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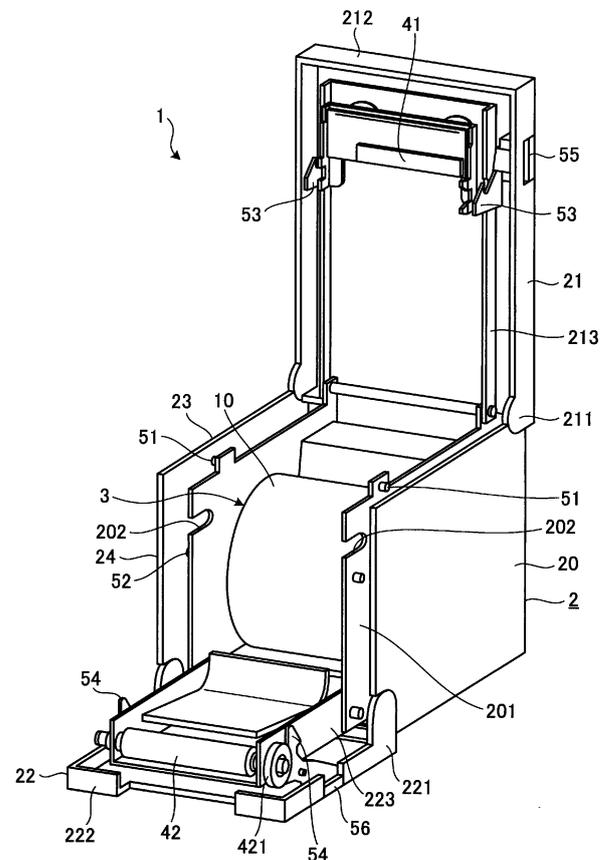
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(54) **PRINTER**

(57) A printer (1) includes a main body (20) having a first opening (23) through which a roll of paper (10) can be inserted for installation within the main body (20) and a second opening (24) through which a roll of paper (10) can be inserted for installation within the main body (20), a first cover (21) configured to open and close the first opening (23), a second cover (22) configured to open and close the second opening (24), a printing head (41) attached to the first cover (21) and configured to print an image on paper supplied from the roll of paper (10), and a roller (42) attached to the second cover (22) and configured to convey the paper from the roll of paper (10) installed within the main body (20) to the printing head (41). The paper is conveyed by the roller (42) and printing is performed by the printing head (41) when both the first and second covers (21, 22) are closed.

FIG. 4



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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is based upon and claims the benefit of priority from Japanese Patent Application No. 2018-023093, filed in February 13, 2018, the entire contents of which are incorporated herein by reference.

FIELD

[0002] Embodiments described herein relate generally to a printer.

BACKGROUND

[0003] In the related art, a label printer is widely used in an office such as a back office in a grocery store. A typical label printer requires a user to open and close the housing at the time of paper sheet replenishment and maintenance, which requires an additional space around the printer. Thus, when the office space is limited, it is difficult for the user to replenish printing paper and handle the maintenance.

[0004] For example, if the printer includes an opening and closing lid on a top surface of the housing, an additional space above the housing is needed. If the printer includes an opening and closing lid on the front side of the housing, an additional space in front of the housing is needed.

[0005] In this way, an installation location for a printer may be limited due to the opening and closing mechanism of the printer, especially when the printer needs to be installed in a small office.

SUMMARY OF THE INVENTION

[0006] One of the objects of the present invention is to improve prior art techniques and overcome at least some of the prior art problems as for instance above illustrated.

[0007] According to a first aspect of the invention, it is provided a printer comprising: a main body having a first opening through which a roll of paper can be inserted for installation within the main body and a second opening through which a roll of paper can be inserted for installation within the main body; a first cover configured to open and close the first opening; a second cover configured to open and close the second opening; a printing head attached to the first cover and configured to print an image on paper supplied from the roll of paper; and a roller attached to the second cover and configured to convey the paper from the roll of paper installed within the main body to the printing head, wherein the paper is conveyed by the roller and printing is performed by the printing head when both the first and second covers are closed.

[0008] Optionally, in the printer according to the first aspect of the invention, the first and second covers form

two contiguous and mutually perpendicular surfaces of the printer when the first and second covers are closed.

[0009] Optionally, in the printer according to the first aspect of the invention, the second cover has a discharge port at one end thereof.

[0010] Optionally, in the printer according to the first aspect of the invention, the printed paper is discharged through the discharge port.

[0011] Optionally, in the printer according to the first aspect of the invention, one end of the first cover is attached to the main body such that the first cover opens and closes in a first direction, and one end of the second cover is attached to the main body such that the second cover opens and closes in a second direction different from the first direction.

[0012] Optionally, in the printer according to the first aspect of the invention, the discharge port is formed at the other end of the second cover.

[0013] Optionally, in the printer according to the first aspect of the invention, the main body has first and second pins, and the first and second covers have first and second locking mechanisms that engage with the first and second pins when the first and second covers are closed.

[0014] Optionally, in the printer according to the first aspect of the invention, the main body has a pin, and the first and second covers have first and second locking mechanisms that engage with the pin when the first and second covers are closed.

[0015] Optionally, in the printer according to the first aspect of the invention, the paper is label paper.

[0016] Optionally, in the printer according to the first aspect of the invention, the paper is receipt paper.

[0017] According to a second aspect of the invention, it is provided a printer comprising: a main body having a first cover configured to open and close in a first direction and a second cover configured to open and close in a second direction perpendicular to the first direction; a printing head attached to the first cover and configured to print an image on paper supplied from roll of paper; and a roller attached to the second cover and configured to convey the paper from the roll of paper installed within the main body to the printing head, wherein the roll of paper can be inserted for installation when at least one of the first and second covers is opened.

[0018] Optionally, in the printer according to the second aspect of the invention, the first and second covers form two contiguous and mutually perpendicular surfaces of the printer when the first and second covers are closed.

[0019] Optionally, in the printer according to the second aspect of the invention, the second cover has a discharge port at one end thereof.

[0020] Optionally, in the printer according to the second aspect of the invention, the printed paper is discharged through the discharge port.

[0021] Optionally, in the printer according to the second aspect of the invention, one end of the first cover is

fixed to the main body such that the first cover opens and closes in a rotatable manner, and one end of the second cover is fixed to the main body such that the second cover opens and closes in a rotatable manner.

[0022] Optionally, in the printer according to the second aspect of the invention, the discharge port is formed at the other end of the second cover.

[0023] Optionally, in the printer according to the second aspect of the invention, the main body has first and second pins, and the first and second covers have first and second locking mechanisms that engage with the first and second pins when the first and second covers are closed.

[0024] Optionally, in the printer according to the second aspect of the invention, the main body has a pin, and the first and second covers have first and second locking mechanisms that engage with the pin when the first and second covers are closed.

[0025] Optionally, in the printer according to the second aspect of the invention, the paper is label paper.

[0026] Optionally, in the printer according to the second aspect of the invention, the paper is receipt paper.

DESCRIPTION OF THE DRAWINGS

[0027]

FIG. 1 illustrates a perspective view of an exterior of a printer according to an embodiment.

FIG. 2 illustrates a perspective view of the printer with a first cover opened.

FIG. 3 illustrates a perspective view of the printer with a second cover opened.

FIG. 4 illustrates a perspective view of the printer with the first cover and the second cover opened.

FIG. 5 illustrates a longitudinal side view of the printer with the first cover and the second cover closed.

FIG. 6 illustrates a longitudinal side view of the printer with the second cover opened.

FIG. 7 illustrates a side view inside the printer showing an exterior of a lock unit.

FIG. 8 illustrates a perspective view inside the printer showing the exterior of another example of a lock unit.

DETAILED DESCRIPTION

[0028] One or more embodiments provide a printer with a high degree of freedom in the installation thereof.

[0029] The printer according to an embodiment includes a main body having a first opening through which a roll of paper can be inserted for installation within the main body and a second opening through which a roll of paper can be inserted for installation within the main body, a first cover configured to open and close the first opening, a second cover configured to open and close the second opening, a printing head attached to the first cover and configured to print an image on paper supplied

from the roll of paper, and a roller attached to the second cover and configured to convey the paper from the roll of paper installed within the main body to the printing head. The paper is conveyed by the roller and printing is performed by the printing head when both the first and second covers are closed.

[0030] One or more embodiments will be described with reference to the figures. Fig 1 illustrates a perspective view of an exterior of the printer 1 according to an embodiment. The printer 1 includes a housing 2. The form of the housing 2 is box-shaped (for example, an approximate cuboid or an approximate cube). The housing 2 includes a main body portion 20 that includes a main portion of the housing 2, and a first cover 21 and a second cover 22 that constitute a portion of the housing 2.

[0031] FIG. 2 illustrates a perspective view of the printer 1 with the first cover 21 opened. FIG. 3 illustrates a perspective view of the printer 1 with the second cover 22 opened. FIG. 4 illustrates a perspective view of the printer 1 with the first cover 21 and the second cover 22 opened. The main body portion 20 includes the openings 23 and 24 on two different surfaces of the housing 2. The first cover 21 opens and closes one opening 23. The second cover 22 opens and closes the other opening 24.

[0032] FIG. 5 illustrates a longitudinal side view of the printer 1 with the first cover 21 and the second cover 22 closed. FIG. 6 corresponds to FIG. 3 and illustrates a longitudinal side view of the printer 1 with the second cover 22 opened. The printer 1 further includes a paper sheet storage portion 3 and a print unit 4.

[0033] The paper sheet storage portion 3 is provided inside the main body portion 20, stores a roll paper sheet 10 and holds the paper sheet such that the roll paper sheet rotates freely. The roll paper sheet 10 is a roll of paper sheet wound, for example, a label roll or a receipt roll. The label roll is a strip of base paper sheet on which labels are stuck at predetermined intervals wound. The receipt roll is a strip of paper sheet wound. Each of the openings 23 and 24 enables the paper sheet replenishment or replacement in the paper sheet storage portion 3.

[0034] Here, the paper sheet storage portion 3 may hold the roll paper sheet 10 in a so-called throw-in way or may hold the core which is inserted into the hollow portion of the roll paper sheet 10 to become a shaft of rotation with a predetermined holding unit.

[0035] The print unit 4 prints on the paper sheet drawn out from the paper sheet storage portion 3. The print unit 4 includes a print head 41 and a platen roller 42.

[0036] The embodiment provides the openings 23 and 24 on two adjacent surfaces of the housing 2 and the paper sheet discharge opening 25 that discharges the paper sheet between the first cover 21 and the second cover 22 (refer to FIG. 1 and 5).

[0037] Further, according to the embodiment, one end 211 of the first cover 21 is attached to the main body portion 20 such that the first cover 21 is rotatable and opens and closes the opening 23 in accordance with the rotation. The other end 212 of the first cover 21 faces the

paper sheet discharge opening 25. Further, one end 221 of the second cover 22 is attached to the main body portion 20 such that the second cover 22 is rotatable and opens and closes the opening 24 in accordance with the rotation. The other end 222 of the second cover 22 faces the paper sheet discharge opening 25.

[0038] The print head 41 is attached to the first cover 21, and the platen roller 42 is attached to the second cover 22. When the first cover 21 closes the opening 23 and the second cover 22 closes the opening 24, the platen roller 42 comes into contact with the print head 41 and the printer 1 becomes ready for printing.

[0039] The print head 41 is, for example, a thermal head. The platen roller 42 rotates by the driving force of a stepping motor or the like being transmitted through the gear 421 (refer to FIG. 4 or the like). When the platen roller 42 rotates, the paper sheet nipped between the platen roller 42 and the print head 41 is conveyed.

[0040] FIG. 7 illustrates a side view inside the printer 1 showing an exterior of the lock unit 5. In FIG. 7, the exterior portion of the housing 2 is removed from the printer 1. Hereinafter, the main body portion 20 without the exterior (frame portion) will be referred to as the main body frame 201, the first cover 21 without the exterior will be referred to as the first frame 213, and the second cover 22 without the exterior will be referred to as the second frame 223. The main body frame 201 is provided with a notch 202 (refer to FIG. 4) for avoiding the rotation shaft of the gear 421 and the platen roller 42. When the second cover 22 is positioned for closing the housing 2, a portion around the notch 202 of the main body frame 201 is positioned between the gear 421 and the platen roller 42, and the rotation shaft of the gear 421 enters the notch 202.

[0041] The printer 1 further includes a lock unit 5. The lock unit 5 includes the pins 51 and 52, the levers 53 and 54, and the buttons 55 and 56 (refer to FIG. 1).

[0042] The levers 53 and 54 have hook-shaped lock ends 531 and 541, the operation ends 532 and 542 to which a force from an operator is transmitted, and the rotation centers 533 and 543. The first cover 21 pivotally supports the lever 53 at the rotation center 533. The second cover 22 pivotally supports the lever 54 at the rotation center 543.

[0043] The lock end 531 is provided at a pair of positions nipping the end portion of the first frame 213 near the paper sheet discharge opening 25 in the width direction. Further, the lock end 541 is provided at a pair of positions nipping the end portion of the second frame 223 near the paper sheet discharge opening 25 in the width direction.

[0044] In the side view illustrated in FIG. 7, the operation end 532 is positioned on the opposite side of the rotation center 533 from the lock end 531 and is provided in a portion connecting a pair of lock ends 531. The operation end 542, in the side view illustrated in FIG. 7, is positioned on the opposite side of the rotation center 543 from lock end 541 and is provided in a portion connecting

a pair of lock ends 541.

[0045] The pin 51 is provided on the main body frame 201 and catches the lever 53 when the first cover 21 is closed. The pin 52 is provided on the main body frame 201 and catches the lever 54 when the second cover 22 is closed.

[0046] The button 55 is provided on the first cover 21, is positioned in the vicinity of the operation end 532 of the lever 53, and transmits the force received from the operator to the operation end 532 to rotate the lever 53.

[0047] In such a configuration, the printer 1 draws out the roll paper sheet 10 stored and held in the paper sheet storage portion 3 by rotating the platen roller 42, prints on the drawn-out paper sheet with the print head 41, and discharges the paper sheet from the paper sheet discharge opening 25.

[0048] Further, for the printer 1 of such a configuration, the operator opens the first cover 21 or the second cover 22 and replenishes and replaces the paper sheet in the paper sheet storage portion 3. Further, the operator closes the opened first cover 21 or the second cover 22 with a tip end of the paper sheet being drawn outside the housing 2 from the roll paper sheet 10 which is inserted in the paper sheet storage portion 3. In this way, the paper sheet is nipped by the print head 41 and the platen roller 42, and the tip end of the paper sheet sticks out the housing 2 from the paper sheet discharge opening 25.

[0049] When the replenishment and the replacement of the paper sheet or the maintenance of the printer 1 is needed, the operator using the printer 1 can choose which one of the first cover 21 and the second cover 22 to open. In arranging the environment in which the printer 1 is to be installed, the operator only needs to maintain a state in which either the first cover 21 or the second cover 22 can be opened. In other words, according to the embodiment, the operator can easily find a location for installing the printer 1 even when the office space is limited.

[0050] The printer 1 includes the openings 23 and 24 that enable the paper sheet replenishment on the two different surfaces of the housing 2, and each of the openings 23 and 24 is opened and closed by the first cover 21 and the second cover 22, so that it is possible to use either the first cover 21 or the second cover 22 that can be opened, depending on the installation environment of the printer 1.

[0051] Further, since the printer 1 includes the openings 23 and 24 on two adjacent surfaces of the housing 2, by opening both the first cover 21 and the second cover 22, it is easy for the operator to clean up the inside of the apparatus.

[0052] The print head 41 is attached to the first cover 21 and the platen roller 42 is attached to the second cover 22 in the printer 1. Therefore, even when either the first cover 21 or the second cover 22 is opened, it is possible to separate the print head 41 and the platen roller 42 from each other. By closing the housing 2, it is possible to easily nip the paper sheet between the print head 41 and

the platen roller 42.

[0053] Further, according to the embodiment, the first cover 21 and the second cover 22 is rotatably attached to the main body portion 20 such that the housing 2 is configured to be opened and closed in accordance with the rotation. According to the embodiment, it is possible to provide the first cover 21 and the second cover 22 to be slidable with respect to the main body portion 20 so as to open and close the housing 2 in accordance with the slide. However, compared with the latter configuration, the former keeps the cost of materializing the configuration for opening and closing low easily.

[0054] The printer 1 using the roll paper sheet 10 as a paper sheet is described as an example according to the embodiment. However, in practice, the configuration for opening and closing two different surfaces of the housing can be applied to a printer that prints on other forms of paper. Further, according to the embodiment, the printer 1 with the paper sheet discharge opening 25 facing forward is illustrated in FIG. 1 and the like. However, in practice, the printer 1 may be used with the paper sheet discharge opening 25 facing another direction such as upward.

[0055] Further, according to the embodiment, each of the openings 23 and 24 corresponds to an entire surface of the housing 2. However, in practice, the opening may correspond to a part of, not an entire, surface of the housing 2.

[0056] Further, according to the embodiment, the levers 53 and 54 lock or unlock by rotation, but, in practice, the operation of the levers 53 and 54 may be other than the rotation.

Modification Example

[0057] Hereinafter, a modification example of the lock unit will be described. FIG. 8 illustrates a perspective view of the interior of the printer 1 showing the exterior of another example of the lock unit (i.e., lock unit 6). In describing the lock unit 6, the same reference numerals are used for the same parts as the parts of the lock unit 5, and for the parts corresponding to, but different from, each other, a suffix A is used at the end.

[0058] The lock unit 6 includes a pin 61 instead of two separate pins 51 and 52, a lever 53A into which the lever 53 is deformed in conformity with the pin 61, and a lever 54A into which the lever 54 is deformed in conformity with the pin 61. The pin 61 positions the first cover 21 and positions the second cover 22.

[0059] The lock ends 531A and 541A of the levers 53A and 54A are longer than the lock ends 531 and 541 as illustrated in FIG. 7, and the tip ends are separated from the rotation centers 533 and 543. The pin 61 is provided at a position where the lock ends 531A and 541A intersect with each other.

[0060] Therefore, by commonizing the pin 61, it is possible to obtain the printing accuracy in the printer 1 easily. This is because the positional accuracy of the print head

41 and the platen roller 42 in the print unit 4 is important for printing accuracy. In the printer 1, to optimize the positional accuracy between the print head 41 and the platen roller 42, the positional accuracy of the first cover 21 with respect to the main body portion 20 has to be improved while the positional accuracy of the second cover 22 with respect to the main body portion 20 also has to be improved.

[0061] If the pin 51 that fixes the first cover 21 and the pin 52 that fixes the second cover 22 are separately provided on the main body portion 20 like the lock unit 5, the total of the positional error of each of the pin 51 and the pin 52 affects the print unit 4.

[0062] If the first cover 21 and the second cover 22 are both fixed to one pin 61 which is provided in the main body portion 20 as in the lock unit 6, the cause of the position error is one. Thus, the error management becomes relatively easy.

[0063] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the embodiments described herein may be made without departing from the scope of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope of the inventions as defined by the appended claims.

Claims

1. A printer comprising:

a main body having a first opening through which a roll of paper can be inserted for installation within the main body and a second opening through which a roll of paper can be inserted for installation within the main body;
 a first cover configured to open and close the first opening;
 a second cover configured to open and close the second opening;
 a printing head attached to the first cover and configured to print an image on paper supplied from the roll of paper; and
 a roller attached to the second cover and configured to convey the paper from the roll of paper installed within the main body to the printing head, wherein
 the paper is conveyed by the roller and printing is performed by the printing head when both the first and second covers are closed.

2. The printer according to claim 1, wherein the first and second covers form two contiguous and

- mutually perpendicular surfaces of the printer when the first and second covers are closed.
3. The printer according to claim 1 or 2, wherein the second cover has a discharge port at one end thereof. 5
4. The printer according to claim 3, wherein the printed paper is discharged through the discharge port. 10
5. The printer according to any of claims 1 to 4, wherein one end of the first cover is attached to the main body such that the first cover opens and closes in a first direction, and one end of the second cover is attached to the main body such that the second cover opens and closes in a second direction different from the first direction. 15
6. The printer according to claim 5, wherein a discharge port is formed at the other end of the second cover. 20
7. The printer according to any of claims 1 to 6, wherein the main body has first and second pins, and the first and second covers have first and second locking mechanisms that engage with the first and second pins when the first and second covers are closed. 25
8. The printer according to any of claims 1 to 7, wherein the main body has a pin, and the first and second covers have first and second locking mechanisms that engage with the pin when the first and second covers are closed. 30
9. The printer according to any of claims 1 to 8, wherein the paper is label paper. 35
10. The printer according to any of claims 1 to 9, wherein the paper is receipt paper. 40
11. A printer comprising:
- a main body having a first cover configured to open and close in a first direction and a second cover configured to open and close in a second direction perpendicular to the first direction; 45
- a printing head attached to the first cover and configured to print an image on paper supplied from roll of paper; and 50
- a roller attached to the second cover and configured to convey the paper from the roll of paper installed within the main body to the printing head, wherein 55
- the roll of paper can be inserted for installation when at least one of the first and second covers is opened.
12. The printer according to claim 11, wherein the first and second covers form two contiguous and mutually perpendicular surfaces of the printer when the first and second covers are closed.
13. The printer according to claim 11 or 12, wherein the second cover has a discharge port at one end thereof.
14. The printer according to claim 13, wherein the printed paper is discharged through the discharge port.
15. The printer according to any of claims 11 to 14, wherein one end of the first cover is fixed to the main body such that the first cover opens and closes in a rotatable manner, and one end of the second cover is fixed to the main body such that the second cover opens and closes in a rotatable manner.

FIG. 1

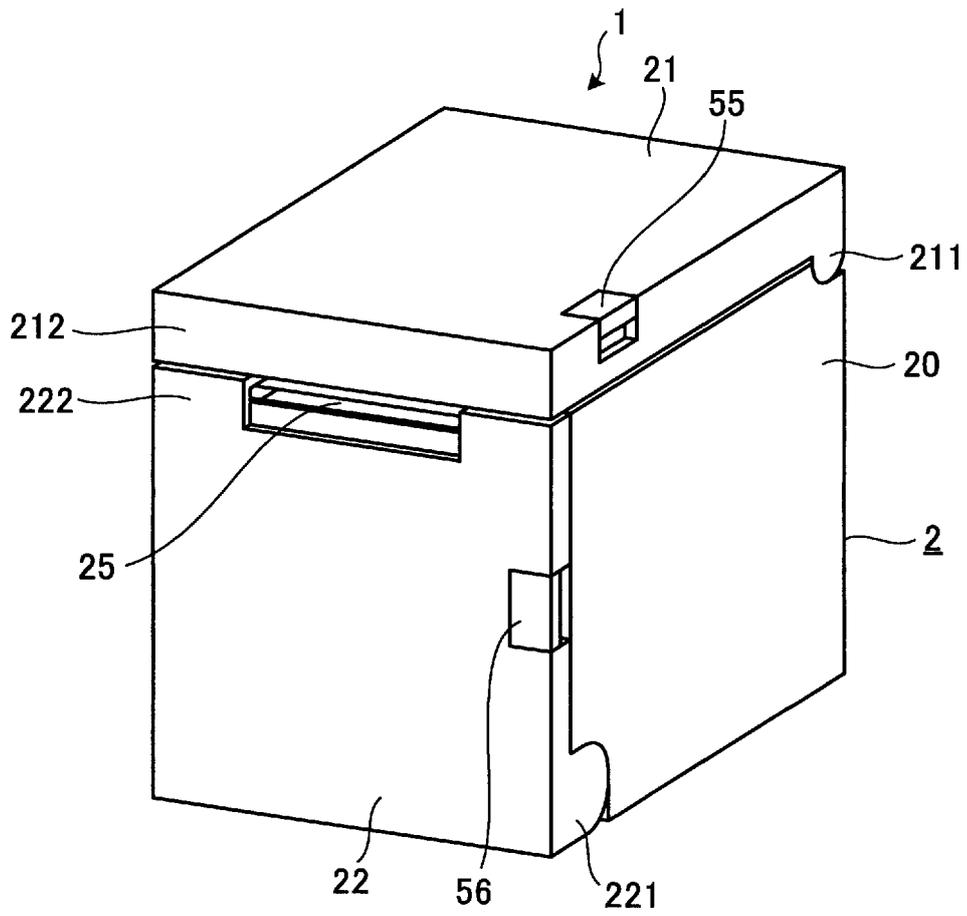


FIG. 2

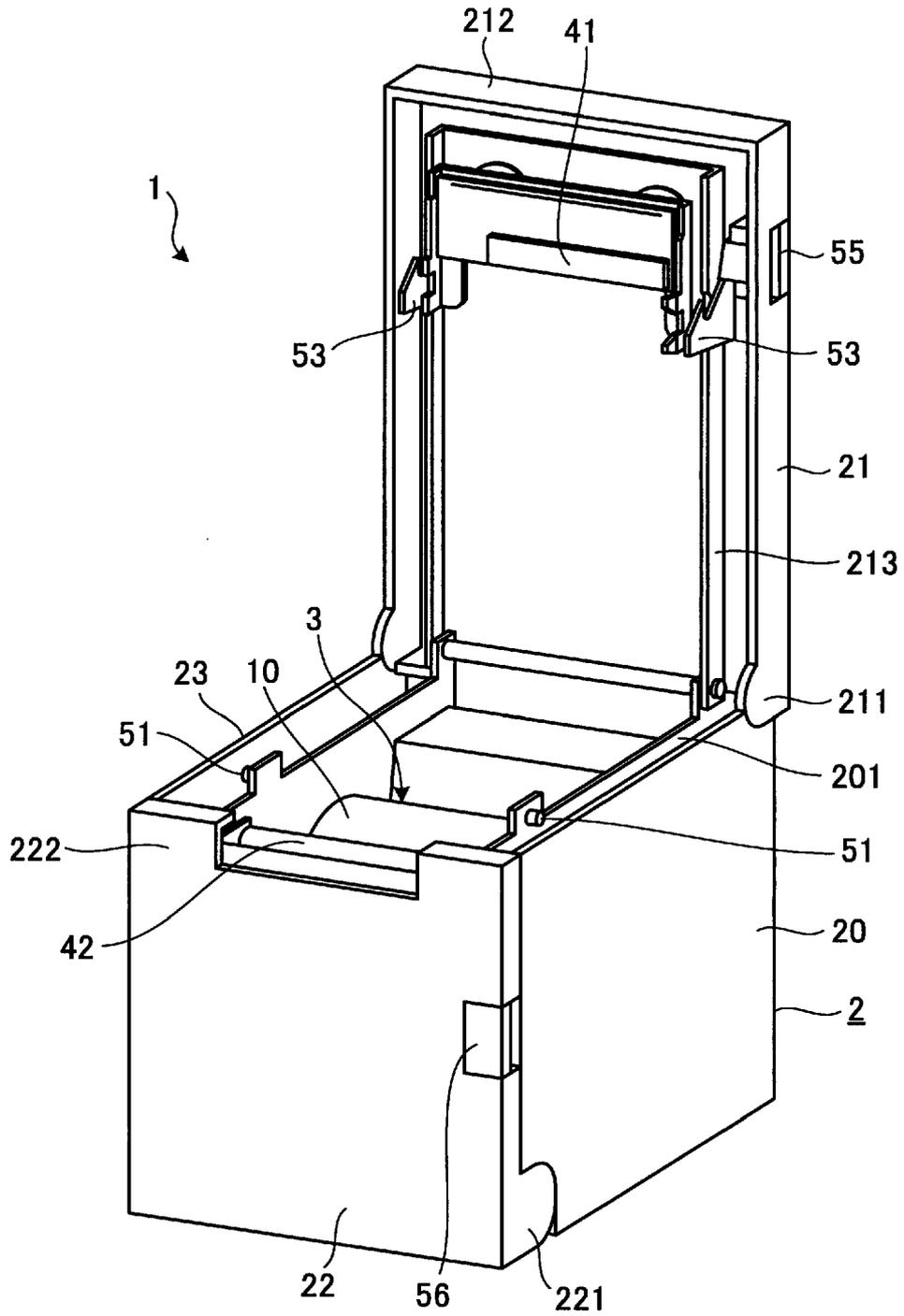


FIG. 4

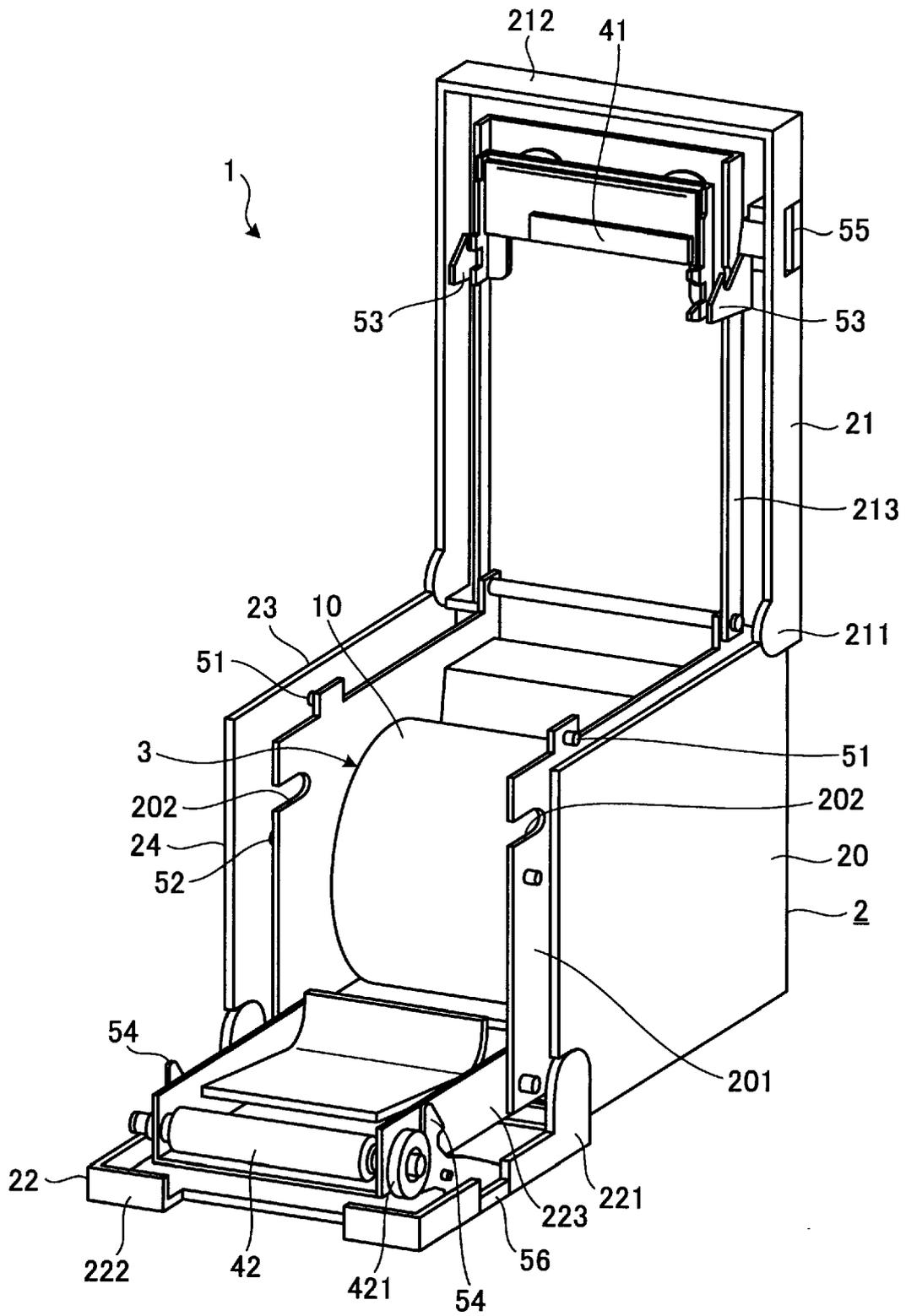


FIG. 5

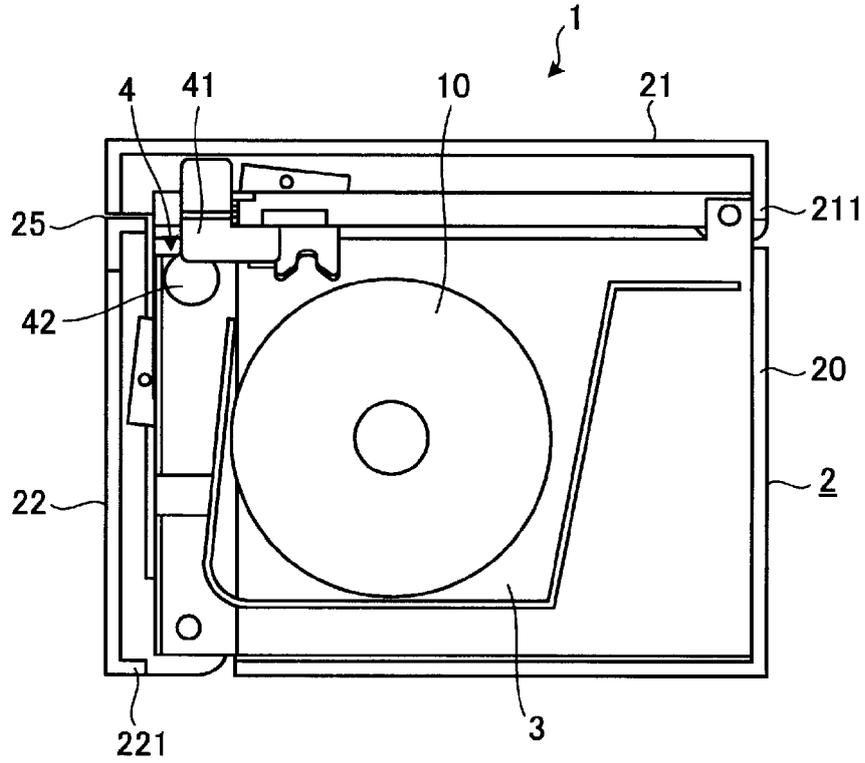


FIG. 6

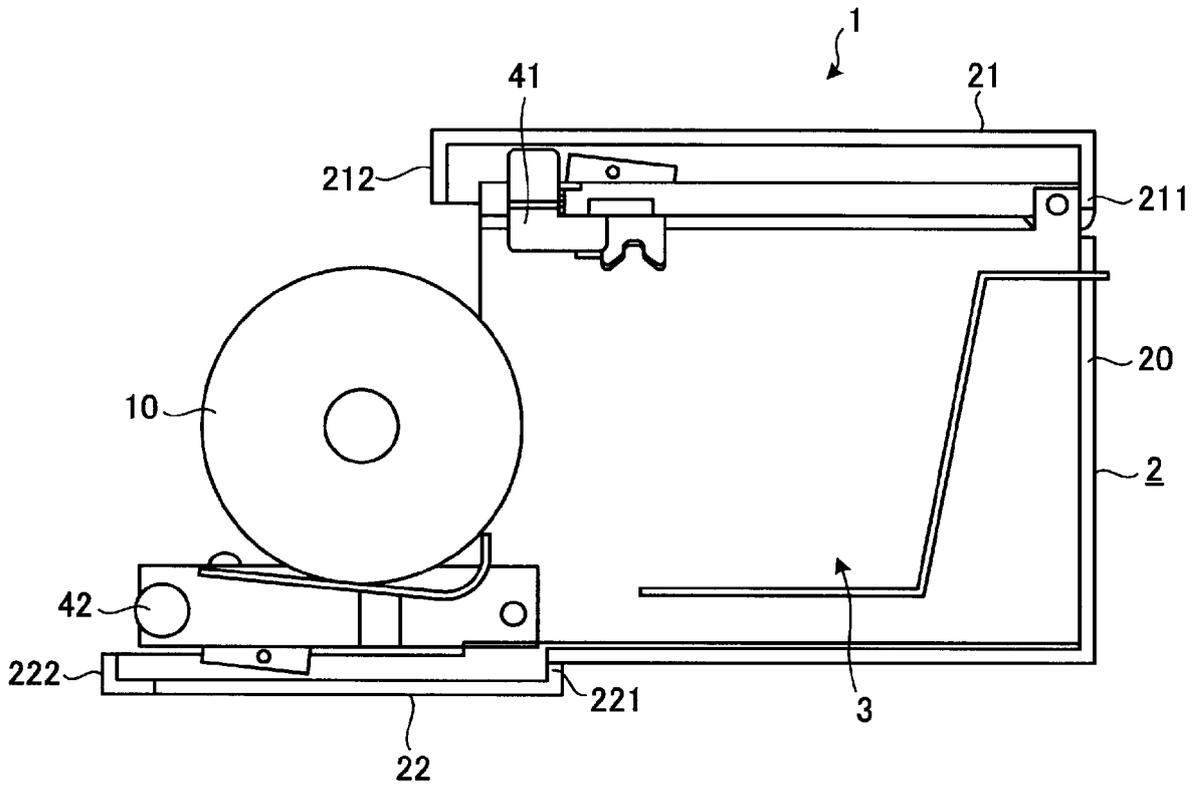


FIG. 7

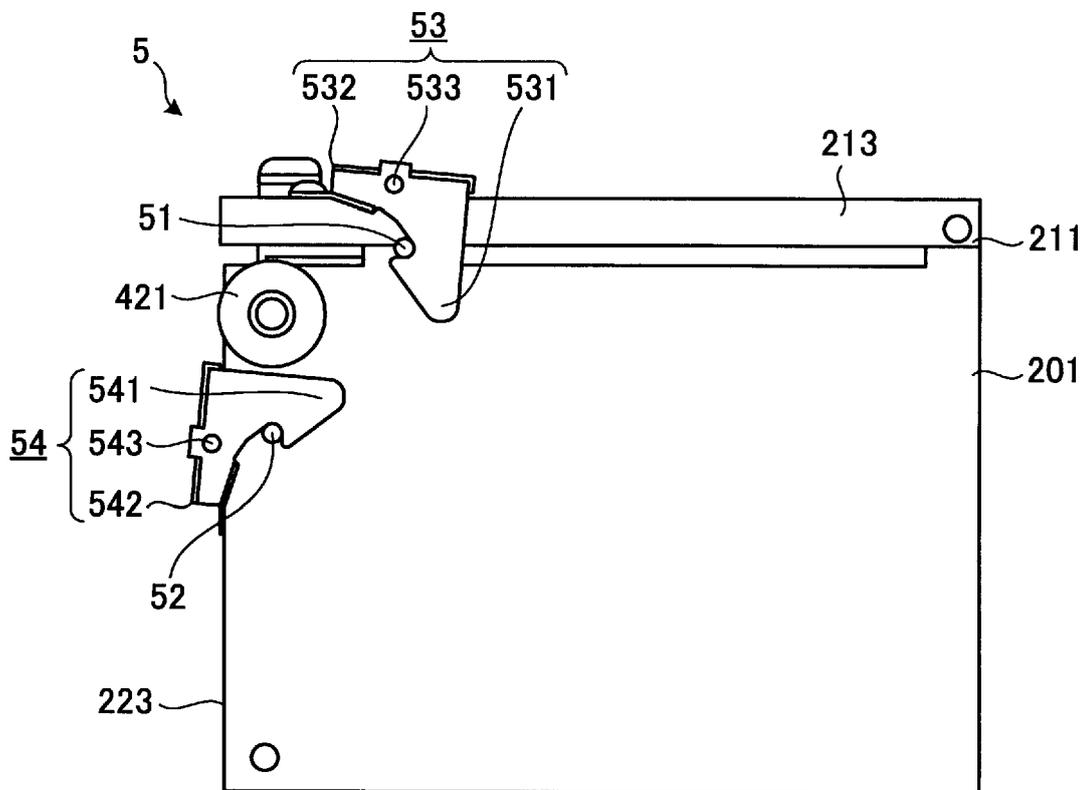
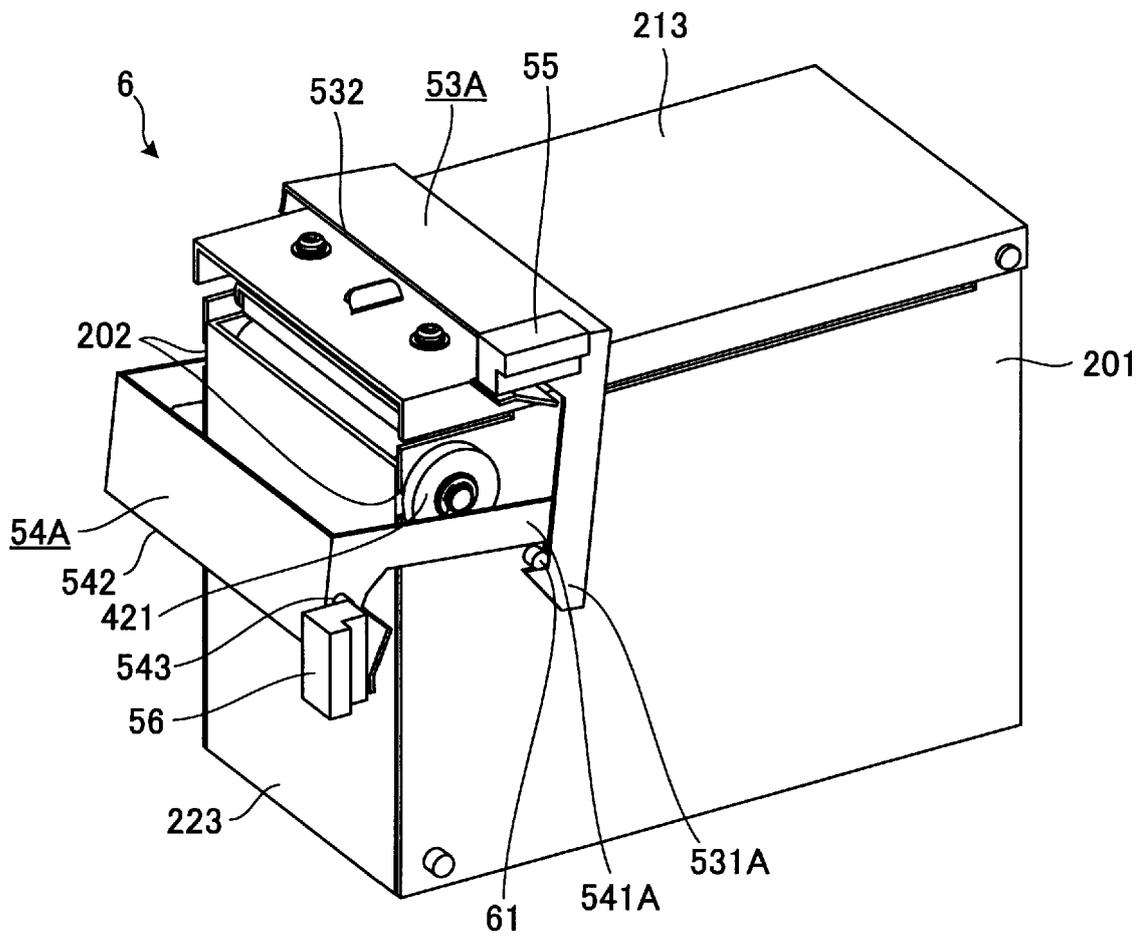


FIG. 8





EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2015/109396 A1 (KAWAMOTO MAKOTO [JP]) 23 April 2015 (2015-04-23) * figures 1, 2, 4-9 *	1-15	INV. B41J3/407 B41J15/04
A	US 2014/209730 A1 (TANAKA MITSUGI [JP]) 31 July 2014 (2014-07-31) * figures 1-6 *	1-15	
A	JP 2002 347294 A (NIDEC COPAL CORP) 4 December 2002 (2002-12-04) * figures 1-7 *	1-15	
A	US 2016/207332 A1 (ISHIMORI HIROYUKI [JP]) 21 July 2016 (2016-07-21) * figures 1-5 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B41J
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 2 July 2019	Examiner Gaubinger, Bernhard
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ON EUROPEAN PATENT APPLICATION NO.

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02-07-2019

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2015109396 A1	23-04-2015	JP 6398174 B2	03-10-2018
		JP 2015080873 A	27-04-2015
		US 2015109396 A1	23-04-2015

US 2014209730 A1	31-07-2014	EP 2762318 A1	06-08-2014
		JP 5924500 B2	25-05-2016
		JP 2014148073 A	21-08-2014
		US 2014209730 A1	31-07-2014

JP 2002347294 A	04-12-2002	NONE	

US 2016207332 A1	21-07-2016	CN 105730028 A	06-07-2016
		JP 6409564 B2	24-10-2018
		JP 2016120655 A	07-07-2016
		KR 20160078869 A	05-07-2016
		US 2016207332 A1	21-07-2016

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EPO FORM P0459

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Patent documents cited in the description

- JP 2018023093 A [0001]