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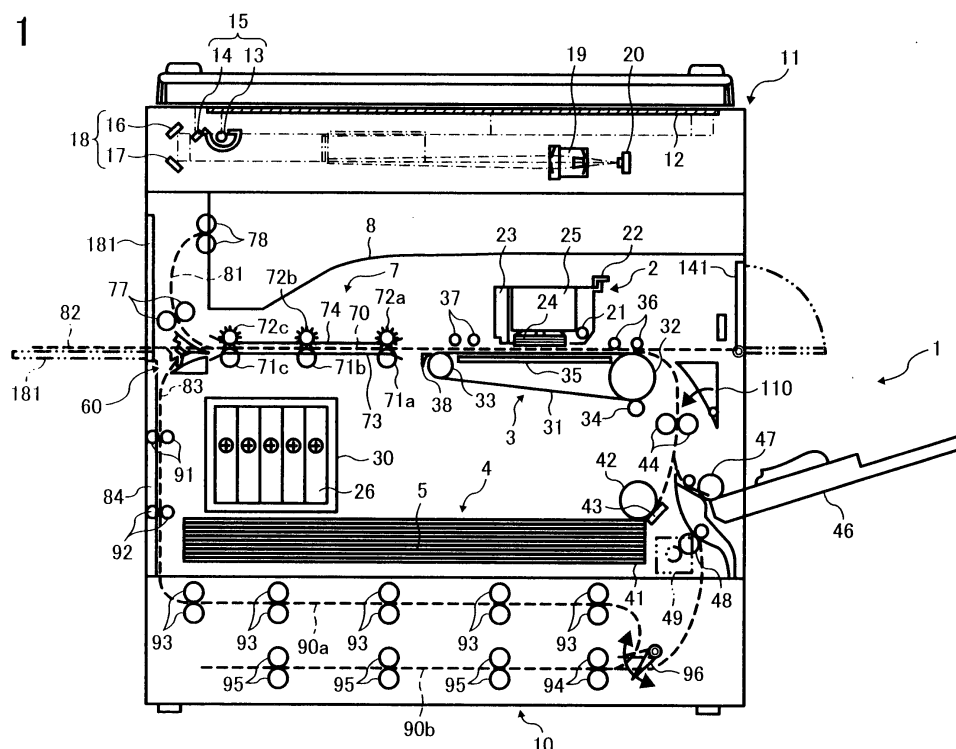
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(54) **Inkjet recording device and method for detaching recording head maintenance unit**

(57) An inkjet recording device including recording heads (24) each configured to eject an ink; a carriage (23) configured to scan the recording head in a main scanning direction to form an image on a receiving material (5) fed in a sub-scanning direction; a recording head maintenance unit (121) including recording head protection caps (122), an ink sucking cap (203), and a recording head cleaning blade (204); and a cover (201) which is

provided on a side wall of the inkjet recording device and which is openable or detachable, wherein when the cover is opened or detached from the device, the recording head protection caps and ink sucking cap are separated from the recording heads with a gap therebetween. Alternatively, the caps may be separated from the recording heads by moving an inner cover provided in front of the maintenance unit after opening the cover.

FIG. 1



Description

[0001] The present invention relates to an inkjet recording device, and more particularly to an inkjet recording device having a replaceable recording head maintenance unit. In addition, the present invention also relates to a method for detaching a recording head maintenance unit.

[0002] In inkjet recording devices, a recording head protection cap of a recording head maintenance unit is pressed to the surface of a recording head to protect the recording head. When a replaceable recording head maintenance unit set in an inkjet device is detached therefrom to be replaced, the maintenance unit is separated from the recording head so that the head protection cap does not damage or contaminate the recording head with ink when the protection cap is detached and/or a new head protection cap is not damaged when being attached.

[0003] Published unexamined Japanese patent application No. 2004-66458 discloses an inkjet recording device which ejects an inkjet ink and a treatment liquid, which forms aggregates or insoluble materials when being contacted with the ink, to form an image without feathering (i.e., blurring). The ink and the treatment liquid are sometimes ejected to a recessed portion (i.e., a vertically-extended hole) of a waste liquid absorbing member set on a side portion (non-image forming portion) of the device to prevent occurrence of a nozzle clogging problem in that ejection nozzles are clogged with the ink or treatment liquid. The ink and the treatment liquid ejected to the recessed portion are mainly absorbed by the bottom surface of the recessed portion. When the ink and the treatment liquid are repeatedly ejected to the recessed portion, the dried materials of the ink and the treatment liquid accumulate on the recessed portion. When the ink and the treatment liquid are further ejected to the dried materials in the recessed portion, the waste liquid penetrate into the waste liquid absorbing member through the side walls of the recessed portion. Thus, the waste liquid absorbing member can maintain good absorbing ability, and can absorb a large amount of waste liquids.

[0004] However, when a replaceable recording head maintenance unit is replaced by a service man or the like person, problems in that the head protection caps, head sucking caps and head cleaning blades of the maintenance unit damage and contaminate the recording head when the maintenance unit is detached occur. In addition, when recording head maintenance unit is detached from an inkjet recording device, a problem in that the ink included in the maintenance unit drops and contaminates the recording device and the vicinity thereof occurs.

[0005] Because of these reasons, a need exists for an inkjet recording device which includes a replaceable recording head maintenance unit and which does not cause the above-mentioned problems.

[0006] Accordingly, the present invention provides an inkjet recording device which includes a replaceable re-

cording head maintenance unit and which does not cause the problems in that the image forming parts such as recording heads are damaged or contaminated and the parts of a new maintenance unit such as protection caps, ink sucking caps and head cleaning blades when the new maintenance unit is attached.

[0007] As one aspect of the present invention, an inkjet recording device is provided which includes recording heads; a carriage which scans the recording heads in a main scanning direction to form an image on a receiving material fed in a sub-scanning direction; a replaceable recording head maintenance unit including recording head protection caps, an ink sucking cap, and a head cleaning blade; and a cover which is provided on a side wall of the device and which is openable or detachable to replace the maintenance unit, wherein when the cover is opened or detached from the device to detach the recording head maintenance unit from the inkjet recording device, the recording head protection caps and ink sucking cap are separated from the recording heads so as to form a gap therebetween.

[0008] The inkjet recording device can include an inner cover covering the recording head maintenance unit. In this case, when the inner cover is moved after the outer cover is opened, the recording head protection caps and ink sucking cap are separated from the recording heads so as to form a gap therebetween and in addition, a fastening part fastening the maintenance unit can be accessed.

[0009] As another aspect of the present invention, a method for detaching a recording head maintenance unit of an inkjet recording device including recording heads is provided which includes opening a cover of the inkjet recording device to access an the recording head maintenance unit, wherein the recording head protection caps and an ink sucking cap of the recording head maintenance unit are separated from the recording heads with a gap therebetween by opening the cover.

[0010] When the inkjet recording device includes an inner cover covering the recording head maintenance unit, the method includes the steps of opening the cover; moving the inner cover to access a fastening part and to separate recording head protection caps and an ink sucking cap of the recording head maintenance unit the recording heads with a gap therebetween; and loosening the fastening part to detach the recording head maintenance unit from the recording device.

[0011] The invention will be described further below with reference to exemplary embodiments and the accompanying drawings in which:

FIG. 1 is a schematic view illustrating the entire of an example of the inkjet recording device of the present invention;

FIG. 2 is a plan view illustrating the image forming section and the sub-scanning section of the inkjet recording device illustrated in FIG. 1;

FIG. 3 is a perspective view illustrating a cover pro-

vided on the rear side of the inkjet recording device illustrated in FIG. 1;

FIG. 4 is a perspective view illustrating the rear side of the inkjet recording device illustrated in FIG. 1 from which the cover is detached;

FIG. 5 is a plan view illustrating the carriage and the recording head maintenance unit of the recording device illustrated in FIG. 1;

FIG. 6 is a perspective view illustrating the cover having an absorber on the inner surface thereof;

FIG. 7 is another example of the inkjet recording device of the present invention;

FIGS. 8A and 8B are perspective views and elevational views illustrating the recording head maintenance unit and the inner cover of the inkjet recording device;

FIGS. 9A and 9B are perspective views and elevational views illustrating the recording head maintenance unit and the inner cover, wherein the inner cover is rotated by 90°;

FIGS. 10A and 10B are elevational views illustrating another example of the inner cover which can be moved up and down;

FIG. 11 is a schematic view illustrating another example of the inkjet recording device of the present invention; and

FIG. 12 is a schematic view illustrating another example of the inkjet recording device of the present invention.

[0012] The inkjet recording device of the present invention will be explained referring to drawings.

[0013] FIG. 1 is a schematic view of the entire of an example of the inkjet recording device of the present invention. FIG. 2 is a schematic plan view illustrating the image forming section and the sub-scanning section of the inkjet recording device illustrated in FIG. 1.

[0014] A main body 1 of the inkjet recording device includes an image forming section 2 configured to form an image on a receiving material 5 and a sub-scanning section 3 configured to feed the receiving material to a sub-scanning direction X (FIG. 2). A paper feeding section 4 including a paper cassette feeds sheets of the receiving material 5 one by one. The thus fed receiving material sheet is fed by the sub-scanning section 3 in the sub-scanning direction to a position at which the receiving material sheet 5 faces the image forming section 2. The image forming section 2 ejects ink drops toward the receiving material sheet 5 to form an image thereon. When it is ordered to form an image on one side of the receiving material sheet 5, the sheet 5 is discharged from the main body by a discharging section 7. Thus, the receiving material sheet 5 bearing an image thereon is stacked on a discharge tray 8. When it is ordered to form images on both sides of the receiving material sheet 5, the sheet is fed to a reversing unit 10.

[0015] An image reading section (i.e., a scanner) 11, which reads an original image to input the image data of

the original image such that the image forming section records the image, is provided above the discharge tray 8. The image reading section 11 includes a first optical system 15 including a lamp 13 and a mirror 14, and a second optical system 18 including mirrors 16 and 17. The first and second optical systems move to read the image of an original set on a contact glass 12. The image of the original is read as image data by an image reading device 20 through a lens 19, which is located before the image reading device 20. The image data are processed so as to be digital image data, and the image forming section 2 forms an image according to the digital image data.

[0016] The image data input device is not limited to the image reading section 11. For example, the inkjet recording device can record an image according to image data sent, via a cable or a network, from an image processing device such as personal computers, an external image reading device such as image scanners, or an imaging device such as digital cameras.

[0017] As illustrated in FIG. 2, the image forming section 2 includes a main scanning mechanism. The main scanning mechanism includes a guide rod 21 and a carriage 23, which is movably supported by a guide stay (not shown), and a timing belt 29 which is moved while being tightly stretched by a driving pulley 28A, which is rotated by a main scanning motor 27, and a driven pulley 28B. Since the timing belt 29 is moved in a main scanning direction Y, the carriage 23 is moved in the main scanning direction.

[0018] A recording head 24, which includes plural ink ejecting heads configured to eject respective color inks, is set on the carriage 23. The recording head 24 ejects drops of the color inks on the receiving material sheet 5 while being shuttled by the carriage in the main scanning direction, wherein the receiving material sheet 5 is moved in the sub-scanning direction by the sub-scanning section 3.

[0019] The recording head 24 includes five ink ejecting heads, i.e., two black ink ejecting heads 24k1 and 24k2, a cyan ink ejecting head 24c, a magenta ink ejecting head 24m and a yellow ink ejecting head 24y. The color inks are supplied to the ink ejecting heads from respective sub-tanks 25, which are provided on the carriage 23.

[0020] Referring to FIG. 1, an ink cartridge 26 including black, cyan, magenta and yellow ink cartridges can be detachably attached to a cartridge setting portion 30. The ink cartridge 26 supplies color inks to the respective sub-tanks 25. In this regard, the black ink cartridge supplied the black ink to the two black ink sub-tanks.

[0021] The ink ejecting method of the recording head 24 is not particularly limited, and for example the following known recording heads can be used.

1. Piezoelectric recording heads in which an ink in an ink room is pressed by a vibrating plate (an actuator) using a piezoelectric device, thereby ejecting a drop of the ink;

2. Thermal recording heads in which an ink in an ink room is heated with a heating resistive element to generate air bubbles in the ink room, thereby ejecting a drop of the ink; and

3. Electrostatic recording heads in which an ink in an ink room is ejected by pressed with a vibrating plate and an opposing electrode, which constitute the walls of the ink room, wherein an electrostatic force is applied between the vibrating plate and the electrode to deform the vibrating plate.

[0022] On one non-image-formation side of the image recording section in the main scanning direction of the carriage 23, a recording head maintenance unit 121 (hereinafter referred to as a maintenance unit 121) configured to maintain and recover the conditions of ink ejecting nozzles of the recording head 24 is provided as illustrated in FIG. 2. The maintenance unit 121 includes five protection caps 122 (i.e., 122k2, 122k1, 122c, 122m and 122y) configured to cap the respective ink ejecting heads 24k2, 24k1, 24c, 24m and 24y; an ink sucking cap 123 configured to suck an ink from one of the ink ejecting heads; a wiper blade (a head cleaning blade) 124 configured to wipe the ink ejecting surface of the ink ejecting heads, and an ink receiving material 125 which receives drops of inks ejected from the ink ejecting heads (i.e., blank ink ejection), which are ejected to maintain the condition of the ink ejecting heads and which do not form an image.

[0023] As illustrated in FIG. 2, on the other non-image formation side of the image recording section in the main scanning direction of the carriage 23, a blank ejection ink receiving material 126 configured to receive drops of inks in blank ink ejection is provided. The ink receiving material 126 includes holes 127k2, 127k1, 127c, 127m and 127y corresponding to the ink ejecting heads 24k2, 24k1, 24c, 24m and 24y, respectively.

[0024] The sub-scanning section 3 turns the feeding direction of the receiving material sheet 5 fed from the paper feeding section 4 by 90° so that the receiving material sheet is fed while opposing the image forming section 2. Specifically, the sub-scanning section 3 includes an endless feeding belt 31 which is rotated while tightly stretched by a feeding roller 32 serving as a driving roller, and a driven roller 33 serving as a tension roller; a charging roller 34 serving as a charging means for applying a high alternating voltage, which is applied from a high voltage power supply, to charge the feeding belt 31 (i.e., to securely feed the receiving material sheet 5 in the sub-scanning direction); a guide member 35 configured to guide the feeding belt 31 in the image forming region at which the feeding belt 31 opposes the image forming section 2; two rollers 36 configured to press the receiving material sheet 5 toward the feeding belt 31 at a position in which the two rollers 36 face the feeding roller 32; two spur rollers 37 configured to press an upper surface of the receiving material sheet 5, on which an image has been formed; and a separation pick 38 configured to sep-

arate the receiving material sheet 5 bearing the image thereon from the feeding belt 31. The feeding belt 31 is intermittently rotated by a driving mechanism including a motor 131 for sub-scanning, a timing belt 132, and a timing roller 133. Numeral 132a denotes a shaft of the feeding roller 32.

[0025] The paper feeding section 4 can be inserted into or taken out of the main body 1, wherein the insertion and taking-cut operation can be performed from the front side of the main body. The paper feeding section 4 includes a paper cassette 41 containing sheets of the receiving material 5; a feeding roller 42 and a friction pad 43 configured to feed the receiving material sheets 5 one by one; and a pair of registration rollers 44 configured to timely feed the receiving material sheet 5 toward the image forming section 2. In addition, the paper feeding section 4 has a manual paper feeding tray 46 on which plural sheets of the receiving material 5 can be set to be fed; a manual paper feeding roller 47 configured to feed the sheets of the receiving material 5 on the manual paper feeding tray 46 one by one; and a pair of feeding rollers 48 configured to feed the receiving material 5 fed from the reversing unit 10 or an additional paper cassette which is optionally set to a bottom portion of the main body 1. The paper feeding members such as the feeding roller 42, the pair of registration rollers 44, the manual paper feeding roller 47, and the pair of feeding rollers 48 are rotated with a motor 49 (a HB type stepping motor) via an electromagnetic clutch (not shown).

[0026] The discharging section 7 includes three rollers 71a, 71b and 71c (hereinafter sometimes referred to as rollers 71) configured to feed the receiving material sheet 5 separated from the feeding belt 31 by the separation pick 38; three spur rollers 72a, 72b and 72c (hereinafter sometimes referred to as spur rollers 72) facing the three rollers 71a, 71b and 71c, respectively; lower and upper guides 73 and 74 configured to guide the receiving material sheet 5 fed by the rollers 71 and spur rollers 72; and a pair of feeding rollers 77 and a pair of discharge rollers 78 configured to feed the receiving material sheet 5, which is fed from the lower and upper guides 73 and 74, to the tray 8 via a first passage 81. In this regard, a numeral 70 denotes a passage surrounded by the lower and upper guides 73 and 74. The passage 70 has a sufficient length to dry the image recorded on the receiving material sheet 5 to an extent such that the recorded image is not damaged or does not contaminate the upper surface of the tray 8 or the backside of the uppermost sheet of the receiving material sheets stacked on the tray 8.

[0027] On an exit side of the passage 70, a branch mechanism 60 is provided which feeds the receiving material sheet 5 to the first discharge passage 81 configured to feed to the tray 8, a second discharge passage 82 configured to feed the receiving material sheet 5 to a straight discharge tray 181, or a third passage 83 for feeding the receiving material sheet 5 to the reversing unit 10.

[0028] The third passage 83 includes a pair of entrance

rollers 91, a pair of exit rollers 92, and a guide plate 84 configured to form the third passage.

[0029] The reversing unit 10 includes a lateral passage 90a configured to laterally feed the receiving material sheet 5 and a switch-back passage 90b configured to switch the receiving material sheet 5 fed from the lateral passage 90a. The lateral passage 90a has five pairs of feeding rollers 93, and the switch-back passage 90b has a pair of reversible rollers 94 configured to reverse the receiving material sheet 5 fed from the lateral passage 90a and feed forward the receiving material sheet 5 to the image forming section 2 and three pairs of feeding rollers 95.

[0030] A branch plate 96 is provided which can swing to have a position illustrated by a solid line in FIG. 1 at which the receiving material sheet 5 can be fed from the lateral passage 90a to the switch-back passage 90b or another position illustrated by a dotted line in FIG. 1 at which the receiving material sheet 5 can be fed from the switch-back passage 90b to the pair of feeding rollers 48.

[0031] The receiving material sheet 5, which is fed from the reversing unit 10, is fed to the pair of registration rollers 44 via the pair of feeding rollers 48. An open/close guide plate 110 is provided which can swing to allow the receiving material sheet 5, which is fed from the cassette 41, the manual paper feeding tray 46 or the reversing unit 10, to form a loop at a position between the feeding roller 32 (and the pressing roller 36) and the registration rollers 44, resulting in prevention of generation of back tension.

[0032] When the registration rollers 44 feeds the receiving material sheet 5 to the sub-scanning section 3, the open/close guide plate 110 swings in a direction indicated by an arrow to guide the receiving material sheet 5. When the receiving material sheet 5 reaches the sub-scanning section 3, the open/close guide plate 110 returns to the position illustrated in FIG. 1 so that the receiving material sheet 5 can form a loop.

[0033] Referring to FIG. 1, an openable and closable straight manual paper feeding tray 141, on which a sheet of the receiving material 5 can be manually set to be straightly fed to the sub-scanning section 3, is provided on one side of the inkjet recording device. When it is desired to straightly feed a sheet of the receiving material 5 to the sub-scanning section 3, the straight manual paper feeding tray 141 is opened so as to have the position illustrated with a chain double-dashed line. The receiving material sheet 5 is inserted along the upper surface of the straight manual paper feeding tray 141 until the tip of the sheet 5 reaches the nip between the feeding roller 32 and the pressure roller 36.

[0034] On the other side of the inkjet recording device, the straight discharge tray 181 is provided to straightly discharge a sheet of the receiving material having an image on the upper surface thereof. By opening the straight discharge tray 181, the straight discharge passage 82, which guides the receiving material sheet 5 fed from the lower and upper guides 73 and 74 of the dis-

charging section 7 to the straight discharge tray 181, is formed.

[0035] When the receiving material 5 is a receiving material such as overhead projection sheets and thick papers, which is difficult to feed through a curved passage, can be fed straightly from the straight manual paper feeding tray 141 to the straight discharge tray 181. Needless to say, this straight passage can be used for general receiving material s such as sheets of plain papers having a middle or small thickness.

[0036] Next, the image forming processes of the inkjet recording device will be explained.

[0037] An alternating voltage (i.e., a positive and negative rectangular-wave voltage) is applied to the charging roller 34 by an AC bias applicator (not shown). In this regard, since the charging roller 34 is contacted with the insulating layer (i.e., the outermost layer) of the feeding belt 31, the feeding belt 31 is charged such that a portion having positive charges and a portion having negative charges are alternately formed on the surface thereof. Thus, uneven electric fields are formed due to the positive and negative charges formed on the surface.

[0038] When a sheet of the receiving material 5 is fed from the paper feeding section 4, the manual paper feeding tray 46, the reversing unit 10 or the straight manual paper feeding tray 141 to the feeding belt 31, which is sandwiched by the feeding roller 32 and the pressing roller 36 and which is positively and negatively charged (i.e., forms an uneven electric field), the receiving material sheet 5 is instantly polarized due to the uneven electric field. Therefore, the receiving material sheet 5 is electrostatically attracted by the feeding belt 31, and thereby the sheet 5 is intermittently fed by the feeding belt 31 in the sub-scanning direction as the feeding belt 31 intermittently moves.

[0039] The recording head 24 ejects drops of the color inkjet inks according to image data to form color images on the surface of the receiving material sheet 5 while the receiving material sheet 5 is intermittently fed by the feeding belt 31. After an entire color image is formed on the receiving material sheet 5, the tip of the receiving material sheet 5 is separated by the separation pick 38 from the feeding belt 31 and fed to one of the discharge tray 8 and the straight discharge tray 181 and the reversing unit 10 through the discharge section 7 to discharge the receiving material sheet 5 from the main body 1 directly or to form another image on the backside of the receiving material sheet 5 at the image forming section 2 and then discharge the receiving material sheet 5 having images on both sides thereof.

[0040] Referring to FIG. 3, an openable and closable (detachable) cover 201 is provided on a backside of the inkjet recording device to attach or detach the maintenance unit 121 to or from the inkjet recording device. The inkjet recording device from which the cover is detached is illustrated in FIG. 4. The way to detach the maintenance unit 121 from a side plate 202 is as follows.

[0041] The main body 1 preferably has a sensor 201s

(illustrated in FIG. 4) configured to detect whether the cover 201 is present or absent. In this regard, any known sensors can be used for the sensor. The drive of the maintenance unit 121 is controlled depending on the information (i.e., presence or absence) of the cover 201 such that the protection caps 122 for protecting the recording head 24, the ink sucking cap and the head cleaning blade are lowered when the cover 201 is absent. In this regard, it is preferable that a mark is formed on each of the maintenance unit and the side plate 202 in a manner such that when the maintenance unit has a lowered position (i.e., a detaching position), the marks have positions so as to be identical to each other, to face each other or the like. By forming such marks, it can be quickly judged from observation whether the maintenance unit has a detaching position.

[0042] Specifically, when the inkjet recording device is in a waiting state, the protection caps 22 are pressed to the surface of the recording head 24 to protect the recording head. When the maintenance unit 121, which includes the protection caps 122, is detached from the inkjet recording device, problems such that the protection caps damage or contaminate the recording head with the inks occur unless the protection caps are separated from the recording head with a sufficient gap therebetween to easily detach the protection caps. In addition, since the same problems occur when the ink sucking cap and the cleaning blade remain lifted, it is preferable that the maintenance unit is detached from the inkjet recording device after all of the protection caps, ink sucking cap and cleaning blade are separated from the recording head with a space therebetween (i.e., they have detaching positions). When the head protection caps, ink sucking cap and cleaning blade are separated, a known device such as cams can be used.

[0043] FIG. 5 illustrates the carriage 23 and the maintenance unit 121 which protects the recording heads. Numerals 203 and 204 denote an ink sucking cap and a head cleaning blade, respectively. As can be understood from FIG. 5, the ink sucking cap 203 also serves as a head protection cap.

[0044] FIG. 6 illustrates the cover 201. An ink absorber 205 is provided on the inner surface of the cover 201. The maintenance unit 121 detached from the inkjet recording device can be placed on the ink absorber 205. Therefore, problems such that the inks remaining in the maintenance unit contaminate the device and the vicinity thereof can be avoided.

Example 2

[0045] FIG. 7 illustrates another example of the inkjet recording device of the present invention.

[0046] In this example, the cover 201 can be opened and closed while pivoting on fulcrums 206. When the cover 201 pivots by an angle of 90 degree to open, the maintenance unit 121 can be stably placed on the absorber 205.

Example 3

[0047] In this example, the maintenance unit 121 has an inner cover 207. When the cover 201 is detached from the inkjet device or opened, the maintenance unit 121 is in the state illustrated in FIG. 8. When the maintenance unit 121 is in this state, fastening screws 208 (illustrated in FIG. 10), which serve as fastening means (hereinafter referred to as a fastening part), cannot be accessed and thereby the maintenance unit cannot be detached from the device. In this example, the fastening screws 208 can be accessed by rotating the inner cover 207 by 90 degree as illustrated in FIGS. 9A and 9B. The inner cover 207 is connected with the driving section (not shown) of the maintenance unit 121 via a connector 209. Therefore, when the inner cover 207 is rotated, the driving member for driving the head protection caps 122, the ink sucking cap 203 and the head cleaning blade 204 is moved, and thereby the head protection caps 122, the ink sucking cap 203 and the head cleaning blade 204 are also moved. Specifically, when the inner cover 207 is rotated so that holes 210 face the fastening screws 208, the head protection caps 122, the ink sucking cap 203 and the head cleaning blade 204 are lowered (i.e., they are separated from the recording heads with a gap therebetween). In this regard, rack and pinion, links, cams, gears and the like can also be used as the driving mechanism.

[0048] For example, a mechanism including a rack-and-pinion 220, a gear 221 and a driving shaft 222 can be used for raising the inner cover 207 so that the holes 210 face the fastening screws 208 as illustrated in FIGS. 10A and 10B.

[0049] After the maintenance unit is detached, a new maintenance unit is attached to the inkjet recording device, followed by fastening with fastening screws. Then the inner cover 207 of the new maintenance unit is moved, the head protection caps and ink sucking cap are lifted to protect the recording heads. In this regard, the inner cover moving operation (i.e., the cap lifting operation) may be performed by closing the cover 201 using the sensor 201s provided at the cover 201.

Example 4

[0050] FIG. 11 illustrates another example of the inkjet recording device of the present invention. In this example, the maintenance unit 121 is fixed to a side plate 121a thereof. The side plate 121a is united with the side unit 1a of the main body 1 via an elevating mechanism 211. The carriage 23 moves in the right and left direction (in FIG. 11) along the guide rod 21, which is fixed to the side unit 1a. The elevating mechanism 211, which is driven by a motor (not shown), moves the side plate 121a upward and downward, thereby moving the head maintenance unit 121 upward and downward.

[0051] In this example, when the cover 201 is detached (or opened) and the absence of the cover is detected by a sensor, the elevating mechanism is driven to lower the

head maintenance unit 121 to a position such that the protection caps, etc. do not damage or contaminate the recording heads.

[0052] The head maintenance unit 121 may be lowered by the elevating mechanism when a service man orders the operation using a key in an operation panel (not shown) of the inkjet recording device.

[0053] Further, the head maintenance unit may be lowered by the elevating mechanism when a release lever (not shown) is operated. In this regard, the elevating mechanism 211 can be operated by a motor or the lever itself.

[0054] When the maintenance unit is replaced with a new maintenance unit and then the cover is closed, the elevating mechanism may lift the side plate to protect the recording heads with head protection caps and the ink sucking cap.

Example 5

[0055] FIG. 12 illustrates another example of the inkjet recording device of the present invention. In this example, the maintenance unit 121 is fixed to the side plate unit 1a of the main body 1, and the carriage 23 and the guide rod 21 are united with the side plate unit 1a via an elevating mechanism 211'. The carriage 23 moves in the right and left direction (in FIG. 12) along the guide rod 21. The elevating mechanism 211' moves the combination of the guide rod 21 and the carriage 23 upward and downward (for example, by 5 mm) while being driven by a motor (not shown).

[0056] In this example, when the cover 201 is detached (or opened) and the absence of the cover is detected by a sensor, the elevating mechanism 211' is driven to heighten the carriage 23 to a position such that the maintenance unit (e.g., the head protection caps, the ink sucking cap, and the head cleaning blade) do not damage or contaminate the recording heads 24 when the maintenance unit is detached. In this regard, the elevation operation can also be performed by keyboard input made by a service man or using a release lever as mentioned above.

[0057] When the maintenance unit is replaced with a new maintenance unit and then the cover is closed, the elevating mechanism 211' lowers the carriage such that the recording heads are covered with the head protection caps and the ink sucking cap.

[0058] The inkjet recording device of the present invention has recording heads, and a replaceable recording head maintenance unit including an optional inner cover, head protection caps, an ink sucking cap and a head cleaning blade. When a cover is opened or detached to detach the maintenance unit from the device to be replaced with new one or when the optional inner cover is moved after opening the cover, the head protection caps, ink sucking cap and head cleaning blade are separated from the recording heads with a gap therebetween. Therefore, the head protection caps, ink sucking

cap and head cleaning blade do not damage or contaminate the recording heads when the maintenance unit is detached from the inkjet recording device and a new maintenance unit is attached to the inkjet recording device.

[0059] This document claims priority and contains subject matter related to Japanese Patent Application No. 2005-343072, filed on November 29, 2005.

Claims

1. An inkjet recording device comprising:

a plurality of recording heads (24) each of which is configured to eject an ink;
a carriage (23) configured to scan the recording heads in a main scanning direction to form an image on a receiving material (5) fed in a sub-scanning direction;
a recording head maintenance unit (121) comprising:

recording head protection caps (122) configured to protect the recording heads;
an ink sucking cap (203) configured to suck ink from the recording heads; and
a recording head cleaning blade (204) configured to clean a surface of the recording heads, and
a cover means which is openable or detachable for replacement of the recording head maintenance unit,
wherein when the cover is opened or detached from the inkjet recording device for detaching the recording head maintenance unit from the inkjet recording device, the recording head protection cap, and the ink sucking cap are separated from the recording heads with a gap therebetween.

2. An inkjet recording device according to claim 1 wherein said cover means comprising a cover (201) which is provided on a side wall of the inkjet recording device.

3. An inkjet recording device according to claim 1 wherein, said cover means comprises an inner cover (207) configured to cover the recording head maintenance unit and forming part of the recording head maintenance unit; and a cover (201) which is provided on a side wall of the inkjet recording device and which is openable or detachable to replace the recording head maintenance unit, and wherein the recording head protection caps and the ink sucking cap are separated from the recording heads with a gap therebetween when the inner cover

is moved after the cover is opened or detached from the inkjet recording device to detach the recording head maintenance unit from the inkjet recording device.

4. An inkjet recording device according to any one of the preceding claims, wherein when the cover means is opened or detached from the inkjet recording device to detach the recording head maintenance unit (121) from the inkjet recording device, the recording head maintenance unit is lowered such that the recording head protection caps (122) and the ink sucking cap (203) are separated from the recording heads with a gap therebetween.
5. An inkjet recording device according to any one of claims 1 to 4, wherein when the cover means is opened or detached from the inkjet recording device to detach the recording head maintenance unit (121) from the inkjet recording device, the recording heads (24) are lifted such that the recording head protection caps (122) and the ink sucking cap (203) are separated from the recording heads with a gap therebetween.
6. The inkjet recording device according to claim 3, wherein when the inner cover is moved after the cover (201) is opened or detached from the inkjet recording device to detach the recording head maintenance unit (121) from the inkjet recording device, a fastening part (208) fastening the recording head maintenance unit can be accessed and the recording head maintenance unit is lowered such that the recording head protection caps (122) and the ink sucking cap (203) are separated from the recording heads (24) with a gap therebetween.
7. An inkjet recording device according to Claim 3, wherein when the inner cover is moved after the cover (201) is opened or detached from the inkjet recording device to detach the recording head maintenance unit (121) from the inkjet recording device, a fastening part (208) fastening the recording head maintenance unit can be accessed and the recording heads (24) are lifted such that the recording head protection caps (122) and the ink sucking cap (203) are separated from the recording heads with a gap therebetween.
8. An inkjet recording device according to claims 3, 6 or 7, wherein the inner cover is moved by a rack and pinion.
9. The inkjet recording device according to any one of claims 2 to 8, wherein the cover (201) comprises:

an ink absorber (205) located on an inner surface of the cover on which the detached record-

ing head maintenance unit (121) can be placed.

10. An inkjet recording device according to any one of the preceding claims, further comprising:

a sensor (201s) configured to detect whether the cover means is opened or closed.

11. The inkjet recording device according to Claim 10, wherein when the cover means is closed after the recording head maintenance unit (121) is detached and a new recording head maintenance unit is attached, the sensor (201s) detects that the cover means is present and the recording head protection caps (122) and the ink sucking cap (203) are attached to the recording heads (24) to protect the recording heads.

12. A method for detaching a recording head maintenance unit (121) from an inkjet recording device including recording heads (24), comprising:

opening a cover (201) of the recording device, wherein recording head protection caps (122) and an ink sucking cap (203) of the recording head maintenance unit are separated from the recording heads with a gap therebetween by opening the cover.

13. A method for detaching a recording head maintenance unit (121) from an inkjet recording device including recording heads (24), the inkjet recording device including an inner cover (207), wherein the method comprises:

opening a cover (201) of the recording device; moving an inner cover (207) to access a fastening part (208) fastening the recording head maintenance unit, wherein recording head protection caps (122) and an ink sucking cap (203) of the recording head maintenance unit are separated from the recording heads with a gap therebetween by moving the inner cover; and loosening the fastening part to detach the recording head maintenance unit from the recording device.

FIG. 1

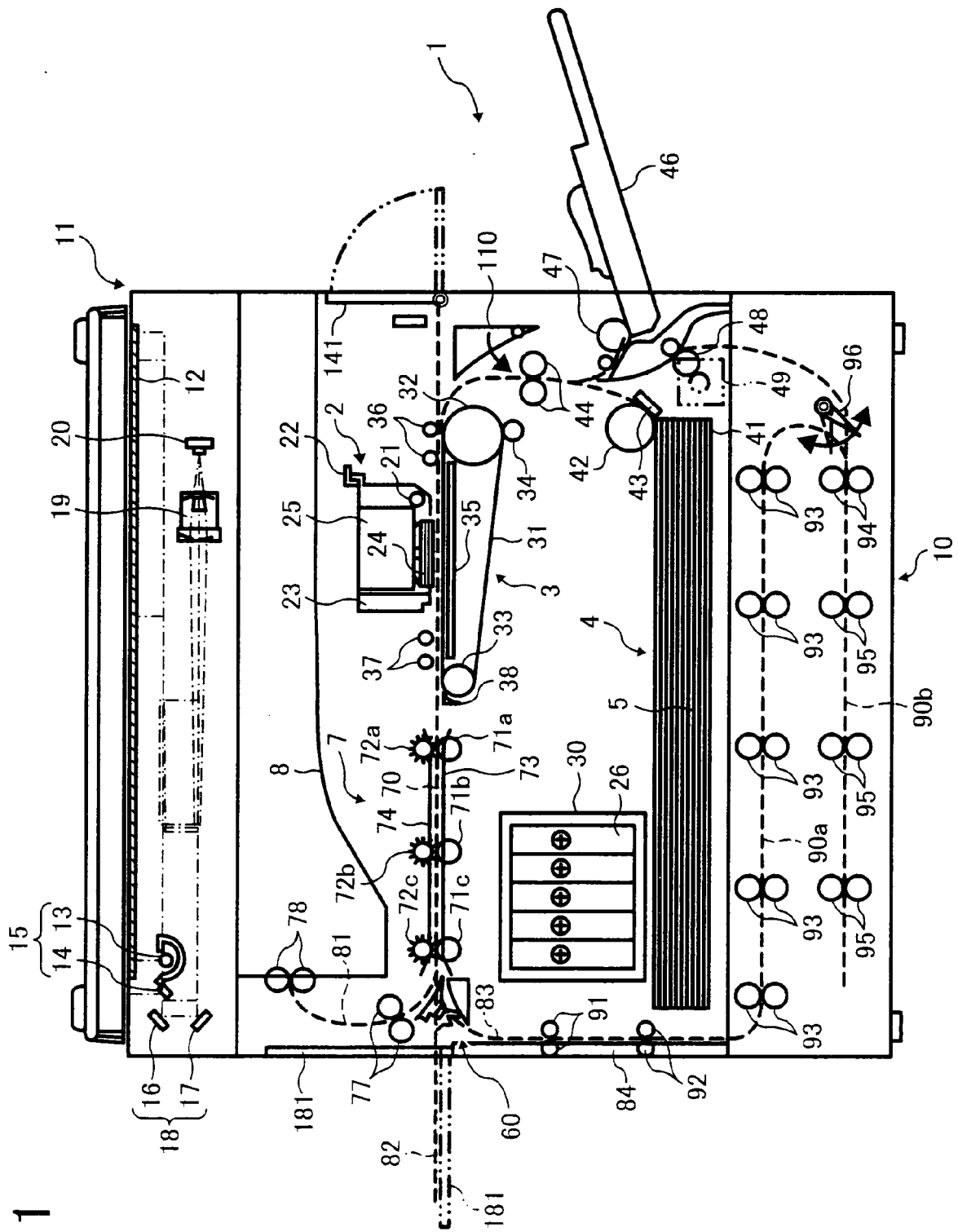


FIG. 2

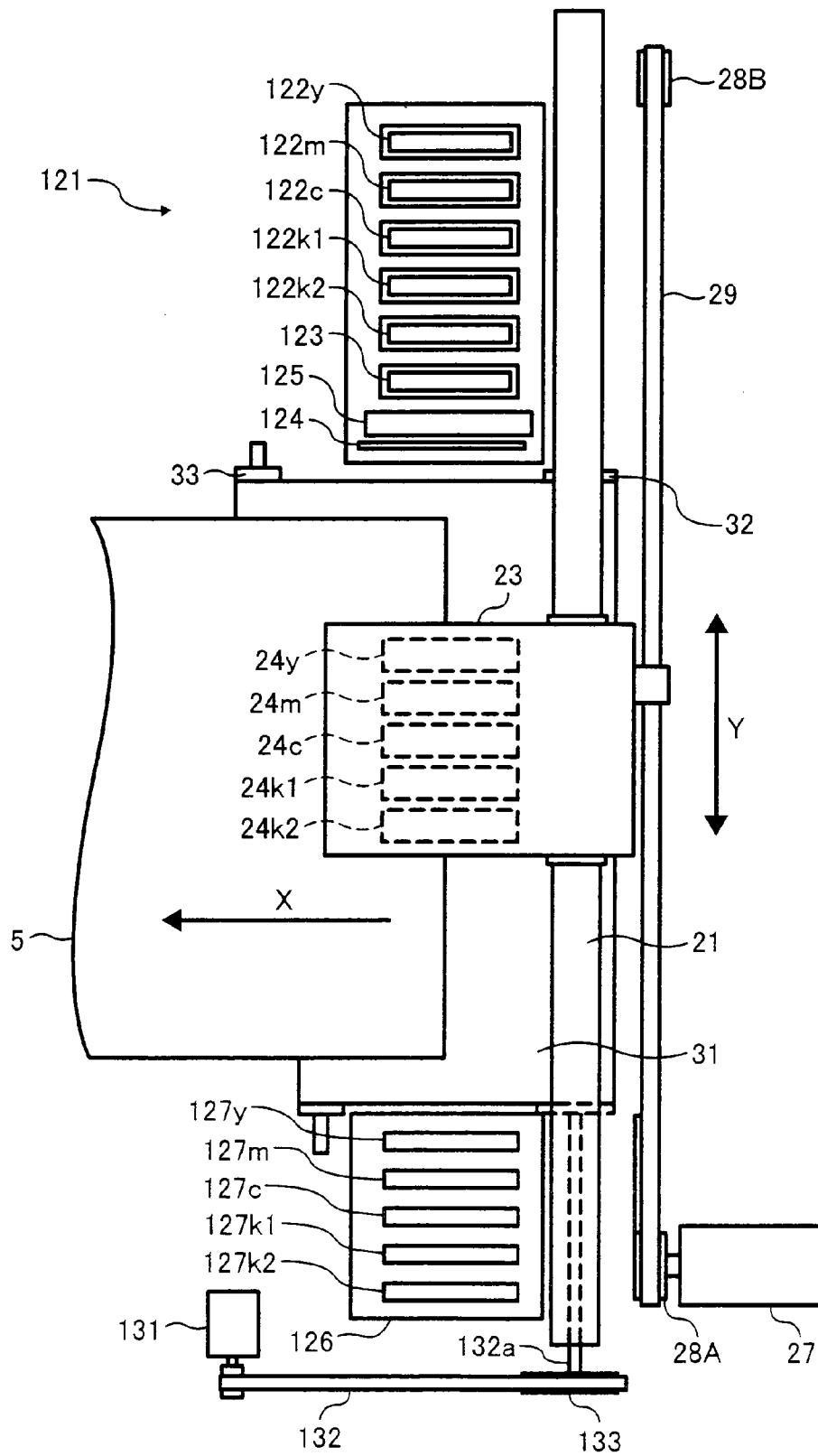


FIG. 3

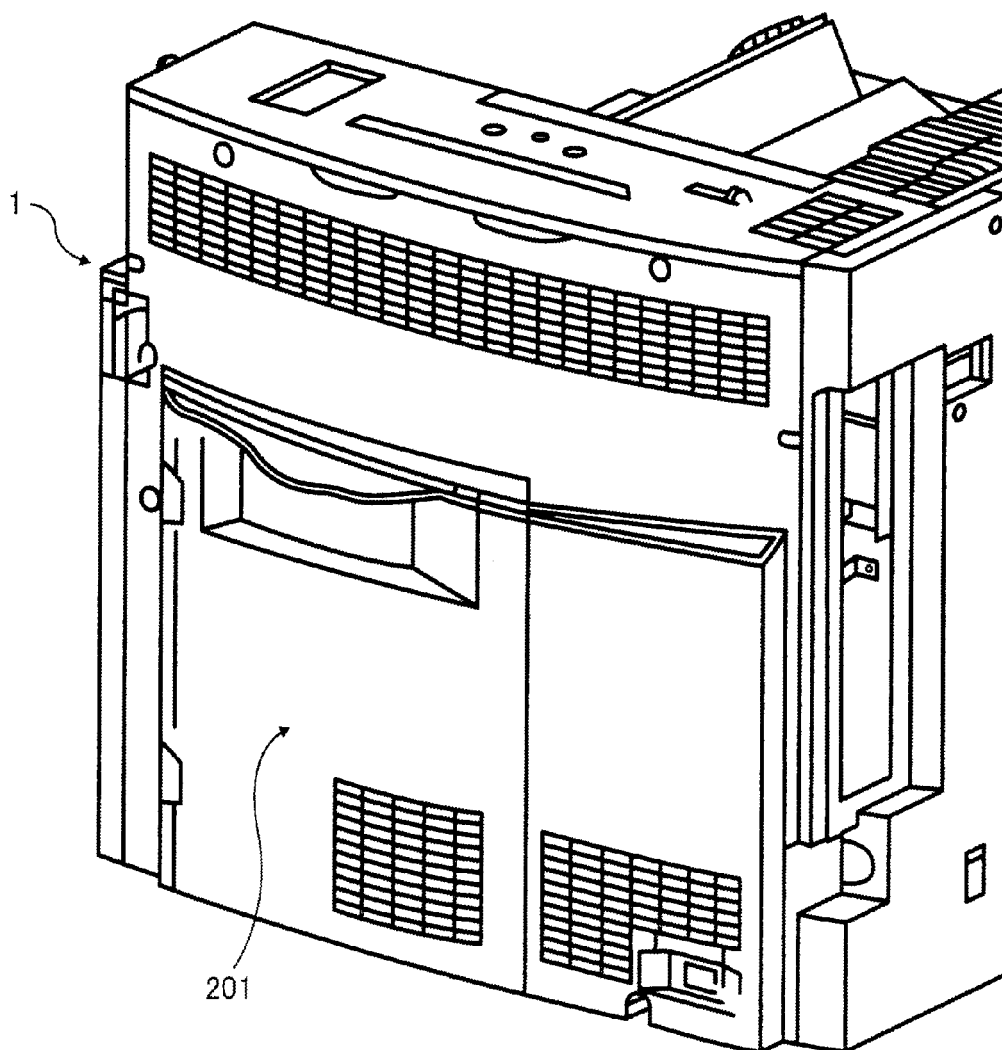


FIG. 4

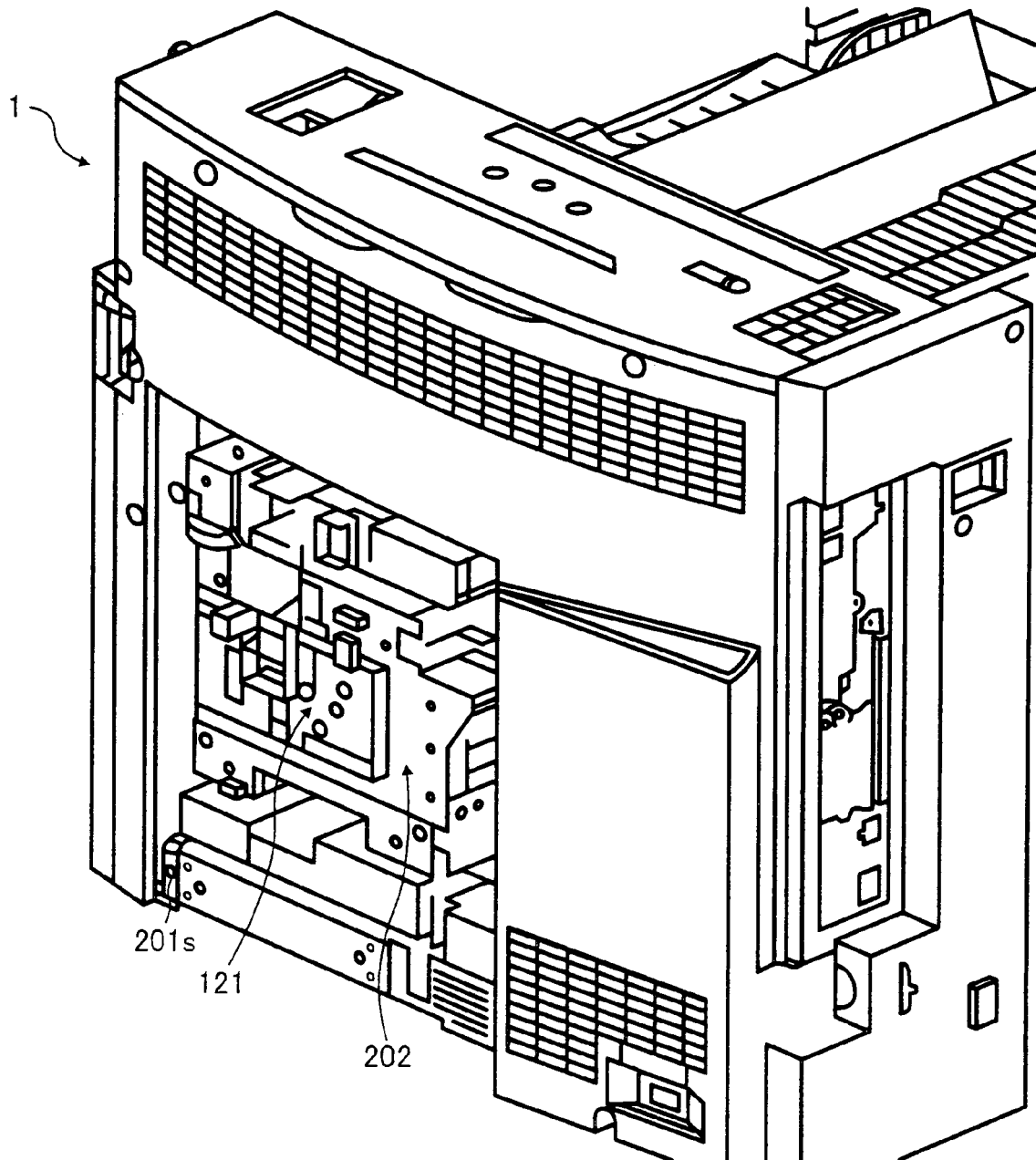


FIG. 5

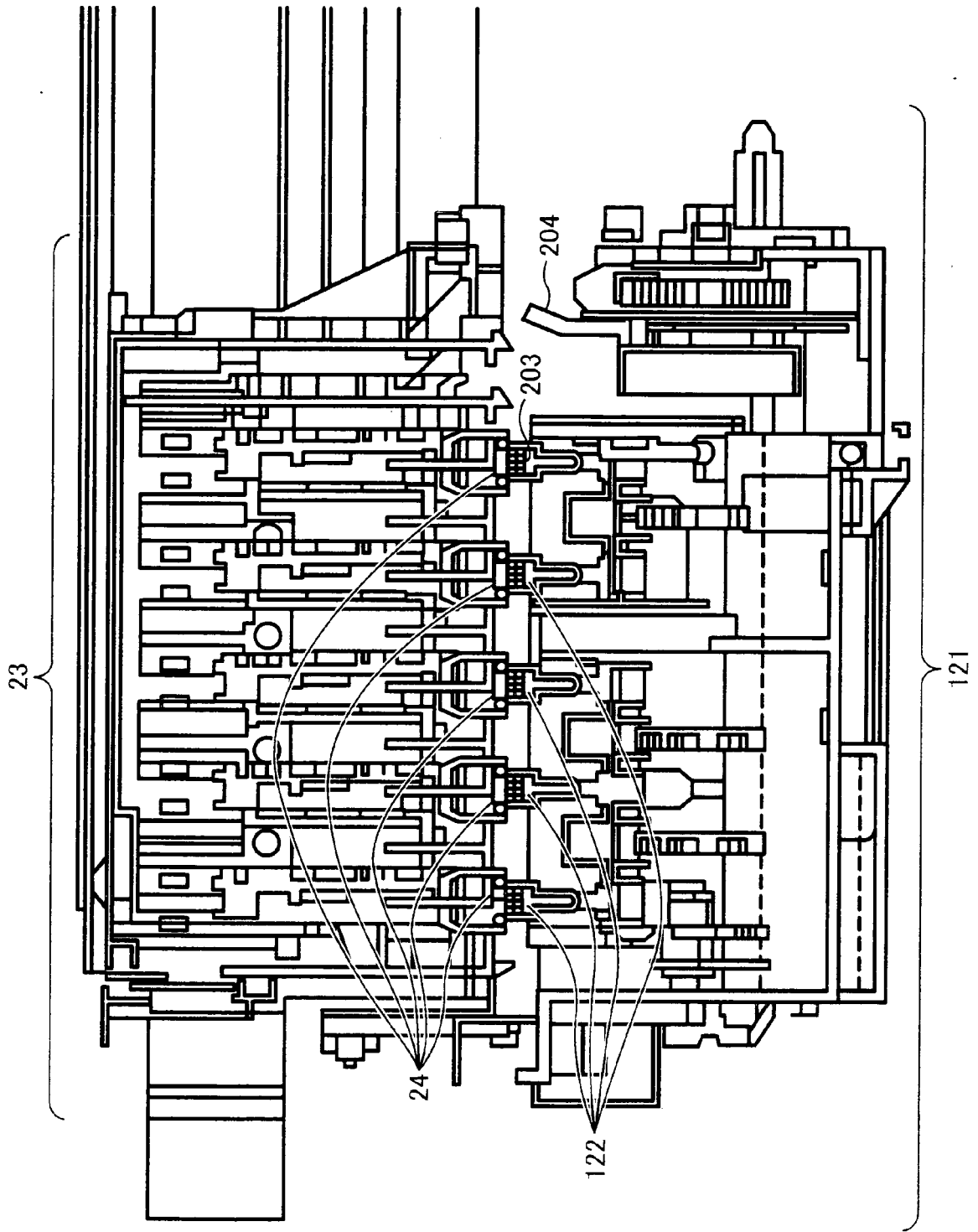


FIG. 6

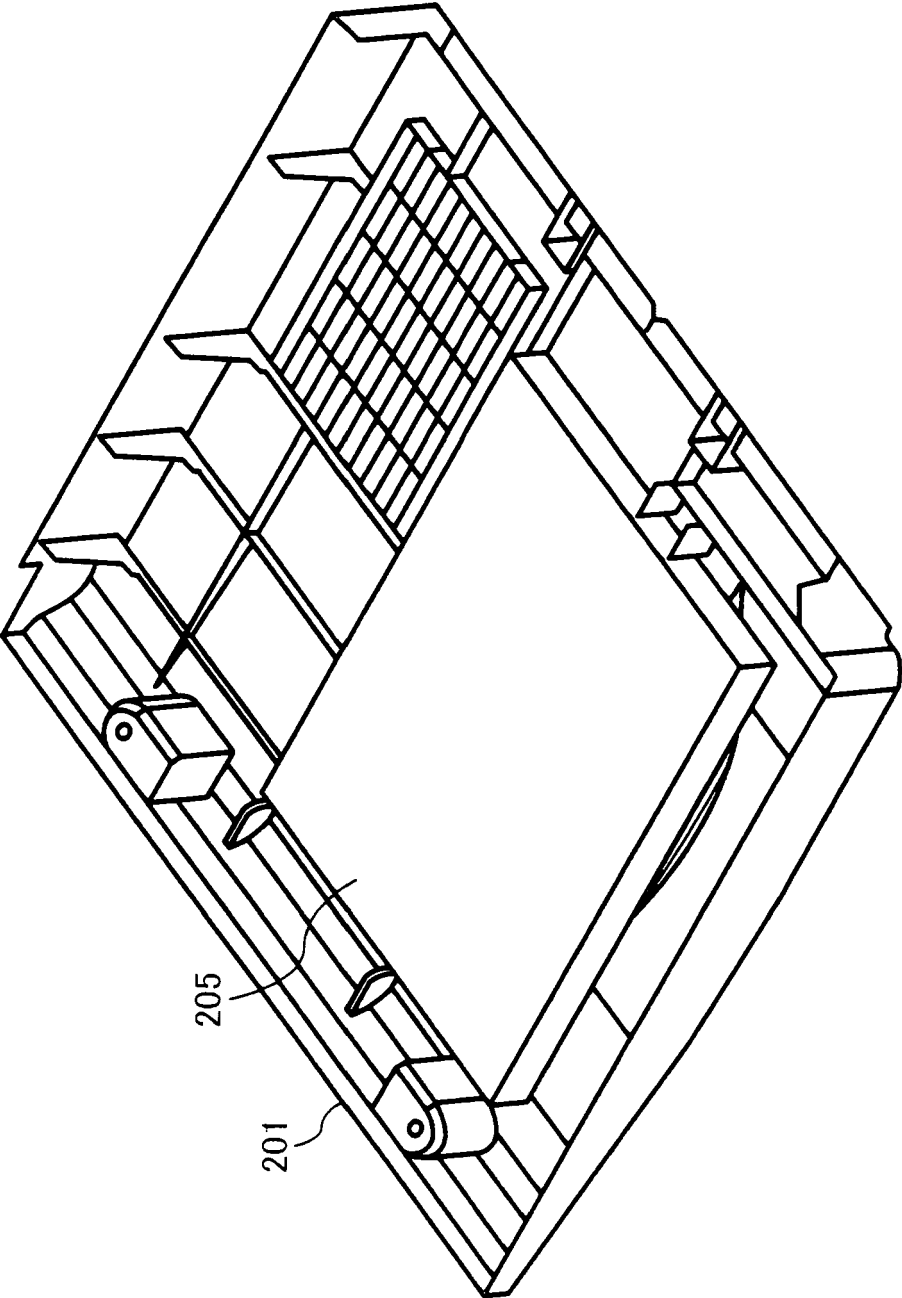
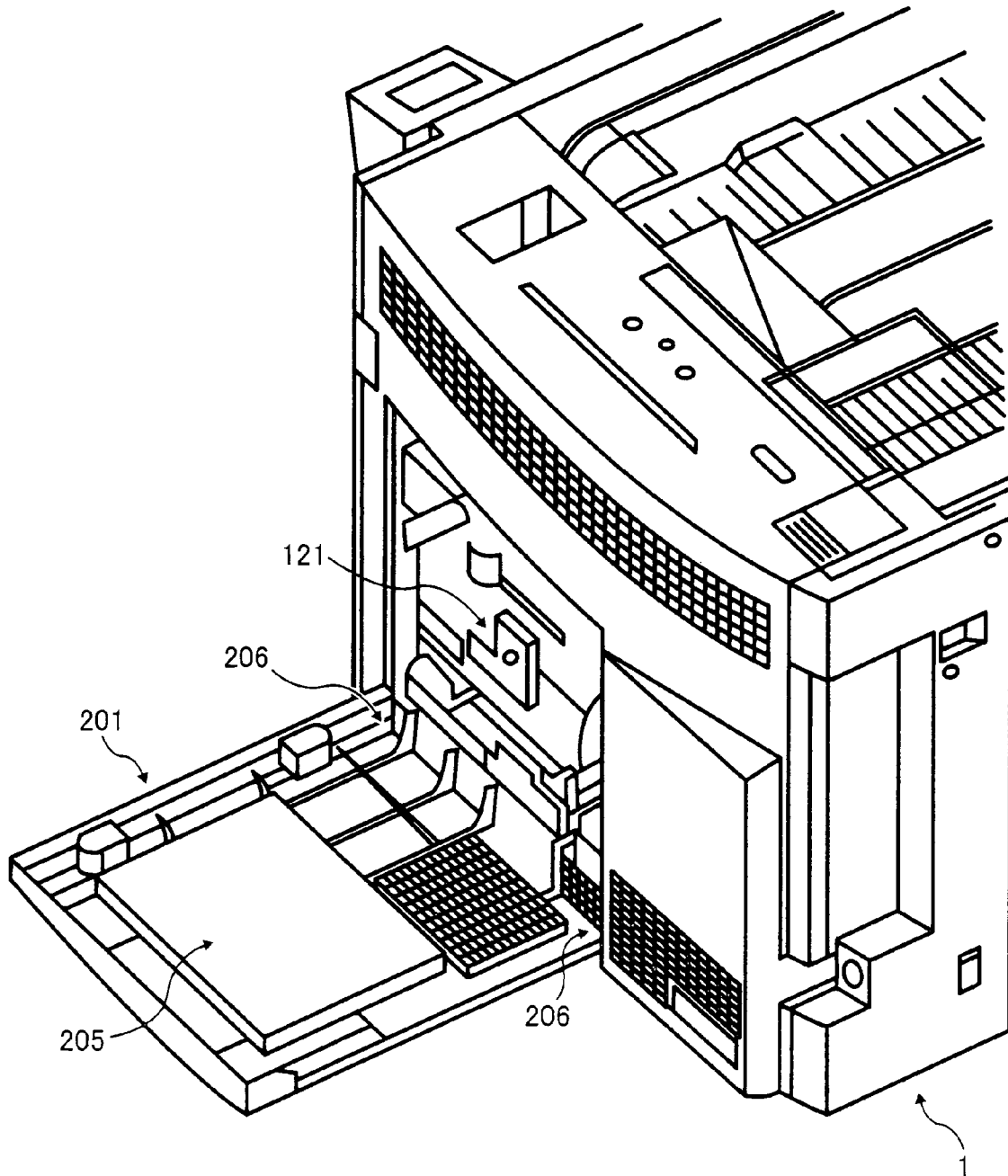
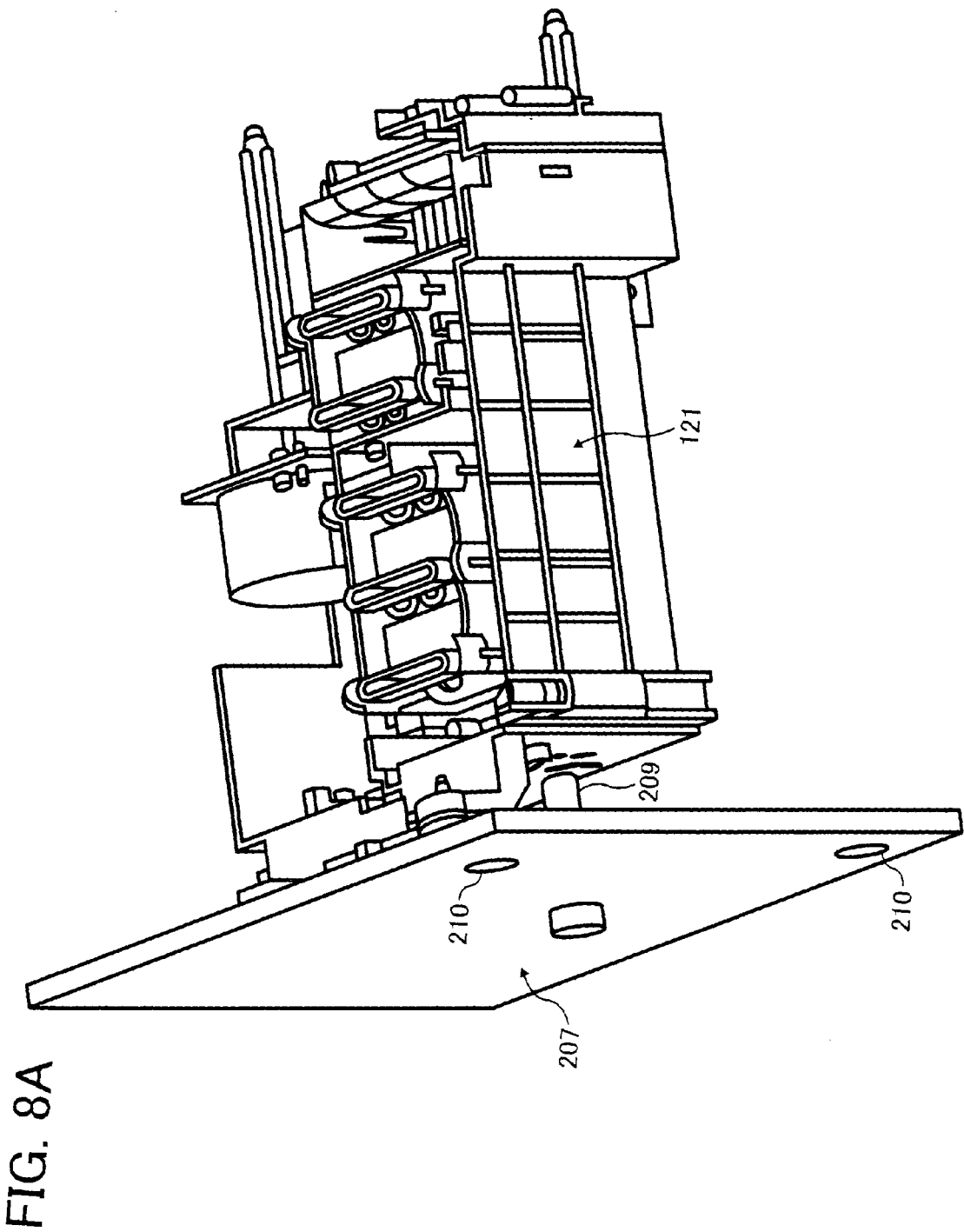


FIG. 7





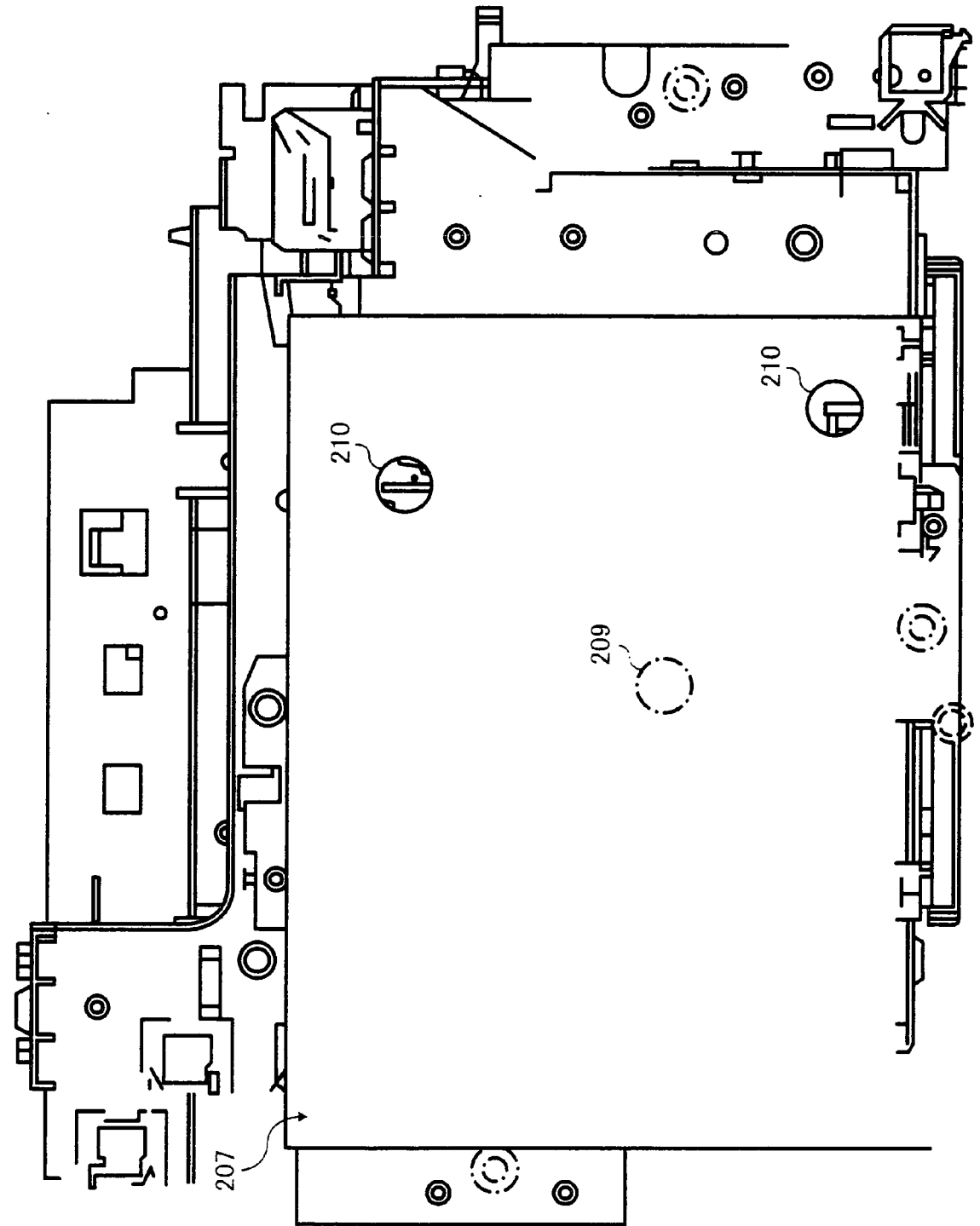
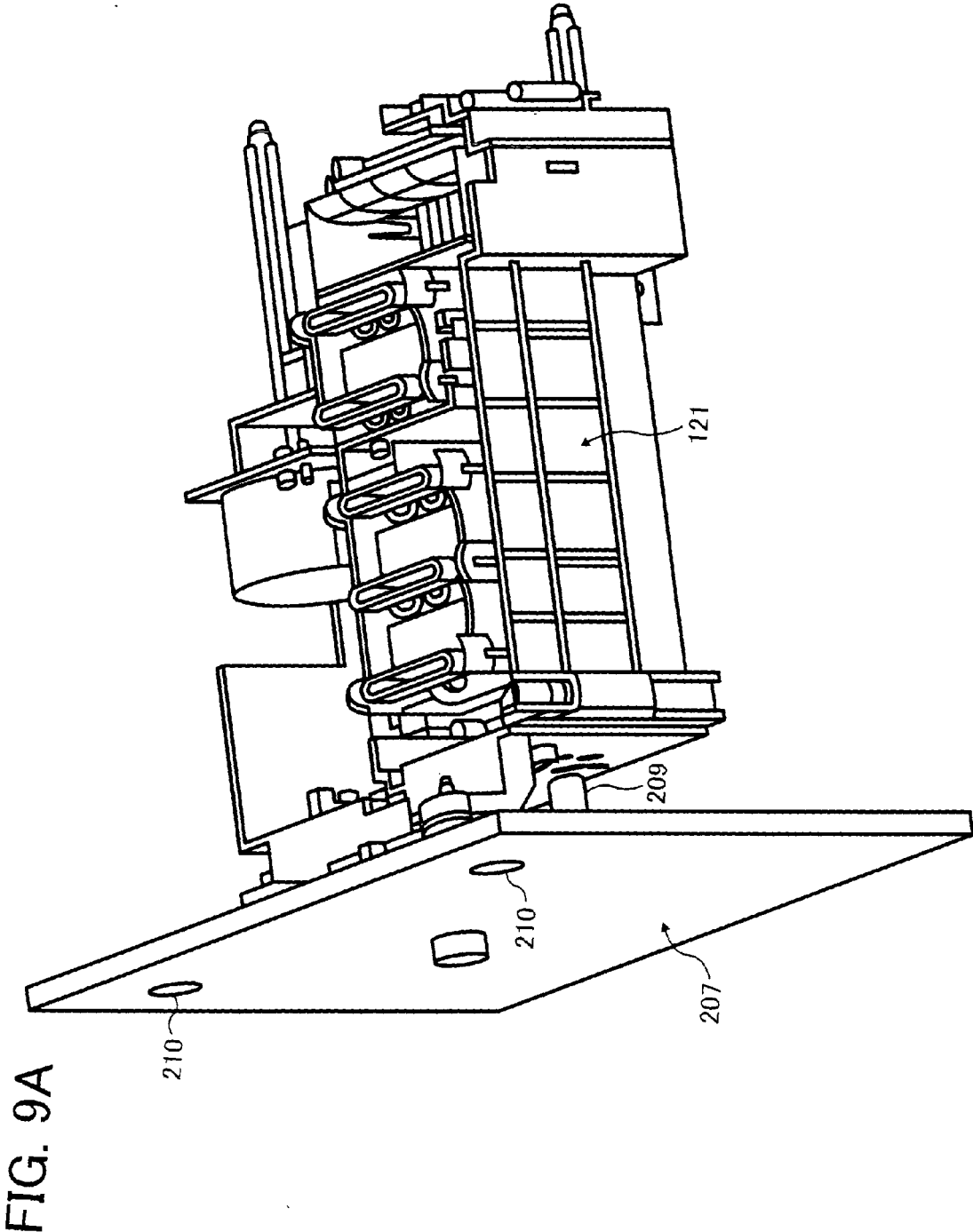


FIG. 8B



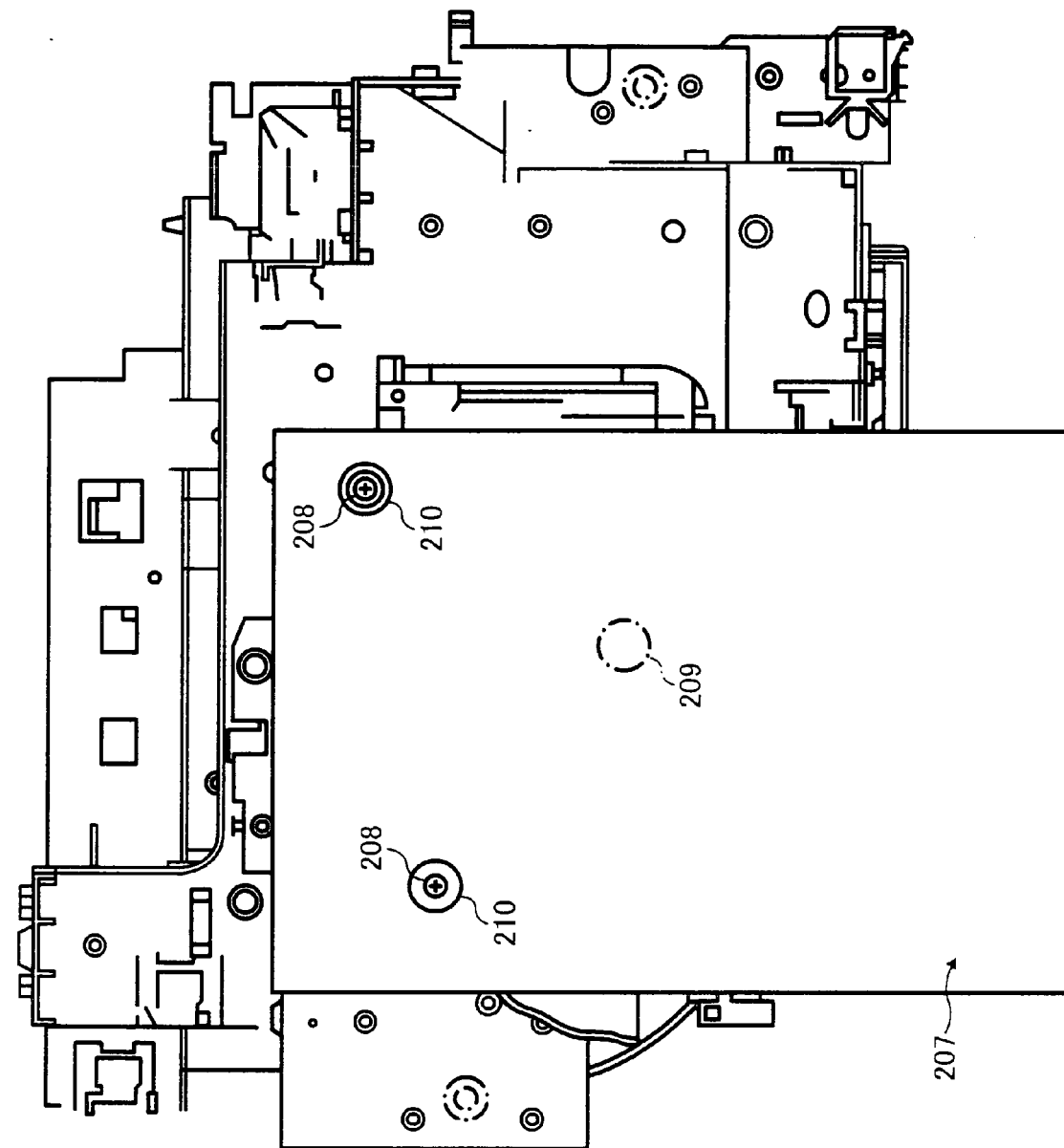


FIG. 9B

FIG. 10A

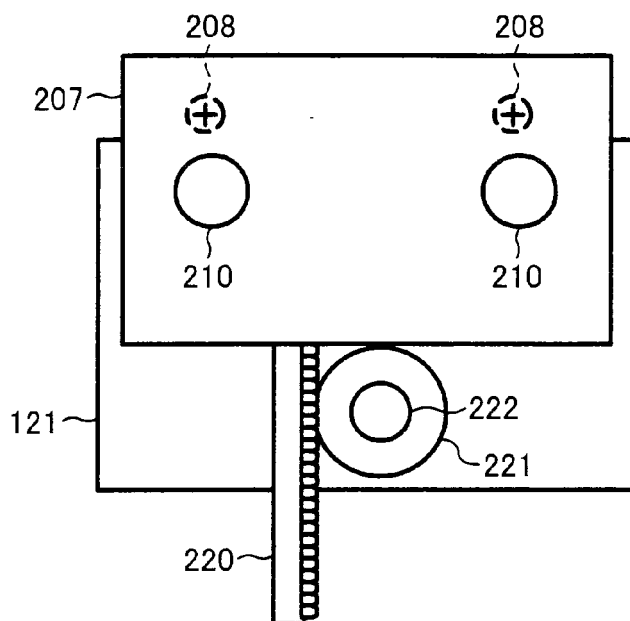


FIG. 10B

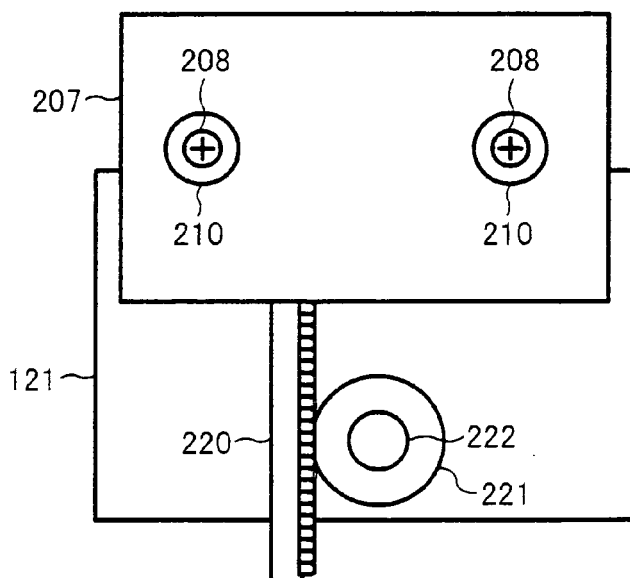


FIG. 11

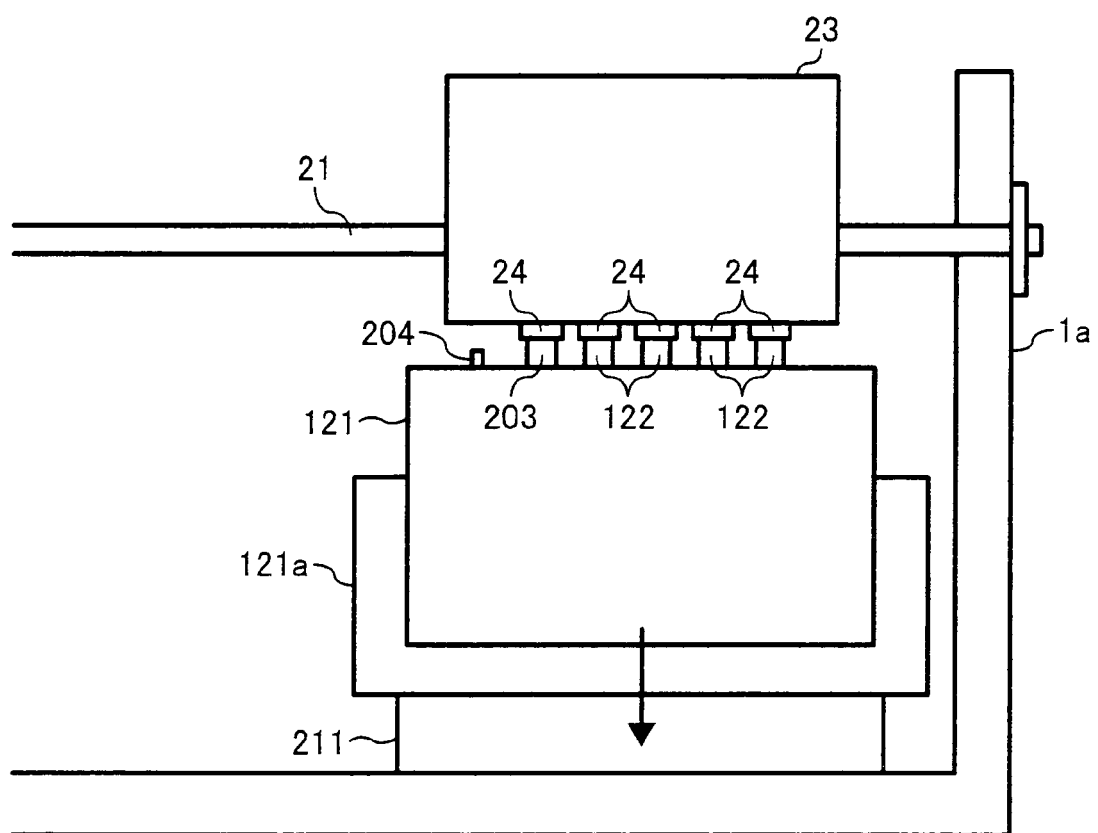
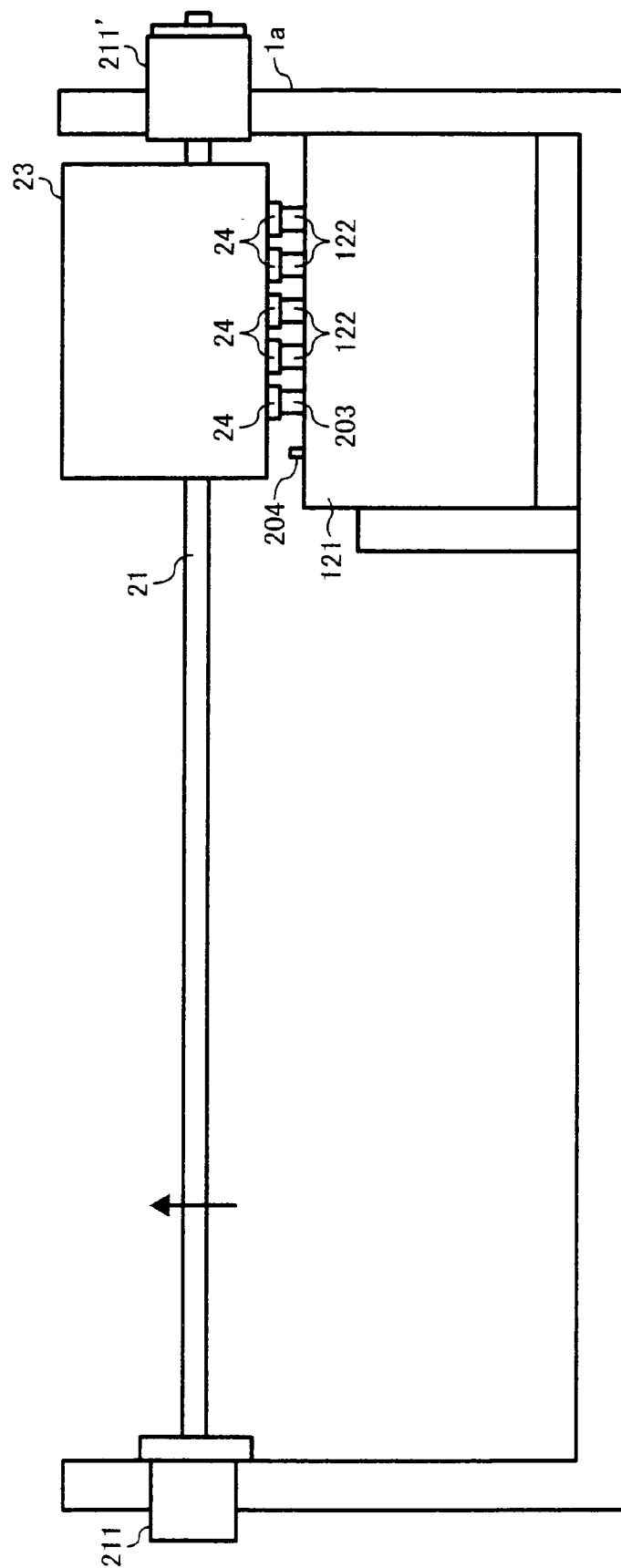


FIG. 12





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 25 6110

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Place of search Munich		Date of completion of the search 21 March 2007	Examiner Axters, Michael
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