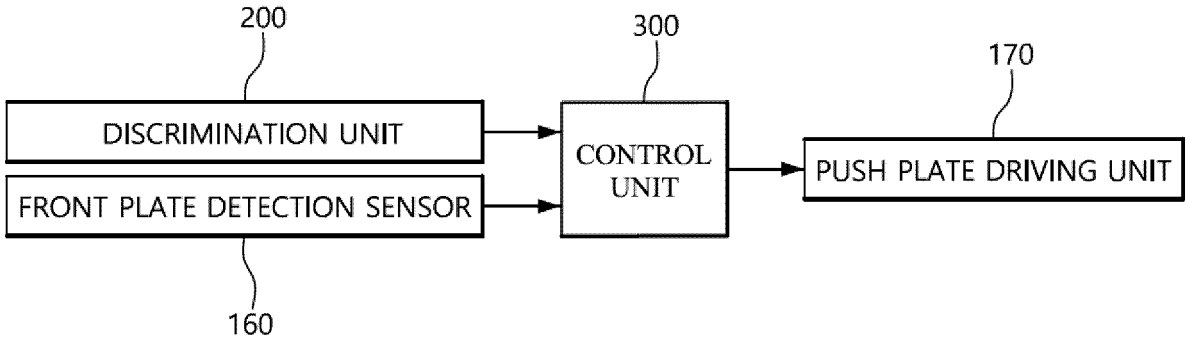
[FIG. 1]



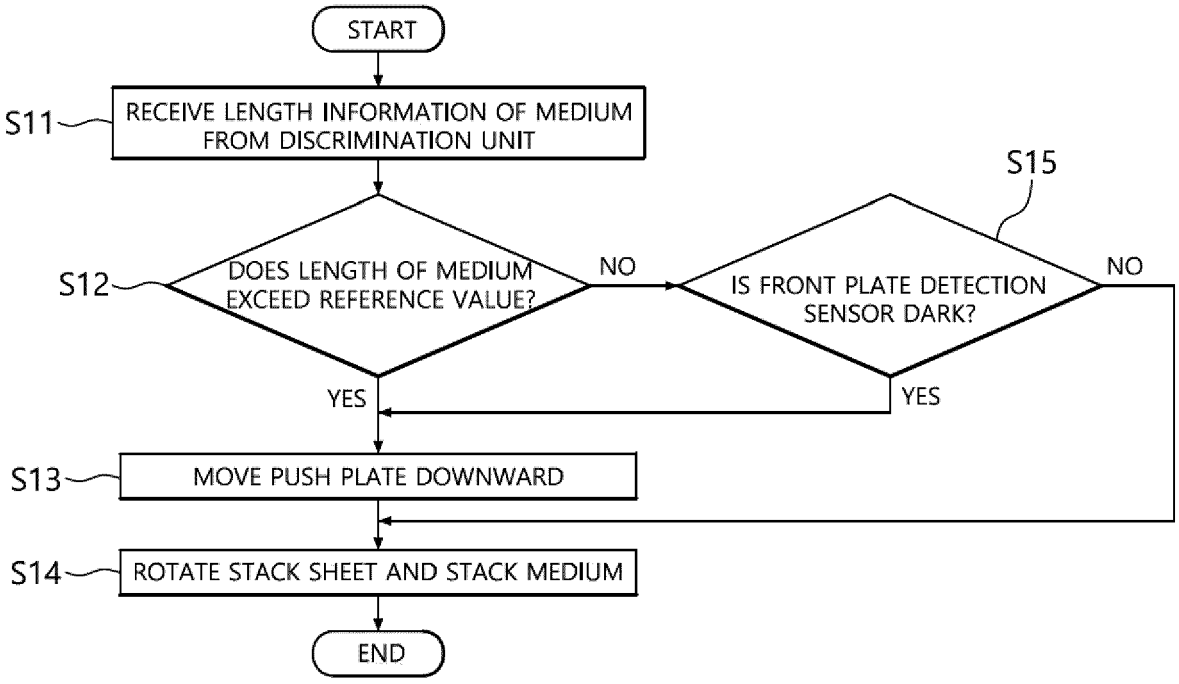
[FIG. 2]


160
120
M
120
111
112
A
113
120
130
142
140
141
G
M
150

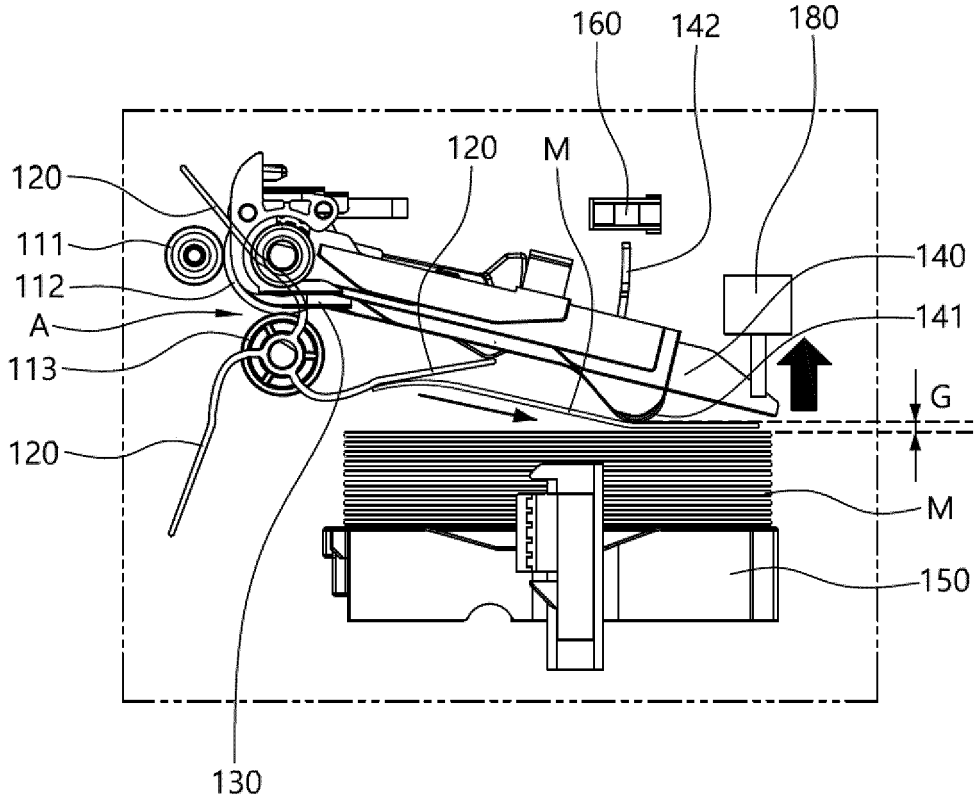
[FIG. 3]


200
DISCRIMINATION UNIT
FRONT PLATE DETECTION SENSOR
160
300
CONTROL UNIT
170
PUSH PLATE DRIVING UNIT

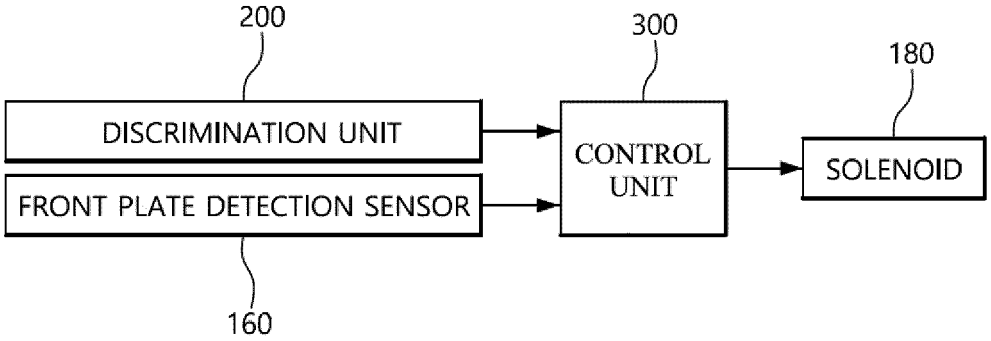
[FIG. 4]


START
S11
RECEIVE LENGTH INFORMATION OF MEDIUM FROM DISCRIMINATION UNIT
S12
DOES LENGTH OF MEDIUM EXCEED REFERENCE VALUE?
NO
S15
IS FRONT PLATE DETECTION SENSOR DARK?
NO
YES
YES
S13
MOVE PUSH PLATE DOWNWARD
S14
ROTATE STACK SHEET AND STACK MEDIUM
END

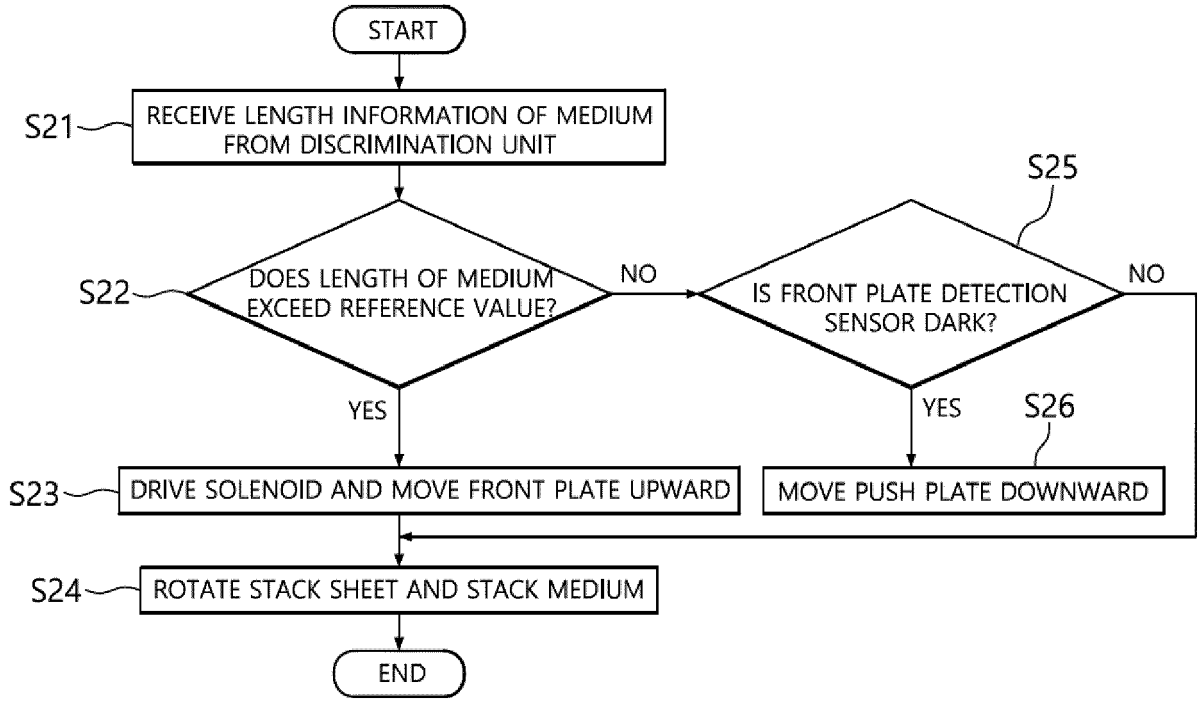
[FIG. 5]


160
142
180
120
M
120
111
112
A
113
120
130
140
141
G
M
150

[FIG. 6]


200
300
180
DISCRIMINATION UNIT
FRONT PLATE DETECTION SENSOR
CONTROL UNIT
SOLENOID
160

[FIG. 7]


START
S21
RECEIVE LENGTH INFORMATION OF MEDIUM FROM DISCRIMINATION UNIT
S22
DOES LENGTH OF MEDIUM EXCEED REFERENCE VALUE?
NO
S25
IS FRONT PLATE DETECTION SENSOR DARK?
NO
YES
YES
S26
S23
DRIVE SOLENOID AND MOVE FRONT PLATE UPWARD
MOVE PUSH PLATE DOWNWARD
S24
ROTATE STACK SHEET AND STACK MEDIUM
END

## INTERNATIONAL SEARCH REPORT

International application No.
**PCT/KR2022/017646**

**A. CLASSIFICATION OF SUBJECT MATTER**

**G07D 11/13**(2019.01)i; **G07D 11/16**(2019.01)i; **G07D 11/20**(2019.01)i; **G07D 11/50**(2019.01)i; **G07F 19/00**(2006.01)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)

G07D 11/13(2019.01); B65H 29/14(2006.01); B65H 31/20(2006.01); B65H 31/26(2006.01); G07D 11/00(2006.01); G07D 7/00(2006.01)

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

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

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

eKOMPASS (KIPO internal) & keywords: 길이(length), 간격(gap), 임계값(threshold), 롤러(roller)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | KR 10-2265004 B1 (NAUTILUS HYOSUNG INC.) 15 June 2021 (2021-06-15)<br>See paragraphs [0029]-[0037]. | 1-6 |
| A | KR 10-2013-0141222 A (NAUTILUS HYOSUNG INC.) 26 December 2013 (2013-12-26)<br>See paragraphs [0006]-[0077]. | 1-6 |
| A | KR 10-2016-0139222 A (NAUTILUS HYOSUNG INC.) 07 December 2016 (2016-12-07)<br>See paragraph [0051]. | 1-6 |
| A | JP 05-058534 A (HITACHI LTD. et al.) 09 March 1993 (1993-03-09)<br>See paragraph [0021]. | 1-6 |
| A | KR 10-2018-0111211 A (HYOSUNG TNS INC.) 11 October 2018 (2018-10-11)<br>See paragraph [0027]. | 1-6 |

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| **17 February 2023** | **20 February 2023** |
| Name and mailing address of the ISA/KR<br>**Korean Intellectual Property Office**<br>**Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208**<br>Facsimile No. **+82-42-481-8578** | Authorized officer<br><br>Telephone No. |

Form PCT/ISA/210 (second sheet) (July 2022)

**INTERNATIONAL SEARCH REPORT**
**Information on patent family members**

International application No.
**PCT/KR2022/017646**

| Patent document cited in search report | Publication date (day/month/year) | Patent family member(s) | Publication date (day/month/year) |
|---|---|---|---|
| KR 10-2265004 B1 | 15 June 2021 | KR 10-2016-0082745 A | 11 July 2016 |
| KR 10-2013-0141222 A | 26 December 2013 | None | |
| KR 10-2016-0139222 A | 07 December 2016 | KR 10-2303729 B1 | 16 September 2021 |
| JP 05-058534 A | 09 March 1993 | DE 69215805 T2 | 12 June 1997 |
| | | EP 0532217 A1 | 17 March 1993 |
| | | EP 0532217 B1 | 11 December 1996 |
| | | JP 2680755 B2 | 19 November 1997 |
| KR 10-2018-0111211 A | 11 October 2018 | KR 10-2303715 B1 | 23 September 2021 |

Form PCT/ISA/210 (patent family annex) (July 2022)

## REFERENCES CITED IN THE DESCRIPTION

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

### Patent documents cited in the description


- KR 101628481 **[0008]**