



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.11.2016 Bulletin 2016/47

(51) Int Cl.:
B41J 29/02 ^(2006.01) **B41J 2/185** ^(2006.01)
B41J 2/17 ^(2006.01)

(21) Application number: **16161523.2**

(22) Date of filing: **22.03.2016**

(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 MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(72) Inventors:
• **FUJISHIMA, Kazutoshi**
Suwa-shi, Nagano 392-8502 (JP)
• **SASAKI, Tsutomu**
Suwa-shi, Nagano 392-8502 (JP)
• **KATAGAMI, Satoru**
Suwa-shi, Nagano 392-8502 (JP)
• **SUZUKI, Manabu**
Suwa-shi, Nagano 392-8502 (JP)

(30) Priority: **19.05.2015 JP 2015101623**

(71) Applicant: **Seiko Epson Corporation**
Shinjuku-ku
Tokyo (JP)

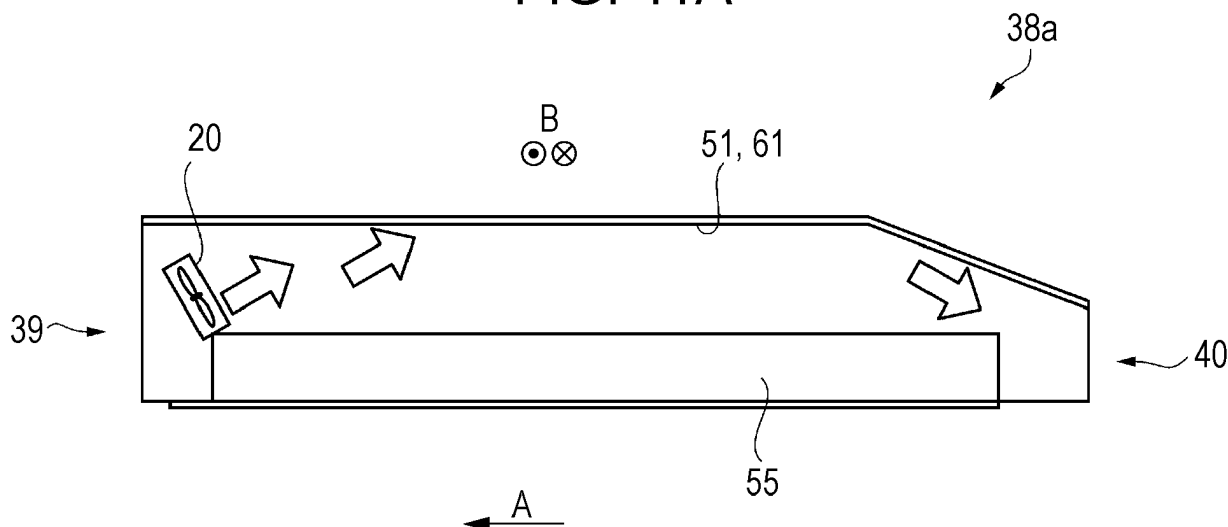
(74) Representative: **Miller Sturt Kenyon**
9 John Street
London WC1N 2ES (GB)

(54) **LIQUID EJECTING APPARATUS**

(57) A recording apparatus as a liquid ejecting apparatus includes a carriage which can move a recording head as an ejecting unit which ejects liquid onto a medium in a main scanning direction, in which the carriage is provided with capturing units which capture mist generated

along with ejecting of the liquid from the recording head on at least one side of the recording head in the main scanning direction, and the capturing units include a catching unit which catches the mist.

FIG. 11A



Description

BACKGROUND

1. Technical Field

[0001] The present invention relates to a liquid ejecting apparatus.

2. Related Art

[0002] In the related art, as an example of a liquid ejecting apparatus, an ink jet printer which performs recording of an image, or the like, on a medium by ejecting liquid as liquid droplets toward the medium such as paper or cloth has been known. The ink jet printer is provided with a recording head in which a plurality of nozzles (ejecting unit) are formed, and alternately repeats a main scanning operation in which the recording head is caused to move in the main scanning direction which intersects a transport direction (sub-scanning direction) of a medium while causing liquid to be ejected from an ejecting unit with respect to the medium which is transported on a platen, and a sub-scanning operation of transporting the medium in the sub-scanning direction. In this manner, an image is formed on the medium. In such a liquid ejecting apparatus, there has been a concern that extremely small liquid droplets (mist) which float in the inside of the liquid ejecting apparatus when liquid is ejected from the ejecting unit are generated, and the mist could deteriorate the quality of an image by contaminating the medium, or the inside of the liquid ejecting apparatus. For this reason, for example, in JP-A-2007-229950, a liquid discharging apparatus (liquid ejecting apparatus) which is provided with a mist collecting unit which suctions and collects mist is disclosed.

[0003] However, the liquid ejecting apparatus which is described in JP-A-2007-229950 has a configuration in which a plurality of suctioning holes are provided on a platen along the main scanning direction, and mist is suctioned from a suctioning hole in a region on the outer side in a width direction, in the main scanning direction of a medium. For this reason, there has been a problem in that it is difficult to collect mist which is generated along with ejecting of liquid from an ejecting unit at a center portion of the medium, immediately after the generation, and the mist is still diffused inside the liquid ejecting apparatus.

SUMMARY

[0004] The invention can be realized in the following aspects or application examples. Application Example 1

[0005] A liquid ejecting apparatus in this application example includes a carriage which can move an ejecting unit which ejects liquid onto a medium in a main scanning direction, in which the carriage is provided with a capturing unit which captures mist generated along with eject-

ing of the liquid from the ejecting unit on at least one side of the ejecting unit in the main scanning direction, and the capturing unit includes a catching unit which catches the mist.

[0006] According to the application example, a carriage of the liquid ejecting apparatus is provided with the capturing unit on at least one side of the ejecting unit. In other words, the capturing unit which captures mist reciprocates in the main scanning direction along with the ejecting unit. In addition, since the capturing unit includes the catching unit which catches the captured mist, it is possible to catch most of mist which is generated along with ejecting of liquid from the ejecting unit immediately after the generation. In this manner, since mist which floats in the inside of the liquid ejecting apparatus is reduced, it is possible to prevent the inside of the liquid ejecting apparatus or a medium from becoming contaminated by the mist. Accordingly, it is possible to provide a liquid ejecting apparatus in which image quality is improved.

Application Example 2

[0007] In the liquid ejecting apparatus according to the application example, it is preferable that the capturing unit extends along a sub-scanning direction which intersects the main scanning direction, and a capturing port is provided on a face which faces the medium.

[0008] According to the application example, the capturing unit of the liquid ejecting apparatus extends in the sub-scanning direction, is provided with the capturing port which captures mist on a face (base) which faces the medium, and reciprocates in the main scanning direction along with the ejecting unit. Mist which is generated along with ejecting of liquid from the ejecting unit is captured in the inside of the capturing unit from the capturing port of the capturing unit which passes immediately after the generation. In this manner, it is possible to improve capturing efficiency of mist.

Application Example 3

[0009] In the liquid ejecting apparatus according to the application example, it is preferable that the capturing unit includes a fan for generating an air current which goes toward the capturing unit.

[0010] According to the application example, since the capturing unit of the liquid ejecting apparatus includes the fan for generating an air current which goes toward the capturing unit, it is possible to guide mist to the capturing unit from the capturing port.

Application Example 4

[0011] In the liquid ejecting apparatus according to the application example, it is preferable that the fan is provided on one end side of the capturing unit in the sub-scanning direction.

[0012] According to the application example, the fan is provided on one end side of the capturing unit in the sub-scanning direction, and generates an air current which goes toward the catching unit from one end side, and reaches the other end side. The air current guides mist which flows in from the capturing port to the catching unit. In other words, since mist does not pass through the fan, the fan can guide mist to the catching unit without being contaminated by the mist.

Application Example 5

[0013] In the liquid ejecting apparatus according to the application example, it is preferable that the catching unit includes an absorbing member which absorbs the mist.

[0014] According to the application example, since the catching unit includes the absorbing member which absorbs mist, the catching unit can efficiently catch mist.

Application Example 6

[0015] In the liquid ejecting apparatus according to the application example, it is preferable that the catching unit includes a fin-shaped uneven portion.

[0016] According to the application example, since the catching unit includes the fin-shaped uneven portion, and a surface area which is in contact with mist is large, it is possible to efficiently catch mist.

Application Example 7

[0017] In the liquid ejecting apparatus according to the application example, it is preferable that the catching unit is provided on an inner face which faces the capturing port.

[0018] According to the application example, since mist flows in from the capturing port which is provided on a face (base) which faces a medium, and rises toward the inner face which faces the capturing port, it is possible to efficiently catch mist by providing the catching unit on the inner face which faces the capturing port.

Application Example 8

[0019] In the liquid ejecting apparatus according to the application example, it is preferable that the catching unit is provided on an inside surface which intersects a face on which the capturing port is provided.

[0020] According to the application example, since the catching unit is provided on the inside surface which intersects the face on which the capturing port is provided, even when much mist is attached to the catching unit, and is liquefied, the liquefied mist (liquid) falls along the inside surface. In other words, since the catching unit is not provided on the inner face which faces the capturing port, it is possible to prevent liquid from falling from the catching unit as liquid droplets, flowing out from the capturing port, and contaminating the inside of the liquid

ejecting apparatus or a medium.

Application Example 9

[0021] In the liquid ejecting apparatus according to the application example, it is preferable that the capturing unit includes a liquid guiding unit at a position which overlaps with the capturing port when planarly viewed, and between the capturing port and the inner face which faces the capturing port.

[0022] According to the application example, the capturing unit includes the liquid guiding unit between the capturing port and the inner face which faces the capturing port. Even in a case in which the catching unit is provided at a position which faces the capturing port, it is possible to prevent a situation in which much mist is attached to the catching unit, liquefied mist (liquid) falls from the catching unit as liquid droplets, flows out from the capturing port, and the inside of the liquid ejecting apparatus or a medium is contaminated.

Application Example 10

[0023] In the liquid ejecting apparatus according to the application example, it is preferable that the liquid guiding unit is inclined to the inside surface of the capturing unit.

[0024] According to the application example, since the liquid guiding unit is inclined to the inside surface of the capturing unit, it is possible to easily collect liquid when captured mist grows, falls from the catching unit as liquid droplets, and is collected as the liquid on the inside surface.

Application Example 11

[0025] In the liquid ejecting apparatus according to the application example, it is preferable that the fan is driven so that wind velocity during stopping of the carriage becomes higher than wind velocity in the middle of moving of the carriage in the main scanning direction.

[0026] According to the application example, there is a concern that a deviation in ejecting position of liquid droplets may occur, when wind velocity of the fan is increased in a state in which liquid is ejected from the ejecting unit as liquid droplets. Therefore, in the liquid ejecting apparatus according to the application example, the fan is driven at wind velocity which is higher than that in the middle of moving of the carriage, during stopping of the carriage in which liquid is not ejected from the ejecting unit. In this manner, it is possible to increase an effect of causing mist which is captured by the capturing unit to be attached to the catching unit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings, wherein like numbers refer-

ence like elements.

Fig. 1 is a perspective view which schematically illustrates the entire configuration of a recording apparatus as a liquid ejecting apparatus according to an embodiment.

Fig. 2 is a side view which schematically illustrates the recording apparatus.

Fig. 3 is a perspective view which schematically illustrates the periphery of a recording region which is a main portion of the recording apparatus.

Fig. 4 is a front view which schematically illustrates the recording apparatus.

Fig. 5 is a rear view which schematically illustrates the recording apparatus.

Fig. 6 is a block diagram which illustrates an electrical configuration of the recording apparatus.

Fig. 7 is a front view which illustrates a schematic configuration of a carriage.

Fig. 8 is a side view which illustrates a schematic configuration of the carriage.

Fig. 9 is a perspective view which illustrates a schematic configuration of the carriage.

Fig. 10 is a bottom view which illustrates a schematic configuration of a frame-shaped unit and a capturing unit.

Fig. 11A is a sectional view in line XIA-XIA of the capturing unit which is illustrated in Fig. 7, and Fig. 11B is a sectional view in line XIB-XIB of the capturing unit which is illustrated in Fig. 8.

Fig. 12 is a sectional view in line XII-XII of the capturing unit which is illustrated in Fig. 8 according to a modification example 1.

Fig. 13 is a sectional view in line XIII-XIII of the capturing unit which is illustrated in Fig. 8 according to a modification example 2.

Fig. 14A is a sectional view in line XIVA-XIVA of the capturing unit which is illustrated in Fig. 8 according to a modification example 3, and Fig. 14B is a sectional view in line XIVB-XIVB of the capturing unit which is illustrated in Fig. 8.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0028] Hereinafter, an embodiment of the invention will be described with reference to drawings. In addition, in each figure below, a scale of each layer or each member is set to be different from the actual scale, in order to set each layer or each member to a size which can be recognized.

Embodiment

Schematic configuration of liquid ejecting apparatus

[0029] Fig. 1 is a perspective view which schematically illustrates the entire configuration of a recording apparatus as an example of a liquid ejecting apparatus accord-

ing to an embodiment. Fig. 2 is a side view which schematically illustrates the recording apparatus. Fig. 3 is a perspective view which schematically illustrates the periphery of a recording region which is a main portion of the recording apparatus. Fig. 4 is a front view which schematically illustrates the recording apparatus. Fig. 5 is a rear view which schematically illustrates the recording apparatus. In addition, Figs. 1 to 5 illustrate a state in which a part of constituent members is detached from the recording apparatus, and for example, illustrate a state in which a sub-carriage 5 (refer to Fig. 7) including a recording head 7 (refer to Fig. 7) is detached from a carriage 6.

[0030] First, a schematic configuration of a recording apparatus 1 will be described.

[0031] As illustrated in Figs. 1 to 3, the recording apparatus 1 is provided with a transport mechanism 3 which transports a medium in a transport direction A using an adhesive belt 2 as a transport belt (endless belt) which supports the medium on a supporting face onto which an adhesive is attached. The recording apparatus 1 is provided with a feeding unit (not illustrated) to which a roll-shaped medium can be set, and can send out the medium to the transport mechanism 3. In addition, the recording apparatus 1 includes a carriage which can move a recording head 7 (refer to Fig. 7) as an ejecting unit which ejects liquid onto the medium. Specifically, in a transport region of the medium using transport mechanism 3, a recording mechanism 4 which causes the carriage 6 including the recording head 7 (refer to Fig. 7) as the ejecting unit to move in the main scanning direction B which intersects the transport direction A (sub-scanning direction) of the medium, and causes the carriage to record an image, or the like, on the medium is provided. In addition, the recording apparatus 1 is provided with a winding mechanism (not illustrated) which can wind up the medium on which an image, or the like, is recorded using the recording mechanism 4.

[0032] The transport mechanism 3 is provided with an adhesive belt 2 on which a medium sent out from the feeding unit is mounted, and is transported, a driving roller 8 which moves the adhesive belt 2, and a driven roller 9. The medium is mounted on the supporting face of the adhesive belt 2 by being stuck thereto. In addition, it is described that the adhesive belt is used as the transport belt; however, it is not limited to this. For example, the transport belt may be an electrostatic adsorption-type endless belt. In addition, in the recording apparatus 1 according to the embodiment, the transport mechanism 3 with the above described configuration is provided; however, it is not limited to a transport mechanism with such a configuration, and may have a configuration in which a medium is transported by being supported by a movable support tray, or the like, a configuration in which a medium is transported by a pair of rollers, or the like. In addition, the recording apparatus may be a so-called flat bed-type recording apparatus in which a medium is fixed to a support unit, and recording is performed by

moving the recording head 7 with respect to the fixed medium.

[0033] The recording mechanism 4 includes a carriage motor 30 (refer to Fig. 6) which causes the carriage 6 including the recording head 7 as the ejecting unit to reciprocate in the main scanning direction B. The recording apparatus 1 includes a pipe 11a, and a pipe 11b which is parallel to the pipe 11a which configure a skeleton unit by being extended in the main scanning direction B. A rail 10a is provided on a top face of the pipe 11a, and a rail 10b is provided on a top face of the pipe 11b. The recording mechanism 4 causes the carriage 6 which is guided by the rails 10a and 10b to reciprocate in the main scanning direction B.

[0034] The recording apparatus 1 according to the embodiment causes an image, or the like, to be recorded on a medium by alternately repeating a main scanning operation in which the recording head 7 is moved in the main scanning direction by driving the carriage motor 30 while causing liquid to be ejected from the recording head 7, and a sub-scanning operation in which the adhesive belt 2 on which a medium is mounted is transported in the sub-scanning direction. The transport mechanism 3 transports a medium in the sub-scanning direction by intermittently transporting the adhesive belt 2, corresponding to the main scanning operation of the carriage 6. In addition, in the following descriptions, extremely small liquid droplets which are generated when liquid is ejected from the recording head 7, and which float in the inside of the recording apparatus 1 will be referred to as "mist".

[0035] An air blowing unit 12 which extends in the main scanning direction B, and blows air in the direction opposite to the transport direction A from a plurality of vents (not illustrated) is provided at position on the lower part of the pipe 11b. In addition, a collecting unit 13 which extends in the main scanning direction B, and can collect mist which is ejected from the recording head 7 is provided at position on the lower part of the pipe 11a. In addition, a collecting port 16 which extends in the main scanning direction B at the position on the lower part of the pipe 11a is provided in the collecting unit 13.

[0036] In addition, as illustrated in Fig. 4, a plurality of (three) blower fans 14 which generate a blowing force using the air blowing unit 12 are provided on the downstream side (front side) in the transport direction A of the recording apparatus 1 according to the embodiment. Due to the blowing force which is generated by the blower fan 14, the air blowing unit 12 can blow air toward the collecting port 16 from the outside of the collecting unit 13 (position on downstream side in transport direction A).

[0037] In addition, as illustrated in Fig. 5, a plurality of (three) suctioning fans 15 which generate an air current toward the inside of the collecting unit 13 from the collecting port 16, and toward the outside of the recording apparatus 1 from the inside of the collecting unit 13 are provided on the upstream side (rear side) of the recording apparatus 1 in the transport direction A.

Electrical configuration of liquid ejecting apparatus

[0038] Fig. 6 is a block diagram which illustrates an electrical configuration of the recording apparatus 1 according to the embodiment. Subsequently, the electrical configuration in the recording apparatus 1 will be described.

[0039] A control unit 23 performs a control of the recording apparatus 1. The control unit 23 includes an input-output unit 34, a Central Processing Unit (CPU) 24, a Read Only Memory (ROM) 26, a Random Access Memory (RAM) 27, a head driving unit 28, and a motor driving unit 29. The CPU 24 is connected to the input-output unit 34, the ROM 26, the RAM 27, the head driving unit 28, and the motor driving unit 29 through a system bus 25. The CPU 24 is an arithmetic processing unit for performing the entire control of the recording apparatus 1. The input-output unit 34 performs transceiving of data between a personal computer (PC) 35 as an external device and the recording apparatus 1. The ROM 26 and the RAM 27 are memories for securing a region for storing a program of the CPU 24, a work area, or the like.

[0040] The CPU 24 controls the head driving unit 28 and the motor driving unit 29 according to the program which is stored in the ROM 26. The head driving unit 28 generated a driving signal for driving piezoelectric elements (not illustrated) which causes liquid to be ejected from the recording head 7 as the ejecting unit. The motor driving unit 29 generates driving signals for driving the carriage motor 30, a transport motor 31, a feeding motor 32, a winding motor 33, a blower fan motor 17, a suctioning fan motor 18, a carriage fan motor 19, and a sub-carriage fan motor 22.

[0041] The carriage motor 30 is a motor for moving the carriage 6 which includes the recording head 7. The transport motor 31 is a motor for driving the driving roller 8. The winding motor 32 is a driving motor of the feeding unit for sending out a medium which is set in the feeding unit (not illustrated) to the transport mechanism 3. The winding motor 33 is a driving motor for driving a winding mechanism (not illustrated), in order to wind up the medium on which an image, or the like, is recorded. The blower fan motor 17 is a motor for driving the blower fan 14. The suctioning fan motor 18 is a motor for driving the suctioning fan 15. The carriage fan motor 19 is a motor for driving a carriage fan 20 (refer to Fig. 7) which will be described later. The sub-carriage fan motor 22 is a motor for driving a sub-carriage fan 21 (refer to Fig. 7) which will be described later.

Carriage

[0042] Fig. 7 is a front view which illustrates a schematic configuration of the carriage 6. Fig. 8 is a side view which illustrates a schematic configuration of the carriage 6. Fig. 9 is a perspective view which illustrates a schematic configuration of the carriage 6. Fig. 10 is a bottom view which illustrates a schematic configuration of the

frame-shaped unit 37 and capturing units 38a and 38b. In addition, Fig. 9 is set to a perspective view in which arrangements of the plurality of recording heads 7 which are provided in each sub-carriage 5 are understood.

[0043] The carriage 6 as a main portion of the recording apparatus 1 will be described with reference to Figs. 7 to 10.

[0044] As illustrated in Figs. 7 and 8, a plurality of sub-carriages 5 (six) can be attached to the carriage 6. In addition, as illustrated in Figs. 9 and 10, the plurality of recording heads 7 are arranged in staggered manner in each sub-carriages 5. In each sub-carriage 5, a substrate, or the like, is formed in the inside, in addition to the plurality of recording heads 7, and the sub-carriage fan 21 for cooling the substrate is provided therein. Since the sub-carriage fan 21 suppresses a temperature rise in the inside of the sub-carriage 5 by sending an air current (blowing air) to the inside of the sub-carriage 5, when mist of ink exists around the sub-carriage fan 21, there is a concern that the mist may be sent to the inside of the sub-carriage 5, and the mist may be attached to the substrate, or the like. For this reason, in the recording apparatus 1 according to the embodiment, the frame-shaped unit 37 for preventing mist from flying up to the periphery of the sub-carriage fan 21 is provided.

[0045] As illustrated in Fig. 9, the frame-shaped unit 37 which surrounds the recording heads 7 which are provided in the six sub-carriages 5 (refer to Fig. 7) is provided in the carriage 6. The frame-shaped unit 37 prevents mist which is generated when liquid is ejected from the recording head 7 from being diffused to the upper part in which the sub-carriage fan 21 exists, from the periphery of the recording head 7. In other words, the frame-shaped unit 37 plays a role of a separator which holds a region on the upper side of the sub-carriage 5 as a region with small mist.

Configuration of capturing unit

[0046] The carriage 6 is provided with the capturing units 38a and 38b which capture mist generated along with ejecting of liquid from the recording head 7 on at least one side of the recording head 7 as the ejecting unit, in the main scanning direction B. As illustrated in Figs. 9 and 10, the capturing units 38a and 38b according to the embodiment is provided on both sides of the recording head 7 which is provided in the six sub-carriages 5 through the frame-shaped unit 37.

[0047] The capturing units 38a and 38b extend along the sub-scanning direction A which intersects the main scanning direction B, and are provided with a capturing port 43 on a face which faces a medium. Specifically, the capturing units 38a and 38b have an approximately rectangular parallelepiped shape, and extend along the sub-scanning direction A on both sides of the frame-shaped unit 37 in the main scanning direction B. In the sub-scanning direction A, an opening portion 39 is provided on a face on one end side of the capturing units 38a and 38b,

and an opening portion 40 is provided on a face on the other end side which is opposite to the one end side. In addition, the capturing port 43 (shaded portion in Fig. 10) which extends from the opening portion 39 to the opening portion 40 is provided on a face (base) which faces the adhesive belt 2 (refer to Fig. 1) which supports a medium.

[0048] In addition, a configuration of the capturing port 43 according to the embodiment is an example, and the capturing port is not limited to the configuration. The capturing port 43 may have an opening which is larger than the width of the recording head 7 when viewed in the main scanning direction. In addition, the capturing port 43 may have a configuration in which a plurality of holes are provided along the sub-scanning direction A, and may have a configuration in which the opening is separated by providing a lid member in a boundary region between the capturing port 43 and the opening portion 40.

[0049] Subsequently, the internal configuration of the capturing units 38a and 38b will be described.

[0050] Fig. 11A is a sectional view in line XIA-XIA of the capturing unit 38a which is illustrated in Fig. 7. Fig. 11B is a sectional view in line XIB-XIB of the capturing unit 38a which is illustrated in Fig. 8. In addition, since the capturing units 38a and 38b are symmetrically configured by interposing the recording head 7, the capturing unit 38a will be described in the following descriptions.

[0051] As illustrated in Figs. 11A and 11B, the capturing unit 38a includes a catching unit 61 which catches mist. The catching unit 61 according to the embodiment is provided on the inner face 51 which faces the capturing port 43. In addition, the capturing unit 38a includes a carriage fan 20 as a fan which generates an air current which goes toward the catching unit 61. Specifically, the carriage fan 20 is provided on one end side in the sub-scanning direction A. According to the embodiment, the carriage fan 20 is provided on the opening portion 39 side as the one end side in the sub-scanning direction A, and generates an air current which is denoted by arrows in Fig. 11A which goes toward the catching unit 61 from the opening portion 39, and reaches the opening portion 40.

[0052] In addition, the capturing unit 38a includes a liquid guiding unit 55 which is overlapped with the capturing port 43 when planarly viewed between the capturing port 43 and the inner face 51 which faces the capturing port 43. The liquid guiding unit 55 is inclined to the inside surface 52 of the capturing unit 38a. As illustrated in Fig. 11B, the capturing unit 38a includes the inner face (inner top face) 51 on which the catching unit 61 is formed, the inside surface 52 which is located on the frame-shaped unit 37 side, an inner base 53a which extends from the frame-shaped unit 37, and forms a base on one side of the capturing unit 38a, and an inner base 53b which forms a base on the other side by interposing the capturing port 43. The liquid guiding unit 55 according to the embodiment is provided at an opening end of the capturing port 43 of the inner base 53a. A tip end portion 55a to a base end portion 55b of the liquid guiding unit 55 is inclined to

the inside surface 52, and the upper part of the capturing port 43 is covered by the liquid guiding unit 55 when viewing the capturing port 43 from the inner top face 51.

[0053] Subsequently, capturing of mist in a case in which the carriage 6 performs main scanning in the direction B1 illustrated in Fig. 11B will be described.

[0054] Mist which is generated along with ejecting of liquid from the recording head 7 is suctioned inside the capturing unit 38a from the capturing port 43 of the capturing unit 38a, and is caught by the catching unit 61. Specifically, as described above, the carriage fan 20 is provided on the opening portion 39 side as the one end side in the sub-scanning direction A, and the carriage fan 20 generates an air current which goes toward the catching unit 61 from the opening portion 39, and reaches the opening portion 40. Due to the internal configuration of the air current and the capturing unit 38a, an ascending current which is denoted by arrows in Fig. 11B, and goes toward the catching unit 61 from the capturing port 43 is generated in the vicinity of the capturing port 43.

[0055] The recording head 7 is located on the downstream side in the main scanning direction B (direction B1) when viewed from the capturing unit 38a, and when the carriage 6 moves to the direction B1, the capturing unit 38a passes through the position which the recording head 7 passes through immediately after passing through of the recording head 7. Mist which is generated along with ejecting of liquid from the recording head 7 is captured inside the capturing unit 38a by ascending with the ascending current from the capturing port 43 of the capturing unit 38a which passes through immediately after the generation, and is attached to the catching unit 61 by colliding with the catching unit 61. In this manner, since most of mist which is generated along with ejecting of liquid from the recording head 7 is captured immediately after the generation, it is possible to reduce mist which floats in the inside the recording apparatus 1.

[0056] In addition, the carriage fan 20 is provided on the opening portion 39 side as the one end side in the sub-scanning direction A, and indirectly generates an air current which causes gas including mist to go toward the catching unit 61 from the capturing port 43. In other words, since the carriage fan 20 does not suction gas including mist, it is possible to cause mist to be attached to the catching unit 61 by preventing the carriage fan 20 from being contaminated by mist.

[0057] In addition, the carriage fan 20 can be driven so that wind velocity during stopping of the carriage 6 becomes higher than wind velocity in the middle of moving of the carriage 6 in the main scanning direction, using a control of the control unit 23. When wind velocity of the carriage fan 20 is increased in a state in which liquid is ejected as liquid droplets from the recording head 7, there is a concern that deviation in landing of liquid droplets may occur. Therefore, in the recording apparatus 1 according to the embodiment, a control in which the carriage fan 20 is driven at wind velocity which does not cause deviation in landing of liquid droplets in the middle of mov-

ing of the carriage 6 in which liquid is ejected from the recording head 7, and wind velocity of the carriage fan 20 is increased during stopping of the carriage 6 in which liquid is not ejected is performed. In this manner, it is possible to improve an effect of causing mist which is caught using the capturing unit 38a to be attached to the catching unit 61 during stopping of the carriage 6.

[0058] In addition, when much mist is attached to the catching unit 61, the mist is liquefied, becomes liquid droplets, and accordingly, there is a concern that the mist may fall to the outside of the capturing unit 38a from the capturing port 43. Therefore, according to the embodiment the liquid guiding unit 55 which covers the upper part of the capturing port 43 is provided. In addition, the inner bases 53a and 53b of the capturing unit 38a have a gutter shape which can hold liquid droplets (liquid). Liquid droplets which fall from the catching unit 61 toward the capturing port 43 land on the liquid guiding unit 55, and are guided to the inner base 53a of the capturing unit 38a along an inclined portion of the liquid guiding unit 55. In this manner, since liquid droplets which fall from the catching unit 61 is held in the inner bases 53a and 53b, it is possible to prevent the inside of the recording apparatus 1 or a medium from being contaminated when mist falls to the outside of the capturing unit 38a from the capturing port 43 as liquid droplets. In addition, since mist (liquid) is held in the gutter-shaped inner bases 53a and 53b, it is possible to easily collect the liquid. In addition, the liquid guiding unit 55 also functions as a rectifying plate of an ascending current which goes from the capturing port 43 to the catching unit 61.

[0059] In addition, the recording apparatus 1 is provided with the collecting unit 13 (refer to Fig. 3) which causes mist which flows out from the opening portion 40 to flow into the collecting port 16 using an air current generated in the air blowing unit 12, and collects the mist; however, since the recording apparatus 1 according to the embodiment causes most of mist to be caught in the inside of the capturing units 38a and 38b, it is possible to prevent mist from being diffused in the inside of the recording apparatus 1 while reaching the collecting port 16 from the opening portion 40.

[0060] In addition, since the recording apparatus 1 according to the embodiment performs bidirectional printing, the carriage 6 has a configuration of including capturing units 38a and 38b on both sides of the recording head 7 in the main scanning direction B; however, in a case of a recording apparatus which performs unidirectional printing, or the like, it may be a configuration in which the capturing unit is provided at least on one side of the recording head 7.

[0061] In addition, in the recording apparatus 1 according to the embodiment, it is possible to drive the carriage fan 20 on both sides of the capturing units 38a and 38b, even in a movement of the carriage 6 in any direction in the main scanning direction B using a control of the control unit 23; however, it is not limited to such a driving method of the carriage fan 20. However, it is preferable

to execute a driving method in which the carriage fan 20 on the upstream side (rear side) in the main scanning direction B of the carriage 6 is driven.

[0062] As described above, according to the recording apparatus 1 as a liquid ejecting apparatus in the embodiment, it is possible to obtain the following effects.

[0063] The carriage 6 of the recording apparatus 1 is provided with the capturing units 38a and 38b which capture mist generated along with ejecting of liquid from the recording head 7. The capturing units 38a and 38b includes the capturing port 43 which captures mist, the catching unit 61 which causes the captured mist to be attached thereto, and the carriage fan 20 which generates an ascending current which goes from the capturing port 43 to the catching unit 61. Since the capturing units 38a and 38b are located on both sides of the recording head 7, mist which is generated along with ejecting of liquid from the recording head 7 is captured by the capturing unit 38a or the capturing unit 38b which passes through immediately after the generation, and is attached to the catching unit 61. In this manner, since most of mist is caught immediately after the generation, mist which floats in the inside the recording apparatus 1 is reduced, and it is possible to prevent the mist from contaminating the inside of the recording apparatus 1 or a medium. Accordingly, it is possible to provide a liquid ejecting apparatus in which an image quality is improved.

[0064] In addition, the capturing units 38a and 38b includes the liquid guiding unit 55 which overlaps with the capturing port 43 when planarly viewed, and is inclined to the inside surface 52 between the capturing port 43 and the inner face which faces the capturing port 43. In this manner, in a case in which much mist is attached to the catching unit 61, since liquid droplets which fall from the catching unit 61 to the capturing port 43 are held in the inner base 53a, it is possible to prevent the inside of the recording apparatus 1 and a medium from being contaminated, when mist falls to the outside of the capturing unit 38a from the capturing port 43 as liquid droplets.

[0065] In addition, it is possible to drive the carriage fan 20 so that wind velocity during stopping of the carriage 6 is higher than wind velocity in the middle of moving of the carriage 6. It is possible to improve an effect of causing mist which is caught by the capturing unit 38a to be attached to the catching unit 61 by increasing wind velocity of the carriage fan 20 during stopping of the carriage 6.

[0066] In addition, since the carriage fan 20 is provided on one end side of the opening portion 39, and does not directly suction gas including mist, it is possible to prevent the carriage fan 20 from being contaminated by mist.

[0067] In addition, the invention is not limited the above described embodiment, and it is possible to add various modifications, improvements, or the like, to the above described embodiment. Modification examples will be described below.

Modification Example 1

[0068] Fig. 12 is a sectional view in line XII-XII of the capturing unit 38a which is illustrated in Fig. 8 according to the modification example 1.

[0069] A recording apparatus 1 as a liquid ejecting apparatus according to the modification example 1 will be described below. In addition, the same constituent portions as those in the embodiment will be given the same reference numerals, and redundant descriptions will be omitted.

[0070] As illustrated in Fig. 12, a catching unit 161 includes an absorbing member 162 which adsorbs mist. The catching unit 161 is provided on an inner face 51 which faces a capturing port 43, and the catching unit 161 is provided with a porous member such as a fiber or sponge as the absorbing member 162. Mist is captured inside a capturing unit 38a by ascending with an ascending current which is denoted by arrows in Fig. 12 from the capturing port 43, and is adsorbed to the absorbing member 162 of the catching unit 161 by colliding with the absorbing member 162. By providing the absorbing member 162 in the catching unit 161, it is possible to efficiently catch mist.

Modification Example 2

[0071] Fig. 13 is a sectional view in line XIII-XIII of the capturing unit 38a which is illustrated in Fig. 8 according to a modification example 2.

[0072] A recording apparatus 1 as a liquid ejecting apparatus according to the modification example 2 will be described below. In addition, the same constituent portions as those in the embodiment will be given the same reference numerals, and redundant descriptions will be omitted.

[0073] As illustrated in Fig. 13, a catching unit 261 includes a fin-shaped uneven portion 262. The catching unit 261 is provided on an inner face 51 which faces the capturing port 43, and the uneven portion 262 which is obtained by molding metal in a wave form is provided in the catching unit 261. As a material of the uneven portion 262, it is preferable to use stainless steel which is excellent in corrosion resistance. Mist is caught inside the capturing unit 38a by ascending with an ascending current which is denoted by arrows in Fig. 13 from the capturing port 43, and is attached to the uneven portion 262 by colliding with the uneven portion 262 which is provided in the catching unit 261. By providing the uneven portion 262 in the catching unit 261, it is possible to efficiently catch mist.

Modification Example 3

[0074] Fig. 14A is a sectional view in line XIVA-XIVA of a capturing unit 38a illustrated in Fig. 8 according to a modification example 3. Fig. 14B is a sectional view in line XIVB-XIVB of the capturing unit 38a illustrated in Fig.

8.

[0075] A recording apparatus 1 as a liquid ejecting unit according to the modification example 3 will be described below. In addition, the same constituent portions as those in the embodiment will be given the same reference numerals, and redundant descriptions will be omitted.

[0076] As illustrated in Figs. 14A and 14B, a catching unit 361 is provided on the inside surface which intersects a face on which a capturing port 43 is provided. Specifically, the catching unit 361 is provided on the inside surface 52 which intersects a plane which is formed with inner bases 53a and 53b on which the capturing port 43 is provided, and is located on a frame-shaped unit 37 side. A carriage fan 20 is provided on an opening portion 39 side as an one end side in the sub-scanning direction A, and generates an air current which is denoted by arrows in Fig. 14A, goes toward the catching unit 361 from the opening portion 39, and reaches an opening portion 40. Due to the air current, the carriage fan 20 indirectly generates an air current which causes gas including mist to go inside the capturing unit 38a from the capturing port 43, to go toward the catching unit 361, and which is denoted by arrows in Fig. 14B. Mist is caught inside of the capturing unit 38a by ascending with an air current which is denoted by arrows in Fig. 14B, and is attached to the catching unit 361 (inside surface 52) by colliding with the catching unit 361. Since the catching unit 361 is provided on the inside surface 52, and liquefied mist is held on an inner base 53a along the inside surface 52 even when much mist is attached to the catching unit 361, and is liquefied, it is not necessary to provide a liquid guiding unit 55. In this manner, it is possible to prevent the inside of the recording apparatus 1 or a medium from being contaminated due to mist which is caught in the catching unit 361, and flows out from the capturing port 43.

[0077] Here, the catching unit 361 may be provided with the absorbing member 162 or the uneven portion 262, similarly to the modification example 1 or the modification example 2.

[0078] The catching unit 361 is described as the inside surface 52; however, an inclined plane may be set as the catching unit 361, by providing the inclined plane which connects an inner top face 51 and the inside surface 52.

Claims

1. A liquid ejecting apparatus comprising:

a carriage which can move an ejecting unit which ejects liquid onto a medium in a main scanning direction,
wherein the carriage is provided with a capturing unit which captures mist generated along with ejecting of the liquid from the ejecting unit on at least one side of the ejecting unit in the main scanning direction, and
wherein the capturing unit includes a catching

unit which catches the mist.

2. The liquid ejecting apparatus according to claim 1, wherein the capturing unit extends along a sub-scanning direction which intersects the main scanning direction, and
wherein a capturing port is provided on a face which faces the medium.
3. The liquid ejecting apparatus according to claim 1, wherein the capturing unit includes a fan for generating an air current which goes toward the capturing unit.
4. The liquid ejecting apparatus according to claim 3, wherein the fan is provided on one end side of the capturing unit in the sub-scanning direction.
5. The liquid ejecting apparatus according to claim 1, wherein the catching unit includes an absorbing member which absorbs the mist.
6. The liquid ejecting apparatus according to claim 1, wherein the catching unit includes a fin-shaped uneven portion.
7. The liquid ejecting apparatus according to claim 2, wherein the catching unit is provided on an inner face which faces the capturing port.
8. The liquid ejecting apparatus according to claim 2, wherein the catching unit is provided on an inside surface which intersects a face on which the capturing port is provided.
9. The liquid ejecting apparatus according to claim 2, wherein the capturing unit includes a liquid guiding unit at a position which overlaps with the capturing port when planarly viewed, and between the capturing port and the inner face which faces the capturing port.
10. The liquid ejecting apparatus according to claim 9, wherein the liquid guiding unit is inclined to the inside surface of the capturing unit.
11. The liquid ejecting apparatus according to claim 3, wherein the fan is driven so that wind velocity during stopping of the carriage becomes higher than wind velocity in the middle of moving of the carriage in the main scanning direction.

FIG. 1

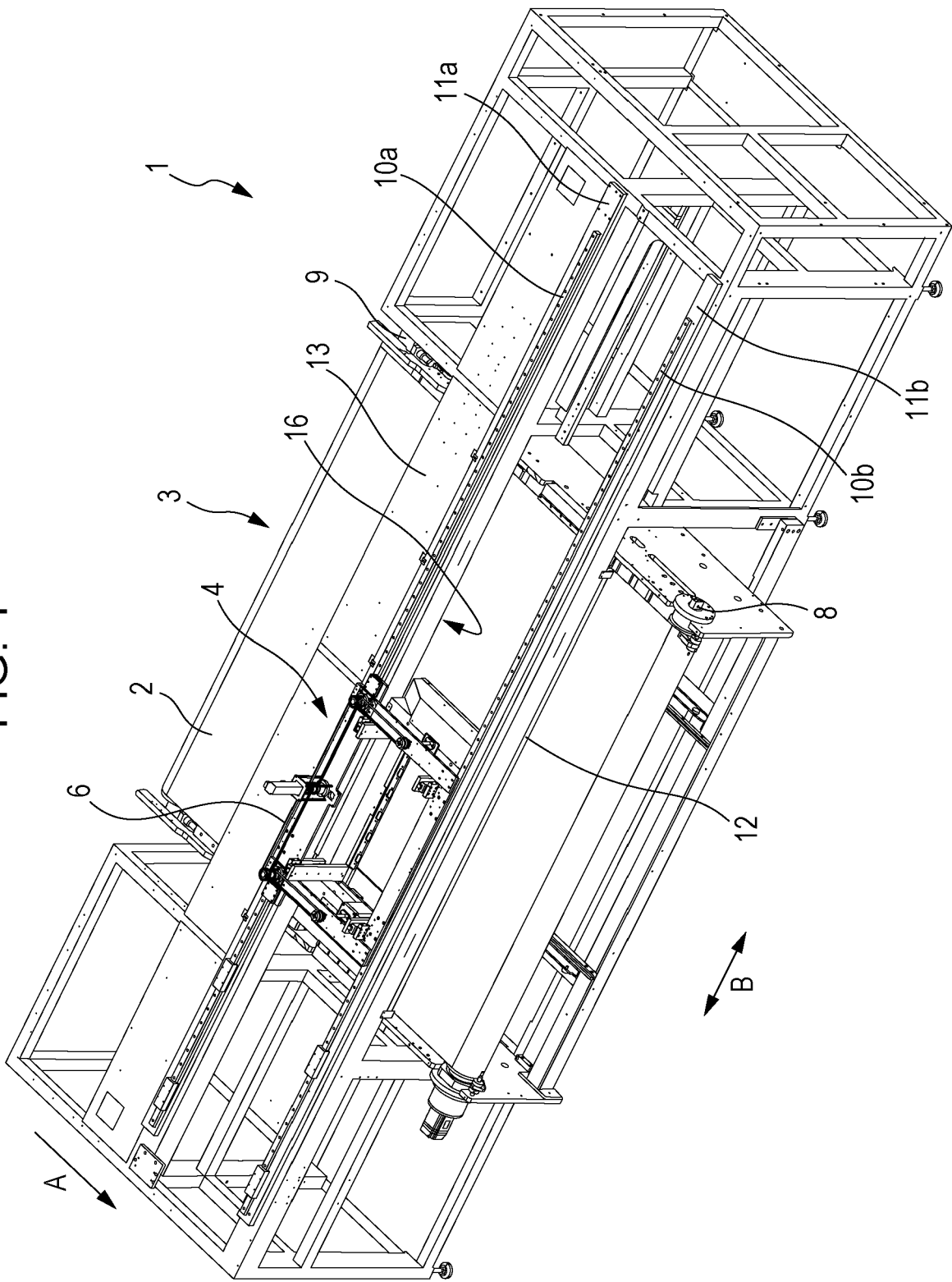


FIG. 2

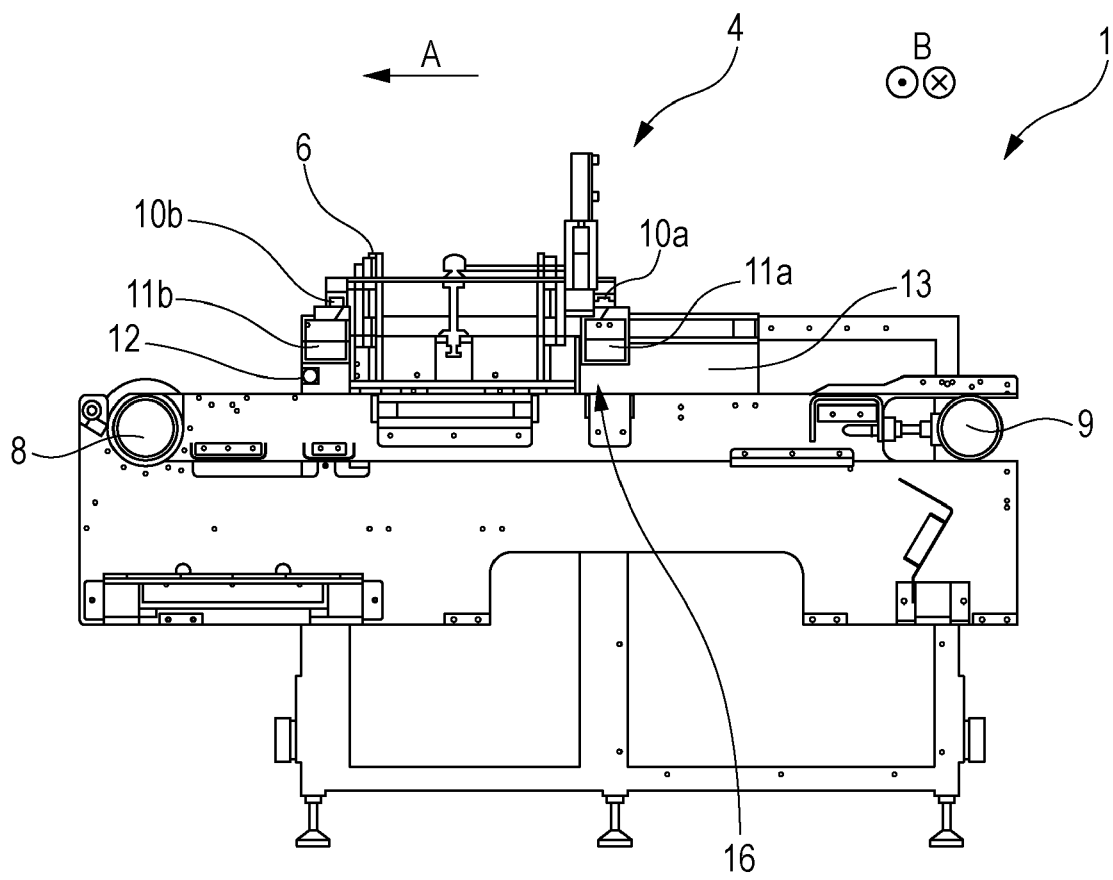


FIG. 3

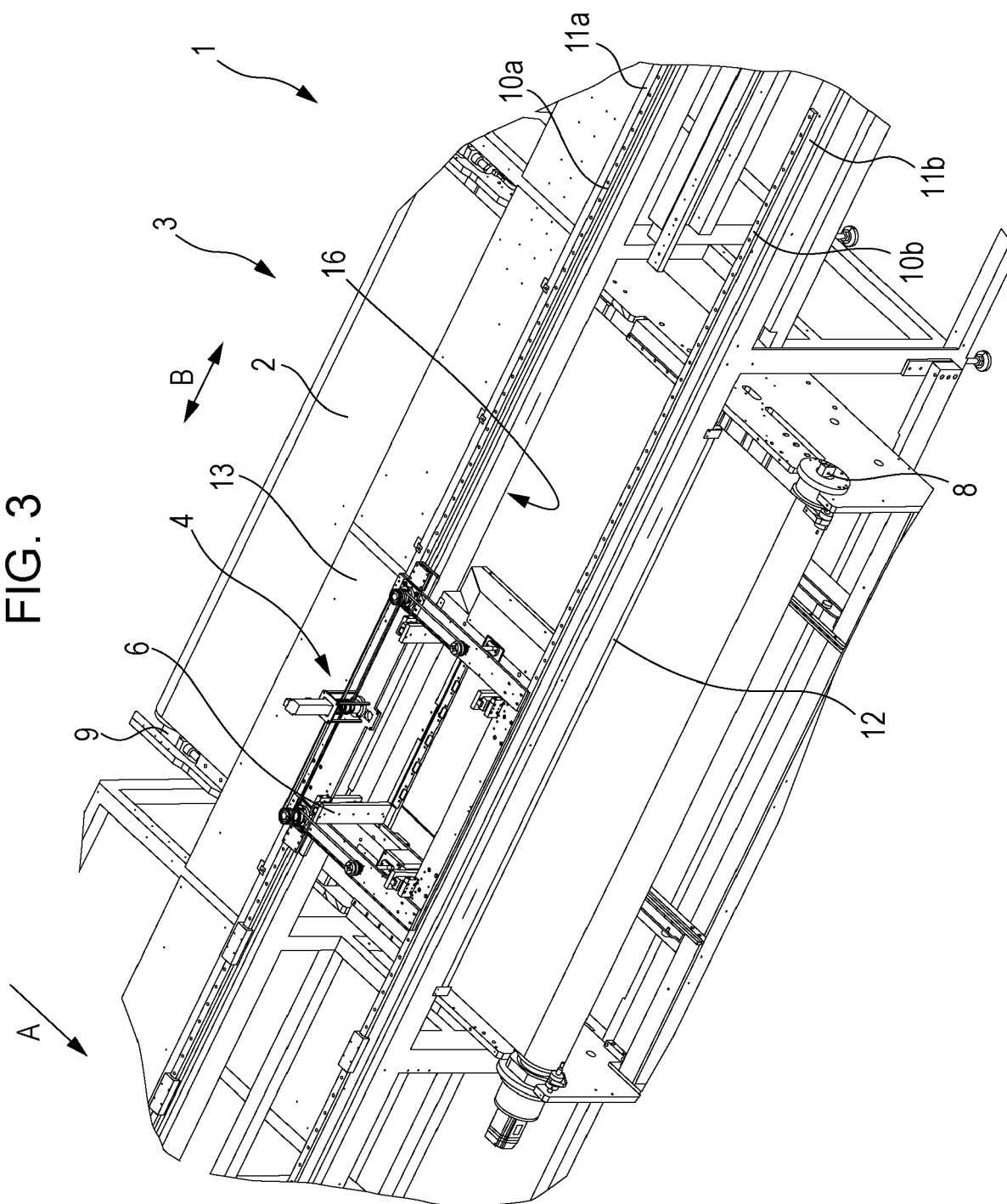


FIG. 4

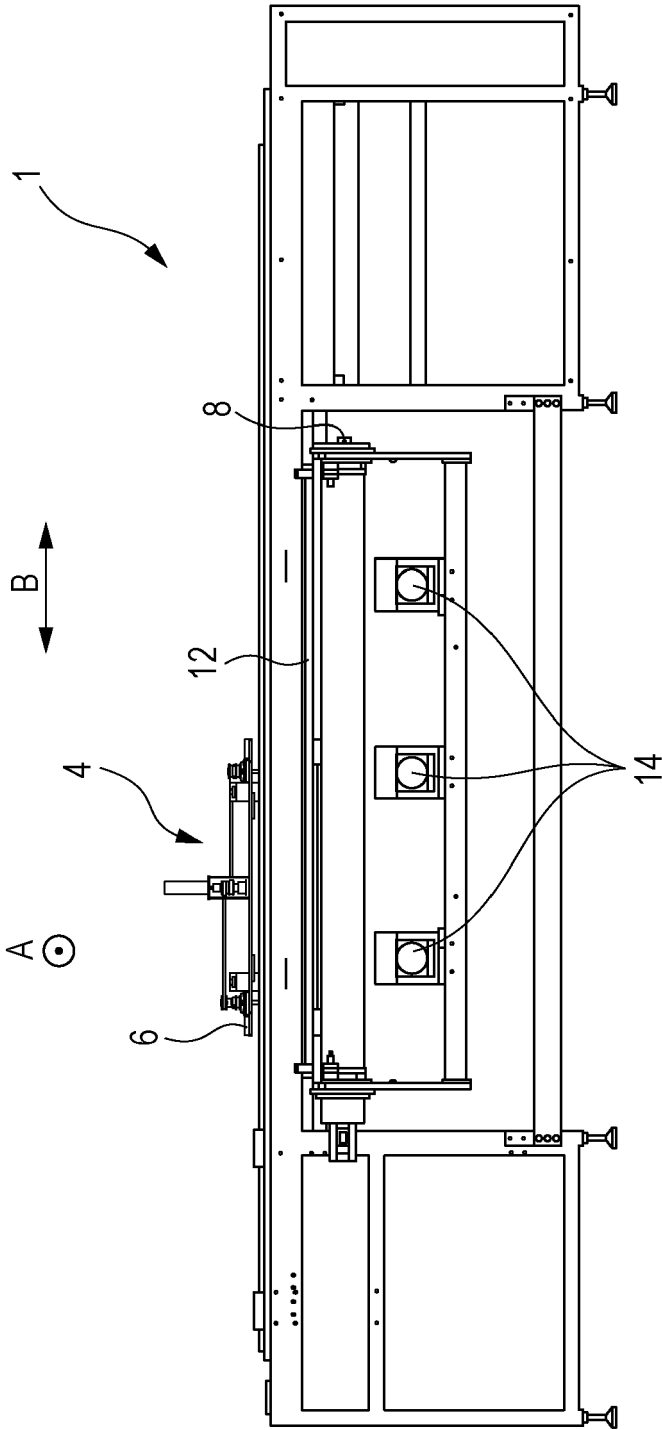
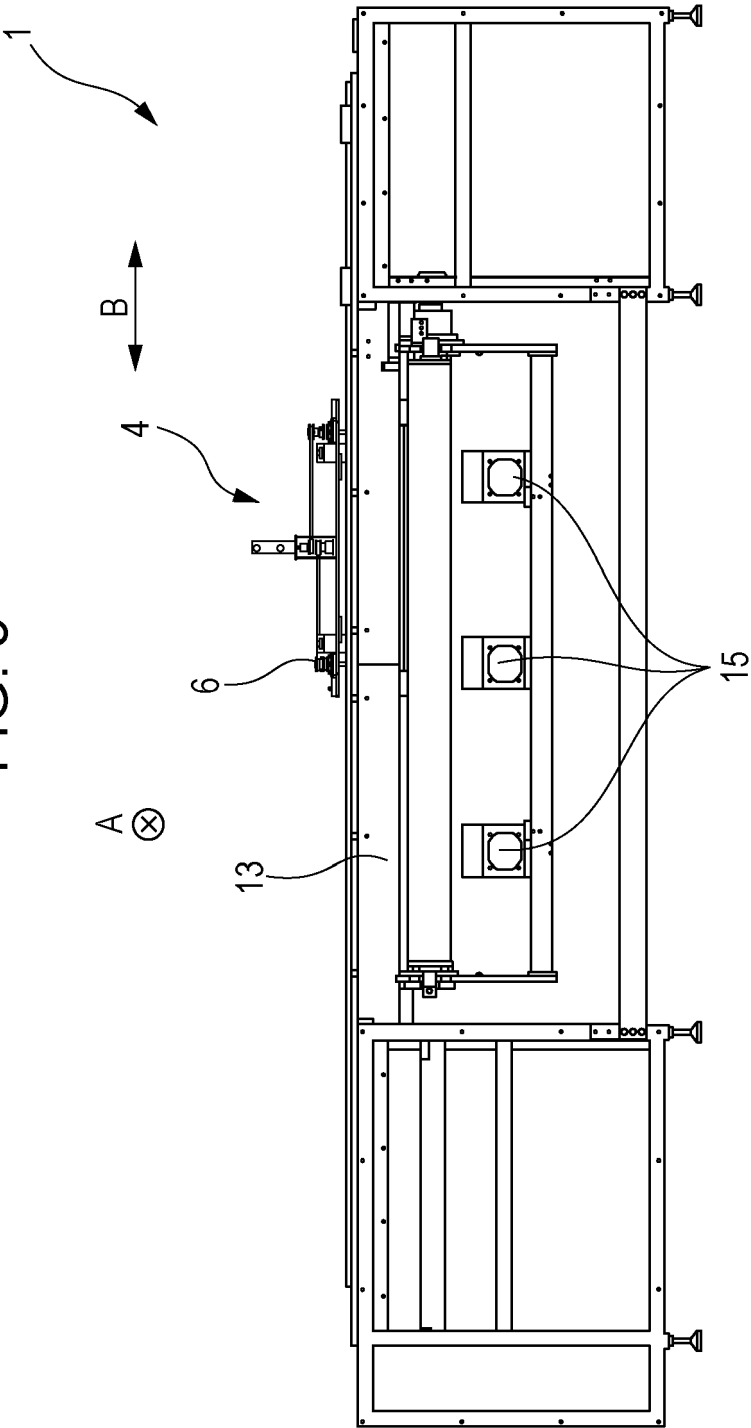


FIG. 5



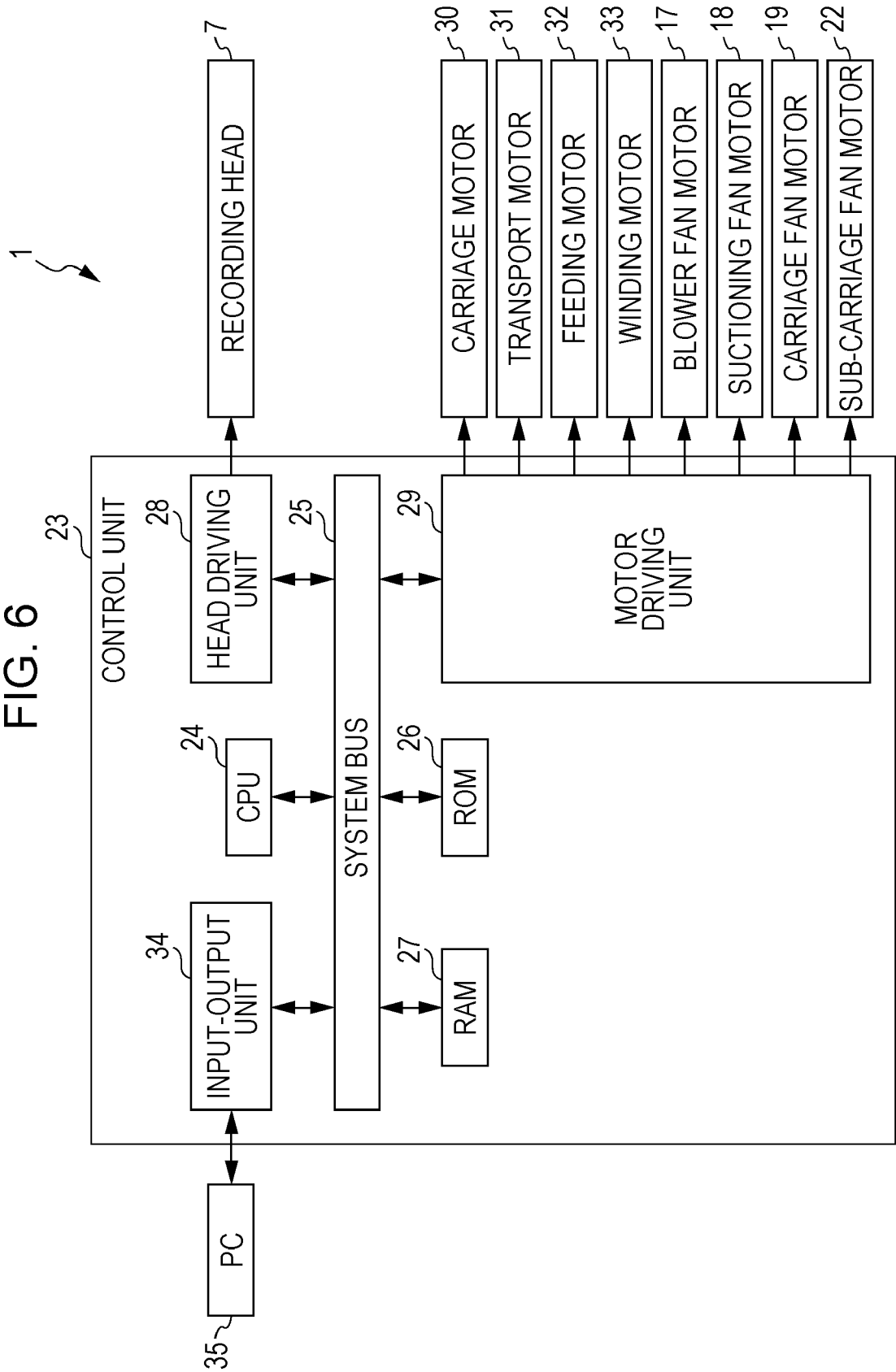


FIG. 7

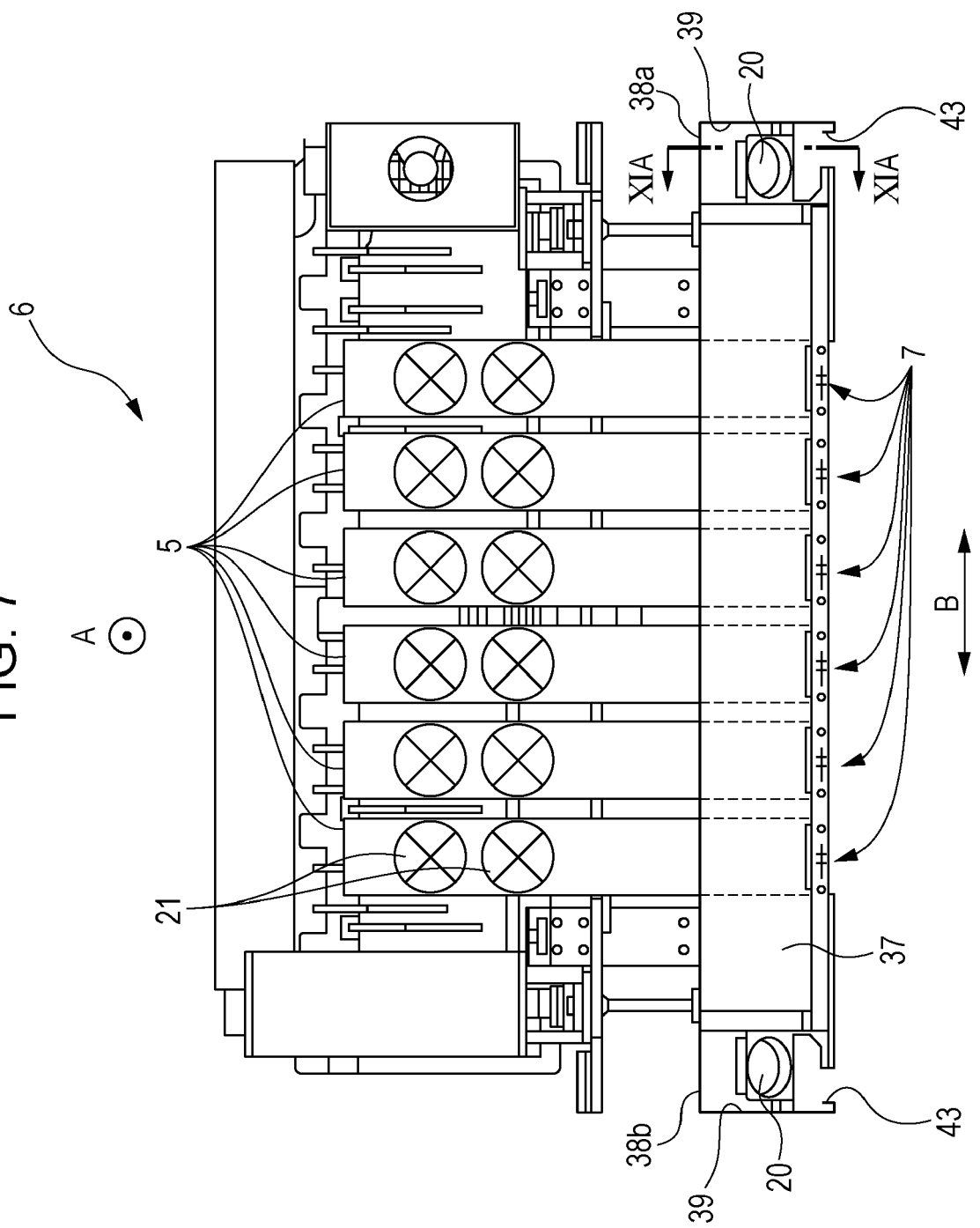


FIG. 8

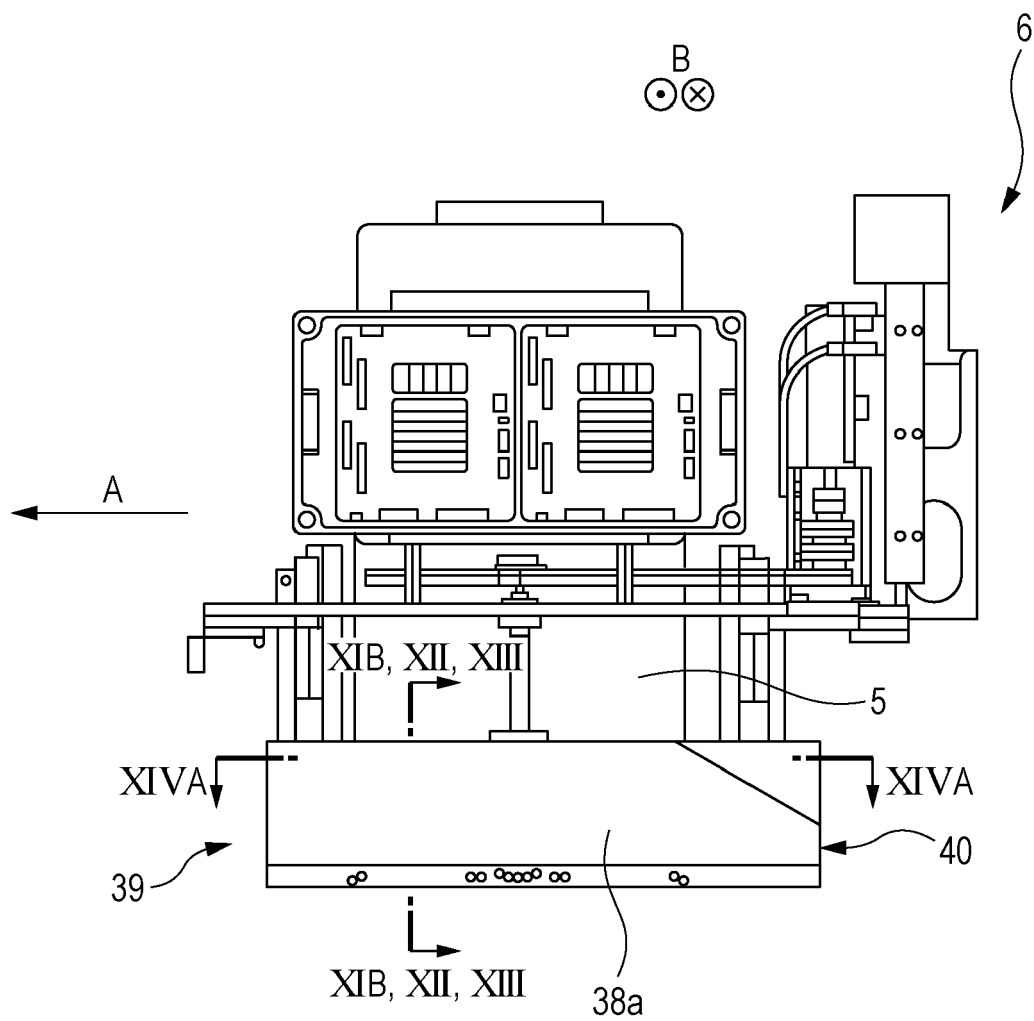


FIG. 9

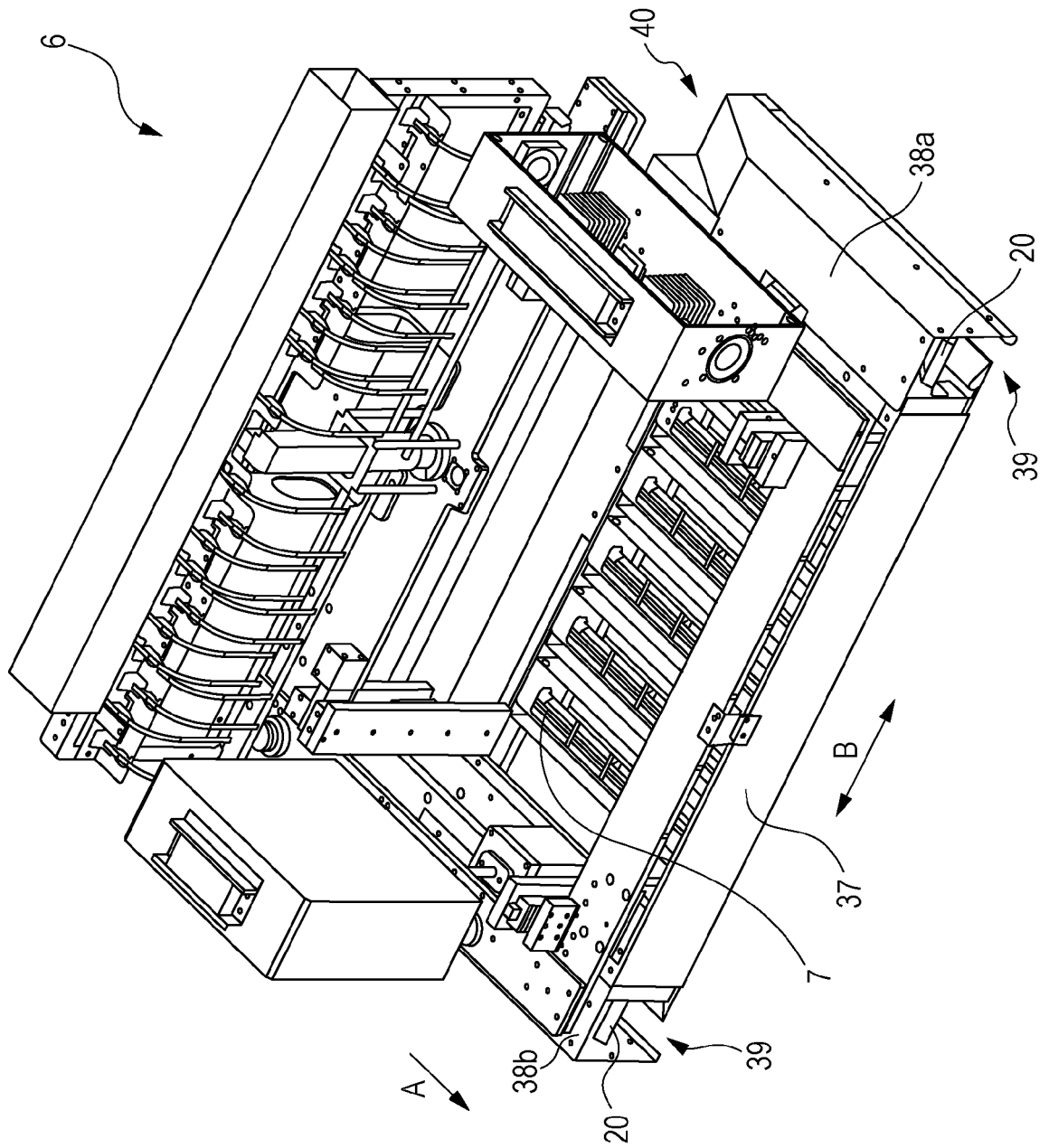


FIG. 10

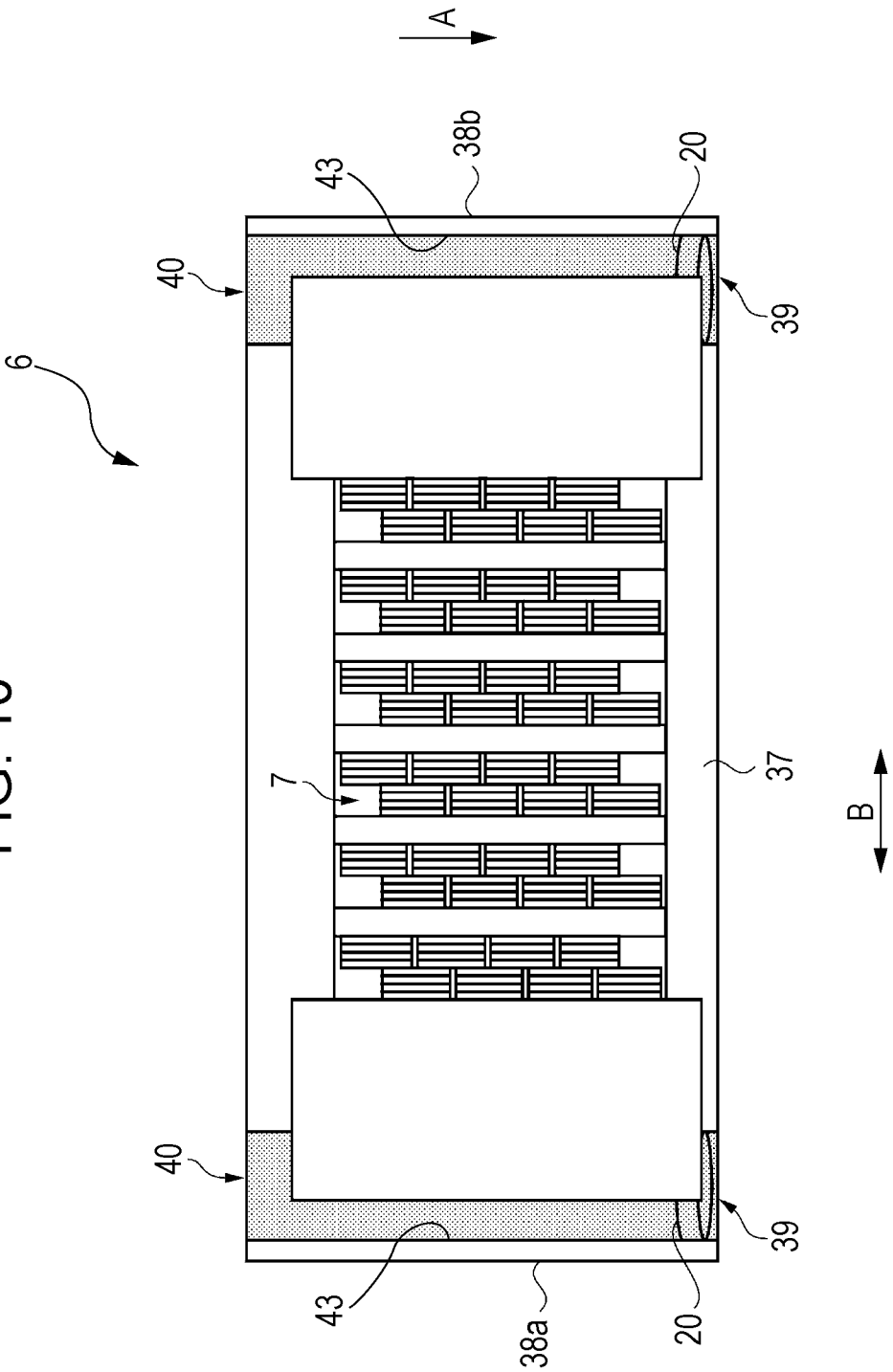


FIG. 11A

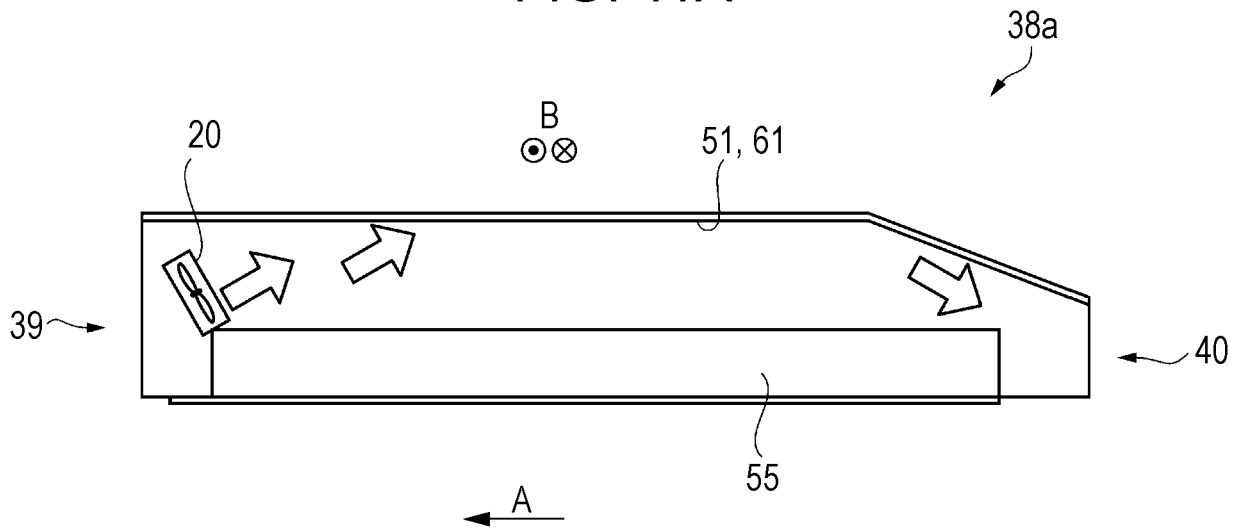


FIG. 11B

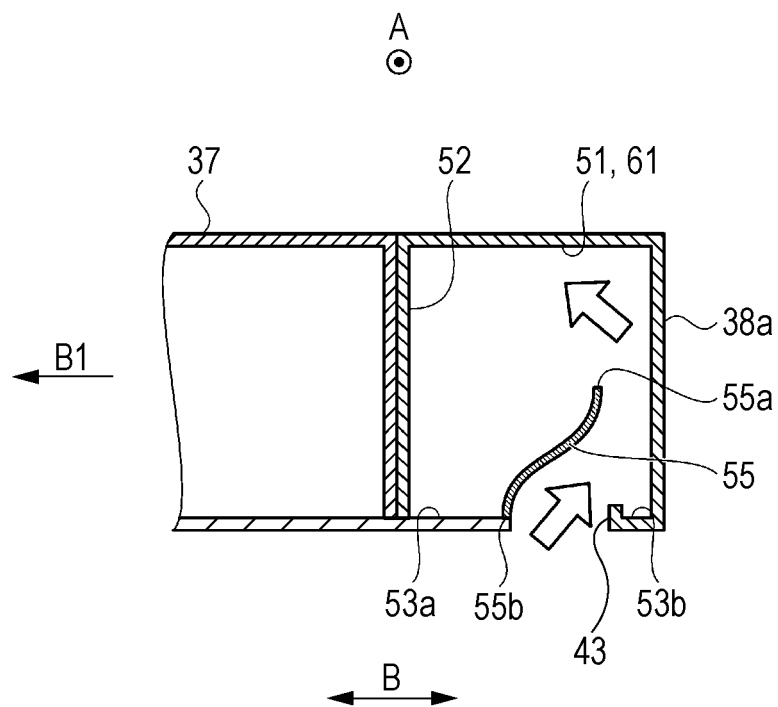


FIG. 12

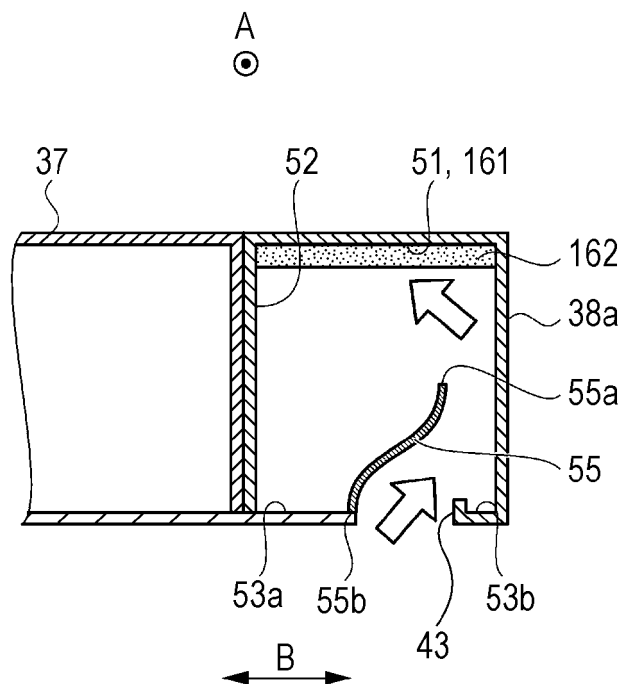


FIG. 13

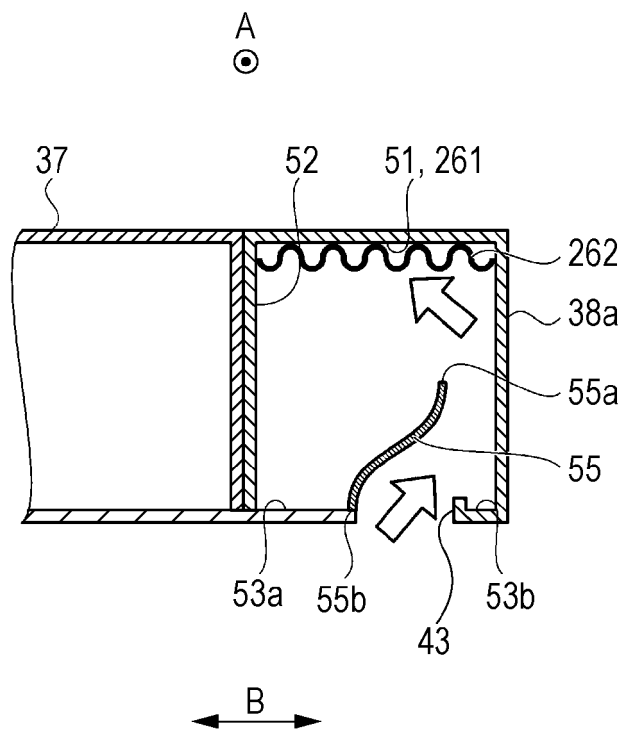


FIG. 14A

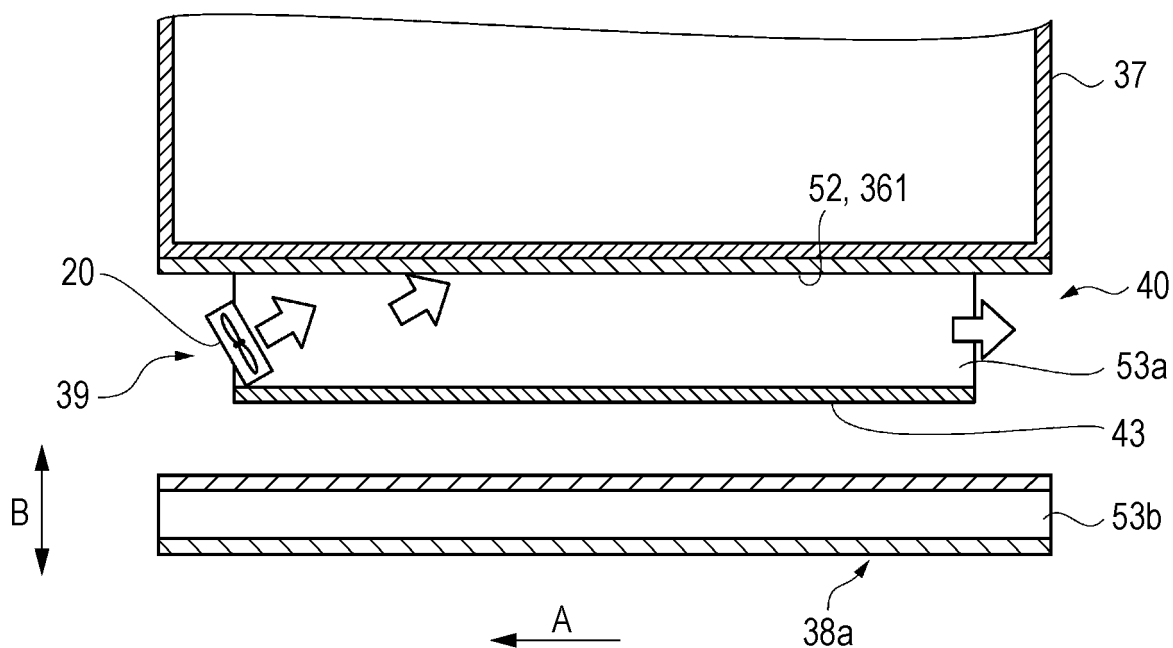
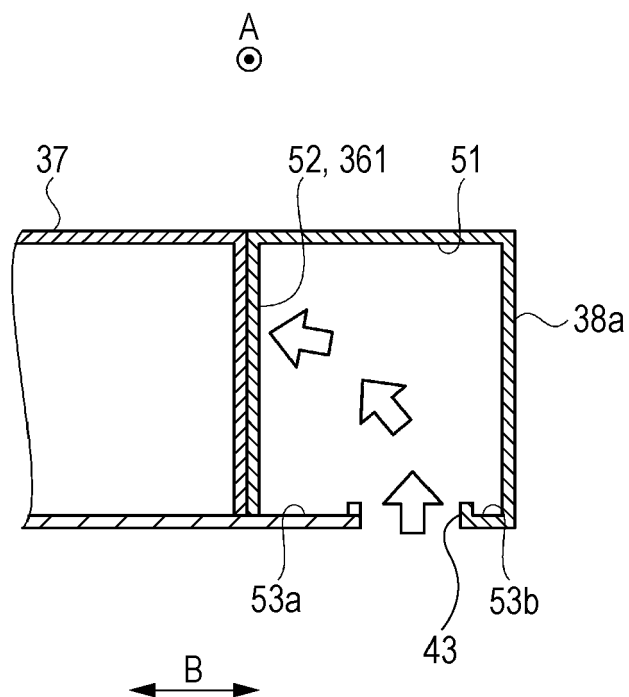


FIG. 14B





EUROPEAN SEARCH REPORT

 Application Number
 EP 16 16 1523

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 774 141 A (COOPER BRENTLY L [US] ET AL) 30 June 1998 (1998-06-30)	1-10	INV. B41J29/02 B41J2/185 B41J2/17
Y	* column 3, lines 52-58 * * column 7, lines 65-67 * * column 8, lines 1-20, 26-39 * * column 9, lines 26-27 * * figures 1, 2, 6 *	11	
X	US 2012/113187 A1 (KIUCHI TAKASHI [JP] ET AL) 10 May 2012 (2012-05-10) * paragraphs [0020], [0022], [0023], [0024], [0027]; figures 2, 3, 5 *	1-5,7-9	
X	US 2014/292921 A1 (TANAKA SHINICHI [JP]) 2 October 2014 (2014-10-02) * paragraphs [0042], [0046], [0053]; figures 5, 7, 8 *	1-5,7,8	
X	US 2012/001985 A1 (KUMAGAI TOSHIO [JP]) 5 January 2012 (2012-01-05) * paragraphs [0034], [0038]; figures 1, 2 *	1-5,7,8	
X	US 2010/149297 A1 (HIDEMASA K; KANADA H; KANEDA H) 17 June 2010 (2010-06-17) * figures 2, 5 *	1-3	TECHNICAL FIELDS SEARCHED (IPC) B41J
Y	JP 2007 160556 A (CANON KK) 28 June 2007 (2007-06-28) * paragraph [0034] *	11	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 September 2016	Examiner Bitane, Rehab
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 16 1523

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-09-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5774141 A	30-06-1998	NONE	
US 2012113187 A1	10-05-2012	CN 102548767 A EP 2455223 A1 JP 5144600 B2 JP 2011020301 A KR 20120032526 A US 2012113187 A1 WO 2011007611 A1	04-07-2012 23-05-2012 13-02-2013 03-02-2011 05-04-2012 10-05-2012 20-01-2011
US 2014292921 A1	02-10-2014	CN 104070798 A JP 2014195887 A US 2014292921 A1	01-10-2014 16-10-2014 02-10-2014
US 2012001985 A1	05-01-2012	CN 102310636 A JP 5482517 B2 JP 2012011746 A US 2012001985 A1 US 2015062243 A1	11-01-2012 07-05-2014 19-01-2012 05-01-2012 05-03-2015
US 2010149297 A1	17-06-2010	CN 101767489 A JP 5251479 B2 JP 2010142954 A US 2010149297 A1	07-07-2010 31-07-2013 01-07-2010 17-06-2010
JP 2007160556 A	28-06-2007	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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

- JP 2007229950 A [0002] [0003]