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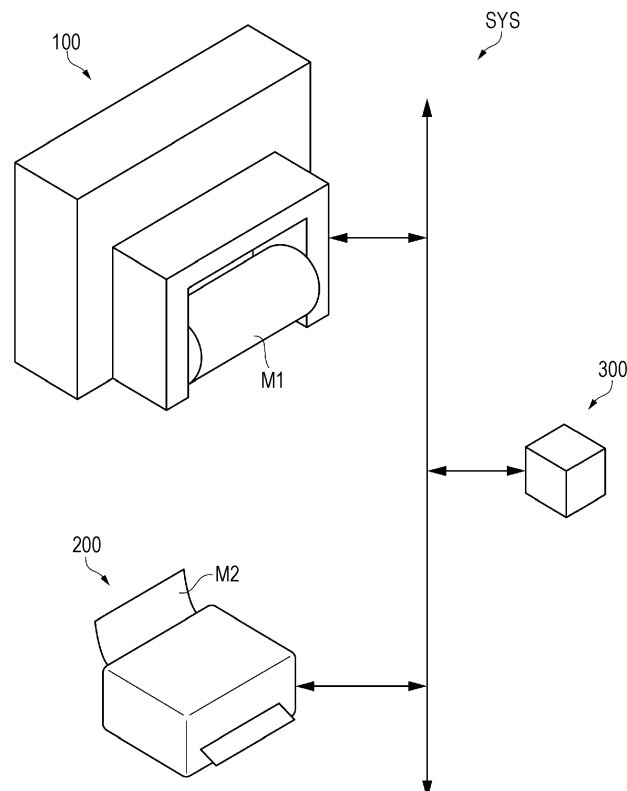
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(54) **Printing method, printing apparatus and printing system**

(57) An inkjet printing system includes a head unit (H) which ejects a liquid; a printing tray (70) which holds a recording medium (M2) in a positioning state; a transport mechanism (CV) which transports the printing tray

to a printing position used by the head unit; and a guide unit (250) which guides a portion of the printing tray in a transport route of the transport mechanism. The printing tray holds the recording medium by using an adhesive.

FIG. 1



Description

BACKGROUND

1. Technical Field

[0001] The present invention relates to a printing method, a printing apparatus and a printing system.

2. Related Art

[0002] In the related art, a screen printing apparatus using a dye mold has been used when printing textiles such as cotton, silk, wool, chemical fibers and mixed-spun fabrics.

[0003] In recent years, as a technology of an ink jet printer has been improved, an ink jet printing apparatus which performs printing using an ink jet method has attracted attention (for example, refer to JP-A-2009-173443).

[0004] Ink jet printing does not require the dye mold used in screen printing, and thus, it is possible to use a digitalized design. Therefore, it is possible to quickly respond to a change in a detail design in response to customers' needs, and it is possible to significantly shorten a production time period. In addition, since color gradation can be expressed, there is an advantage in that a design can be very freely developed.

[0005] In some cases, when performing the printing using the ink jet printing apparatus, a sample is printed in advance by using a small-sized printing apparatus (sample printing apparatus), and the design is appropriately changed depending on states of the sample. Then, main printing is performed by using the ink jet printing apparatus. The sample printing is used as a guideline establishing a task for setting conditions of the printing performed by the ink jet printing apparatus (main printing apparatus). Accordingly, it is desirable to allow the setting condition to be close as possible to the printing condition for the main printing apparatus. For example, the sample printing is performed by using a medium sample cut out from raw fabric of textiles (medium) which are actually printed by the inkjet printing apparatus.

[0006] However, even when using the medium sample cut out from the textiles for the main printing, depending on how the medium sample is held in the printing apparatus for the sample printing, there is a problem in that an identical printing state cannot be obtained again.

SUMMARY

[0007] The invention can be realized in the following forms and application examples. Application Example 1

[0008] A printing method according to this application example uses a printing apparatus that includes a head unit which ejects a liquid; a printing tray which holds a recording medium in a positioning state; a transport mechanism which transports the printing tray to a printing

position used by the head unit; and a guide unit which guides a portion of the printing tray in a transport route of the transport mechanism. The printing tray holds the recording medium by using an adhesive.

[0009] According to the application example, in the printing method using the printing apparatus, the recording medium is transported in a state of being held by the adhesive of the printing tray, and the printing tray is transported to the printing position so that a portion thereof is guided by the guide unit. Therefore, the recording medium can be transported to the printing position in a simple manner with high repeatability. As a result, it is possible to achieve a printing state ensuring the high repeatability.

15 Application Example 2

[0010] In the printing method according to the application example, a scale having a constant angle with respect to an end surface of the printing tray may be disposed on a holding surface which holds the recording medium of the printing tray.

[0011] According to the application example, when the recording medium is set on the printing tray, the scale having the constant angle with respect to the end surface is disposed on the holding surface. Therefore, there is an advantage in that it is possible to relatively easily hold the recording medium with the high repeatability when setting the recording medium on the printing tray.

30 Application Example 3

[0012] In the printing method according to the application example, the guide unit may guide the end surface.

[0013] According to the application Example, the end surface of the printing tray is guided by the guide unit to transport the printing tray to the printing position. Since the scale having the constant angle with respect to the end surface is disposed on the holding surface of the printing tray, the recording medium can be set on the printing tray by using the end surface or the scale as a guide. Therefore, the recording medium can be transported to the printing position with the high repeatability, and thus, it is possible to achieve a printing state ensuring the high repeatability.

45 Application Example 4

[0014] A printing apparatus according to this application example includes a head unit which ejects a liquid; a printing tray which holds a recording medium in a positioning state; a transport mechanism which transports the printing tray to a printing position used by the head unit; and a guide unit which guides a portion of the printing tray in a transport route of the transport mechanism. The printing tray holds the recording medium by using an adhesive.

[0015] According to the application example, the recording medium is transported in a state of being held

by the adhesive of the printing tray, and the printing tray is transported to the printing position so that a portion thereof is guided by the guide unit. Therefore, the recording medium can be transported to the printing position in a simple manner with high repeatability, and thus, it is possible to achieve a printing state ensuring the high repeatability.

Application Example 5

[0016] In the printing apparatus according to the application example, a scale having a constant angle with respect to an end surface of the printing tray may be disposed on a holding surface which holds the recording medium of the printing tray.

[0017] According to the application example, when the recording medium is set on the printing tray, the scale having the constant angle with respect to the end surface is disposed on the holding surface. Therefore, there is an advantage in that it is possible to relatively easily hold the recording medium with the high repeatability when setting the recording medium on the printing tray.

Application Example 6

[0018] In the printing apparatus according to the application example, the guide unit may guide the end surface.

[0019] According to the application example, the end surface of the printing tray is guided by the guide unit to transport the printing tray to the printing position. Since the scale having the constant angle with respect to the end surface is disposed on the holding surface of the printing tray, the recording medium can be set on the printing tray by using the end surface or the scale as a guide. Therefore, the recording medium can be transported to the printing position with the high repeatability, and thus, it is possible to achieve a printing state ensuring the high repeatability.

Application Example 7

[0020] A printing system according to this application example includes a main printing apparatus that has a first head unit which ejects a liquid onto a recording medium held by a medium holding unit and performs a printing operation on the recording medium; and an auxiliary printing apparatus that has a second head unit which ejects the liquid onto the recording medium and performs a printing operation onto the recording medium. The auxiliary printing apparatus has a printing tray which holds the recording medium in a positioning state; a transport mechanism which transports the printing tray to a printing position used by the second head unit; and a guide unit which guides a portion of the printing tray in a transport route of the transport mechanism. The printing tray holds the recording medium by using an adhesive.

[0021] According to the application example, in the auxiliary printing apparatus, the recording medium is

transported in a state of being held by the adhesive of the printing tray, and the printing tray is transported to the printing position so that a portion thereof is guided by the guide unit. Therefore, the recording medium can be transported to the printing position in a simple manner with high repeatability. As a result, in the auxiliary printing apparatus in the printing system, it is possible to achieve a printing state ensuring the high repeatability similar to that of the main printing apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings, wherein like numbers reference like elements.

Fig. 1 illustrates an overall configuration of an ink jet printing system according to an embodiment of the invention.

Fig. 2 illustrates a configuration of a main printing apparatus according to the present embodiment.

Fig. 3 is a plan view illustrating a configuration of a head unit of the main printing apparatus according to the embodiment.

Fig. 4 is a perspective view illustrating an example of an outer appearance of an auxiliary printing apparatus according to the embodiment.

Fig. 5 is a schematic plan view illustrating an example of an internal configuration of the auxiliary printing apparatus according to the embodiment.

Fig. 6 is a schematic plan view illustrating an outline configuration of a printing tray according to the auxiliary printing apparatus of the embodiment, and a balloon section schematically illustrates a partially enlarged weave pattern of a recording medium.

Fig. 7 illustrates a configuration of a head according to the embodiment.

Fig. 8 illustrates a configuration of the head according to the embodiment.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0023] Hereinafter, an embodiment of the invention will be described with reference to the drawings.

[0024] Fig. 1 is a schematic view illustrating an overall configuration of an ink jet printing system SYS according to the embodiment.

[0025] As illustrated in Fig. 1, the inkjet printing system SYS has a main printing apparatus 100, an auxiliary printing apparatus 200 and a main controller (adjustment device) 300.

[0026] The main printing apparatus 100 performs printing on a raw fabric medium M1 by forming an image on the raw fabric medium M1 using an ink jet mechanism. In the printing performed by using the inkjet mechanism, a dye mold as used in screen printing is unnecessary and a digitalized design can be used. Therefore, since

color gradation can be expressed, there is an advantage in that a design can be very freely developed.

[0027] For example, textiles such as cotton, silk, wool, chemical fibers and mixed-spun fabrics are used as the raw fabric medium M1. In the embodiment, a configuration of forming an image on the raw fabric medium M1 having a strip shape by using a roll method will be described as an example. However, without being limited thereto, other methods (for example, a single sheet processing method) may be adopted.

[0028] The auxiliary printing apparatus 200 performs sample printing on a medium sample M2 by forming an image on the medium sample M2 which is the same as the above-described raw fabric medium M1. The term of the medium sample M2 which is the same as the raw fabric medium M1 represents that at least one out of numerous features which affect a printing quality, such as a material, a color, density, a weave pattern and surface finishing, is the same as that of the raw fabric medium M1. For example, a planar shape thereof may be different from each other. In the embodiment, the medium sample M2 is cut out from the raw fabric medium M1. Similar to the main printing apparatus 100, the auxiliary printing apparatus 200 performs the printing by using the ink jet mechanism. Since the auxiliary printing apparatus 200 is disposed, when the printing is performed by the main printing apparatus 100, it is possible to form a sample in advance by using the auxiliary printing apparatus 200 and to appropriately change the design depending on a state of the sample. Therefore, it is possible to contribute to the freely developed design.

[0029] The main controller 300 controls overall printing operations of the main printing apparatus 100 and the auxiliary printing apparatus 200. In the embodiment, the printing operations of the main printing apparatus 100 and the auxiliary printing apparatus 200 can be individually adjusted so that a state of the raw fabric medium M1 printed by the main printing apparatus 100 corresponds to a state of the medium sample M2 printed by the auxiliary printing apparatus 200 (to be described in detail below). Therefore, there is no need to prepare data of a printing image (printing data) for each printing apparatus in accordance with a difference between the printing operations of the main printing apparatus 100 and the auxiliary printing apparatus 200. In addition, the state of the printed raw fabric medium M1 and the state of the printed medium sample M2 can correspond to each other.

[0030] Fig. 2 illustrates an example of a configuration of the main printing apparatus 100.

[0031] As illustrated in Fig. 2, the main printing apparatus (liquid ejecting apparatus) 100 has a recording medium supply unit 10, a recording medium transport unit 20, a recording medium collection unit 30, an inkjet unit 40 as a first head unit, and a maintenance unit 50. Each unit of the main printing apparatus 100 is attached to a frame unit FR.

[0032] The recording medium supply unit 10 supplies

the raw fabric medium M1 having no image formed. The recording medium supply unit 10 has a shaft portion 11 and a bearing portion 12.

[0033] The shaft portion 11 is formed in a cylindrical shape or a columnar shape, and is disposed to be rotatable in a circumferential direction. The strip-shaped raw fabric medium M1 is wound in a roll shape around the shaft portion 11. The shaft portion 11 is attached to be attachable to and detachable from the bearing portion 12. Therefore, for example, the shaft portion 11 wound with the raw fabric medium M1 in advance can be attached to the bearing portion 12.

[0034] The bearing portion 12 rotatably supports both ends in an axial direction of the shaft portion 11. The bearing portion 12 has a rotation drive unit (not illustrated) for rotatably driving the shaft portion 11. The rotation drive unit rotates the shaft portion 11 in a direction in which the raw fabric medium M1 is delivered. An operation of the rotation drive unit is controlled by the main controller 300, for example.

[0035] The recording medium transport unit 20 transports the raw fabric medium M1 in a section from the recording medium supply unit 10 to the recording medium collection unit 30. The recording medium transport unit 20 has a transport roller 21, a transport roller 22, a transport belt 23, a belt rotation roller 24, a belt rotation roller 25, a transport roller 26, a drying unit 27 and a transport roller 28.

[0036] The transport roller 21 relays the raw fabric medium M1 between the recording medium supply unit 10 and the transport roller 22. For example, the transport roller 22 is disposed so that the raw fabric medium M1 can be pinched between the transport roller 22 and the transport belt 23. The transport roller 22 causes the raw fabric medium M1 to be supported by the transport belt 23.

[0037] The transport belt 23 is endlessly formed, and is hung on the belt rotation roller 24 and the belt rotation roller 25. A section of the transport belt 23 between the belt rotation roller 24 and the belt rotation roller 25 is held so as to be parallel with a floor surface in a state where a predetermined tension is applied thereto. An adhesive layer (not illustrated) for adhering the raw fabric medium M1 is disposed on a surface (support surface 23a) of the transport belt 23. The transport belt 23 supports the raw fabric medium M1 on the support surface 23a having the adhesive layer.

[0038] The belt rotation roller 24 and the belt rotation roller 25 support an inner peripheral surface 23b of the transport belt 23. A support portion for supporting the transport belt 23 may be configured to be disposed between the belt rotation roller 24 and the belt rotation roller 25. The belt rotation roller 24 is rotated by the rotation of the transport belt 23. The belt rotation roller 25 is rotated by a rotation drive unit such as a motor MTR1. The motor MTR1 is controlled by the main controller 300.

[0039] The transport belt 23 is rotated by the rotation of the belt rotation roller 25, and the belt rotation roller

24 is rotated by the rotation of the transport belt 23. The raw fabric medium M1 supported by the transport belt 23 is transported in a predetermined transport direction by the rotation of the transport belt 23. In the embodiment, the transport direction is a direction from the belt rotation roller 24 to the belt rotation roller 25. Therefore, for example, when comparing the belt rotation roller 24 with the belt rotation roller 25, the belt rotation roller 24 is arranged upstream in the transport direction, and the belt rotation roller 25 is arranged downstream in the transport direction.

[0040] The transport roller 26 relays the raw fabric medium M1 transported by the transport belt 23. The drying unit 27 is disposed between the transport roller 26 and the transport roller 28, and dries an ink ejected onto the raw fabric medium M1. The transport roller 28 relays the raw fabric medium M1 passing through the drying unit 27 to the recording medium collection unit 30.

[0041] The recording medium collection unit 30 collects the raw fabric medium M1 transported by the recording medium transport unit 20. The recording medium collection unit 30 has a shaft portion 31 and a bearing portion 32.

[0042] The shaft portion 31 is formed in a cylindrical shape or a columnar shape, and is disposed to be rotatable in a circumferential direction. The strip-shaped raw fabric medium M1 is wound in a roll shape around the shaft portion 31. The shaft portion 31 is attached to be attachable to and detachable from the bearing portion 32. Therefore, for example, in a state where the raw fabric medium M1 is wound around the shaft portion 31, the raw fabric medium M1 together with the shaft portion 31 can be detached from the bearing portion 32 by detaching the shaft portion 31 from the bearing portion 32.

[0043] The bearing portion 32 rotatably supports both ends in the axial direction of the shaft portion 31. The bearing portion 32 has a rotation drive unit (not illustrated) for rotatably driving the shaft portion 31. The rotation drive unit rotates the shaft portion 31 in a direction in which the raw fabric medium M1 is wound up. An operation of the rotation drive unit is controlled by the main controller 300, for example.

[0044] The ink jet unit 40 ejects the ink onto the raw fabric medium M1. The ink jet unit 40 has a head unit HU and a unit moving unit 41. The head unit HU has 12 heads, H1 to H12, where ejecting surfaces Ha for ejecting the ink are set respectively. Multiple nozzles NZ for ejecting the ink are formed on the respective ejecting surfaces Ha.

[0045] The ejecting surface Ha faces the raw fabric medium M1 transported by the transport belt 23. An interval (platen gap) between the ejecting surface Ha and the raw fabric medium M1 is set to be equal to or longer than a predetermined distance, for example, 2.0 mm or longer. In some cases, for example, the platen gap may be 2.7 mm or longer depending on a type of the raw fabric medium M1. The unit moving unit 41 moves the head unit HU in a direction intersecting the transport direction

(for example, width direction of the raw fabric medium M1).

[0046] In addition, a platen gap adjustment mechanism 42 is disposed in the inkjet unit 40. As the platen gap adjustment mechanism 42, for example, a cam mechanism or the like is used. The platen gap adjustment mechanism 42 moves the head unit HU in a direction where the ejecting surface Ha and the raw fabric medium M1 oppose each other. In addition, a temperature controller 43 for adjusting a temperature of the ink inside the heads H1 to H12 is disposed in the ink jet unit 40.

[0047] The maintenance unit 50 performs maintenance on the transport belt 23. The maintenance unit 50 has a processing portion 51, a base portion 52 and a moving unit 53. The processing portion 51 has a function for performing various processes on the transport belt 23, serving as a maintenance portion for removing foreign matters such as ink, dust and lint which adhere to the transport belt 23, for example, or an adhesive layer repair portion for repairing an adhesive layer when the adhesive layer of the transport belt 23 is degraded. The base portion 52 supports the processing portion 51. The base portion 52 may have a hoist portion for hoisting the processing portion 51. The moving unit 53 moves the processing portion 51 integrally with the base portion 52 along the floor surface.

[0048] Fig. 3 illustrates a configuration of the head unit HU. Fig. 3 illustrates the configuration when the head unit HU is viewed from the raw fabric medium M1 side.

[0049] As illustrated in Fig. 3, the head unit HU has multiple heads H1 to H12. The multiple heads H1 to H12 are arrayed from an upstream side to a downstream side in the transport direction, that is, sequentially from the heads H1, H2 to H12.

[0050] Four nozzle rows L are respectively formed in the multiple heads H1 to H12. The respective heads H1 to H12 are adapted to eject the inks having different colors for each nozzle row L (for example, yellow, magenta, cyan and black). Each nozzle row L is provided with 180 nozzles NZ, respectively in the transport direction. Therefore, in the respective heads H1 to H12, the sum of the number of nozzles NZ respectively formed in one nozzle row L is 2,160.

[0051] According to the design of the head unit HU, the heads H1 to H12 are arranged so that 2,160 nozzles NZ in each nozzle row L are arranged to have an equal pitch in the transport direction. Therefore, the adjacent heads are arranged to be shifted away from each other in the width direction of the raw fabric medium M1. Specifically, the heads H2, H4, H6, H8, H10 and H12 are arranged to be respectively shifted from the heads H1, H3, H5, H7, H9 and H11 in the width direction of the raw fabric medium M1. A distance between the nozzle NZ arranged in the farthest upstream side in the transport direction and the nozzle NZ arranged in the farthest downstream side in the transport direction is represented by S1.

[0052] Fig. 4 is a perspective view illustrating an ex-

ample of an outer appearance of the auxiliary printing apparatus 200. In addition, Fig. 5 is a schematic plan view illustrating an example of an internal configuration of the auxiliary printing apparatus 200.

[0053] As illustrated in Fig. 4, the auxiliary printing apparatus 200 performs a printing process on the medium sample M2 while transporting a printing tray 70 which holds the medium sample M2 cut out from the above-described raw fabric medium M1 in a positioning state. The auxiliary printing apparatus 200 of the embodiment is a type of apparatus which performs the printing process on the medium sample M2 held by the printing tray 70 after an operator inserts the printing tray 70 into a housing (PB) from the front of the housing (PB).

[0054] In Fig. 5, the auxiliary printing apparatus 200 includes the housing PB, an ink jet unit IJ serving as a second head unit which ejects the ink onto the medium sample M2, an ink supply unit IS which supplies the ink to the ink jet unit IJ, a transport unit CV which transports the printing tray 70 holding the medium sample M2, and a maintenance unit MN which performs a maintenance operation on the inkjet unit IJ.

[0055] The housing PB is formed so that the transport direction of the medium sample M2 represents a lateral direction and a direction orthogonal to the transport direction of the medium sample M2 represents a longitudinal direction. Each unit of the above-described ink jet, unit IJ, ink supply unit IS, transport unit CV and maintenance unit MN is internally attached to the housing PB. A transport guide stand 213 is disposed in the housing PB. The transport guide stand 213 is a support member for supporting the printing tray 70 transported inside the auxiliary printing apparatus 200 during the printing. The transport guide stand 213 is arranged at a center portion in the longitudinal direction within the housing PB. The transport guide stand 213 is used as a support surface for supporting the printing tray 70 when transporting the printing tray 70 holding the medium sample M2 supported so that a printing surface faces the inkjet unit IJ.

[0056] The transport unit CV has a transport roller RL and a motor MTR2 for driving the transport roller RL. The transport unit CV transports the printing tray 70 holding the medium sample M2 from a medium supply and discharge unit PB1 into the housing PB. After the printing process of the medium sample M2 is completed, the transport unit CV discharges the printing tray 70 outward from the housing PB through the medium supply and discharge unit PB1. The transport unit CV is configured so that a time for transport or a transport amount is controlled by the main controller 300.

[0057] Here, in the auxiliary printing apparatus 200 of the embodiment, the printing tray 70 for positioning and holding the medium sample M2 to be printed (textile-printed) will be described in detail with reference to the drawings. Fig. 6 is a schematic plan view illustrating an outline configuration of the printing tray 70 for positioning and holding the medium sample M2 in the auxiliary printing apparatus 200, and a balloon section schematically

illustrates a partially enlarged weave pattern of the medium sample M2.

[0058] In Fig. 6, the printing tray 70 has a rectangular plate shape and is formed of a resin material, for example. The printing tray 70 positions and holds the medium sample M2. In the embodiment, an adhesive layer (not illustrated) adhering to the medium sample M2 is disposed on a holding surface 70a which holds the medium sample M2 of the printing tray 70, thereby enabling the medium sample M2 to be held by adhesive force of the adhesive layer. In the adhesive layer, it is preferable to use an adhesive the same as that of the surface (support surface 23a) of the transport belt 23 serving as a medium support unit of the main printing apparatus 100. In this manner, it is possible to hold the medium sample M2 in a holding state similar to that of the raw fabric medium M1 held on the support surface 23a (medium holding unit) of the main printing apparatus 100. Since the adhesive of the support surface 23a of the main printing apparatus 100 and the adhesive of the holding surface 70a of the printing tray 70 of the auxiliary printing apparatus 200 are the same as each other, it is possible to produce a printing sample in a state where each medium has the same holding state and the same permeability of the landed ink. Therefore, it is possible to ensure a state closer to a printing condition of the main printing apparatus 100.

[0059] One end surface 71y of the printing tray 70 serves as a reference to the alignment of the medium sample M2. More specifically, for example, between a horizontal weave pattern (weft) M2x and a vertical weave pattern (warp) M2y of a weave pattern M2xy of the medium sample M2, depending on how extensive a direction of the vertical weave pattern M2y along the transport direction of the medium sample M2 is tilted to the end surface 71y of the printing tray 70, a direction of the weave pattern M2xy of the medium sample M2 is aligned with a direction of the weave pattern of the raw fabric medium M1 in the main printing apparatus 100. In this manner, it is possible to produce a printing sample by using the auxiliary printing apparatus 200 in a state of repeating the direction of the weave pattern of the raw fabric medium M1 which is used by the main printing apparatus 100 during the main printing.

[0060] The present inventor has found out that it is possible to ensure substantially the same printing quality if the direction of the weave pattern M2xy of the medium sample M2 in the auxiliary printing apparatus 200 is within a range of $\pm 45^\circ$ with respect to the direction of the weave pattern of the raw fabric medium M1 in the main printing apparatus 100. In addition, the inventor has found out that the range is more preferably $\pm 30^\circ$.

[0061] In addition, in Fig. 6, multiple bench marks 72 parallel with the end surface 71y are disposed with a predetermined interval on the holding surface 70a of the printing tray 70 of the embodiment. Even when the direction of the weave pattern M2xy is aligned by using any one of the multiple bench marks 72 as the reference, it is also possible to align the direction of the weave pattern

M2xy of the medium sample M2 with the direction of the weave pattern of the raw fabric medium M1 in the main printing apparatus 100 within a predetermined range. According to this configuration, it is possible to align the bench mark 72 positioned to be closer than the end surface 70y of the printing tray 70 with the weave pattern M2xy, thereby facilitating the alignment.

[0062] Referring back to Fig. 5, description will be made.

[0063] A guide unit 250 which guides the end surface 71y of the printing tray 70 during the transport is disposed in the transport unit CV. In this manner, it is possible to perform the printing process by transporting the medium sample M2 aligned with the printing tray 70 by matching the direction of the weave pattern of the raw fabric medium M1 in the main printing apparatus 100, to the printing unit of the auxiliary printing apparatus 200, without obliquely transporting the medium sample M2.

[0064] It is desirable that a position of the guide unit 250 be adjustable in a direction orthogonal to the transport direction of the printing tray 70. According to this configuration, it is possible to guide a transport angle to a printing tray having multiple sizes.

[0065] The ink jet unit IJ has a head H which ejects the ink and a head moving unit AC which holds and moves the head H. The head H reciprocates in the longitudinal direction of the housing PB (direction intersecting the transportation direction of the medium sample M2: a first direction). The head H ejects the ink onto the medium sample M2 on the printing tray 70 which is fed to the printing position on the transport guide stand 213. The head H has the ejecting surface Ha through which the ink is ejected. The multiple nozzles NZ (not illustrated) are formed on the ejecting surface Ha. These multiple nozzles NZ are arranged side by side along the transport direction of the medium sample M2, and configure the nozzle row NL (not illustrated). The nozzle row NL is disposed to form multiple rows in the first direction, for example, four rows. The ejecting surface Ha faces a flat surface 213a of the transport guide stand 213. The configuration of the head H is substantially the same as the configuration of the heads H1 to H12 arranged in the head unit HU. However, it is desirable to more densely arrange the multiple nozzles NZ formed on the ejecting surface Ha of the head H than the multiple nozzles NZ formed on the ejecting surface Ha of the respective heads H1 to H12 of the head unit HU in the main printing apparatus 100.

[0066] In addition, a platen gap adjustment mechanism 242 is disposed in the ink jet unit IJ. As the platen gap adjustment mechanism 242, for example, a cam mechanism or the like is used. The platen gap adjustment mechanism 242 moves the head H in a direction where the ejecting surface Ha and the medium sample M2 oppose each other.

[0067] In addition, a temperature controller 243 for adjusting a temperature of the ink inside the head H is disposed in the inkjet unit IJ.

[0068] The head moving unit AC moves the head H in the longitudinal direction of the housing PB. The head moving unit AC has a carriage 204 for fixing the head H. The carriage 204 is in contact with a guide shaft 208 hung in the longitudinal direction of the housing PB. The head moving unit AC has a mechanism for moving the carriage 204 along the guide shaft 208, for example, such as a pulse motor 209, a drive pulley 210, an idler pulley 211 and a timing belt 212.

[0069] The ink supply unit IS supplies the ink to the head H. Multiple ink cartridges IC are accommodated in the ink supply unit IS. The auxiliary printing apparatus 200 of the embodiment has a configuration in which the ink cartridges IC are accommodated in a position different from the head H (off-carriage type).

[0070] The ink supply unit IS has a supply tube TB which connects the head H and the ink cartridge IC. The supply tube TB is disposed for each ink cartridge IC. In the embodiment, there are four ink cartridges IC which respectively contain different types of ink. The four ink cartridges IC are respectively connected to four corresponding nozzle rows NL of the head H via the supply tube TB and a sub-tank 202.

[0071] The maintenance unit MN is disposed in a region away from a region for performing the printing on the medium sample M2 (home position). The maintenance unit MN has a capping portion CP for covering the ejecting surface Ha of the head H and a wiping portion WP for wiping the ejecting surface Ha. A suction pump SC is connected to the capping portion CP. A waste ink discharged from the head H to the maintenance unit MN side is collected in a waste liquid collection unit (not illustrated).

[0072] Figs. 7 and 8 illustrate an internal configuration of the above-described heads H1 to H12 and head H.

[0073] As illustrated in Figs. 7 and 8, the above-described heads H1 to H12 and head H are configured so that a pressure chamber plate 351 is stacked on a nozzle substrate 325 and further a vibrating plate 352 is stacked on the pressure chamber plate 351.

[0074] A liquid reservoir 355 which is constantly filled with the ink to be supplied to the heads H1 to H12 and head H is formed in the pressure chamber plate 351. The liquid reservoir 355 is configured to have a space surrounded by the vibrating plate 352, the nozzle substrate 325 and a wall portion (not illustrated). The ink is supplied to the liquid reservoir 355 through a liquid supply hole 353 of the vibrating plate 352. In addition, a pressure chamber 358 which is divided by multiple head diaphragms 357 is formed in the pressure chamber plate 351.

[0075] The pressure chambers 358 are disposed to correspond to the respective nozzles NZ, and the number of the pressure chambers 358 is the same as the number of the nozzles NZ. The ink is supplied from the liquid reservoir 355 to the pressure chamber 358 via a supply port 356 positioned between two head diaphragms 357. The pressure chamber 358 of the head diaphragm 357,

the nozzle NZ and the supply port 356 are combined together, and are arrayed in one row along the liquid reservoir 355.

[0076] As illustrated in Fig. 7, piezoelectric elements (first drive element, second drive element) 359 are arranged on the vibrating plate 352 so as to correspond to the respective pressure chambers 358. The piezoelectric element 359 is configured so that a piezoelectric layer is pinched between a lower electrode and an upper electrode. If a drive signal is applied to a portion between the electrodes, the ink is ejected from the corresponding nozzle NZ.

[0077] Next, an operation of the ink jet printing system SYS configured as described above will be described. In the embodiment, the auxiliary printing apparatus 200 produces a sample of a printed material by using data of an image to be printed (printing data), and then, the main printing apparatus 100 produces a regularly printed material by using printing data which is the same as the printing data for the auxiliary printing apparatus 200. Hereinafter, the description will be made sequentially.

[0078] First, the main controller 300 causes the auxiliary printing apparatus 200 to perform a printing operation. The main controller 300 causes the transport unit CV to arrange the medium sample M2 in the printing position. After the medium sample M2 is arranged, the main controller 300 moves the head H and inputs a drive signal (second drive signal) to the piezoelectric element 359 of the nozzle NZ based on image data of the image to be printed (printing data).

[0079] The printing data is electronic data generated by predetermined software, for example. In the printing data, the design is first set by using drawing software, is separately drafted by using separation draft software, and color layout is performed by using layout software to generate intermediate data. Halftone processing is performed on the intermediate data by using predetermined software. Then, after dot data corresponding to an image to be printed is generated, the printing data is generated. In the embodiment, the data of the image to be printed is co-shared between the main printing apparatus 100 and the auxiliary printing apparatus 200. Therefore, between the main printing apparatus 100 and the auxiliary printing apparatus 200 which are different models, the printing data having the same format is used. The auxiliary printing apparatus 200 may print only a portion of the image data. In this manner, the main printing apparatus 100 and the auxiliary printing apparatus 200 may print different ranges of the image.

[0080] If the drive signal is input to the piezoelectric element 359, the piezoelectric element 359 is expanded and contracted to eject the ink through the nozzle NZ. The ink ejected through the nozzle NZ prints and forms a desired image on the medium sample M2. According to the operation as described above, a sample of a printed material is produced. After producing the sample of the printed material, a user may check a printed state such as a tone of color in the sample of the printed material,

and if necessary, the user may reproduce the sample of the printed material by changing the printing data.

[0081] Next, the main controller 300 causes the main printing apparatus 100 to perform the printing operation by using the printing data the same as the printing data of the sample of the printed material which is finally produced. The main controller 300 inputs the printing data to the main printing apparatus 100. Thereafter, the main controller 300 causes the main printing apparatus 100 to form an image corresponding to the input printing data on the raw fabric medium M1. At this time, depending on a size of the recording medium, the image may be formed on the raw fabric medium M1 by arraying multiple printing data items in a tile shape.

[0082] The main controller 300 rotates the shaft portion 11 to feed the raw fabric medium M1 from the recording medium supply unit 10. The raw fabric medium M1 fed from the recording medium supply unit 10 is supported by the transport belt 23 through the transport roller 21 and the transport roller 22. The main controller 300 rotates the belt rotation roller 25 to move the transport belt 23 in the transport direction. This operation causes the raw fabric medium M1 to be transported in the transport direction by the transport belt 23.

[0083] After the raw fabric medium M1 reaches a predetermined position on the transport belt 23, the main controller 300 moves the heads H1 to H12 in the width direction of the raw fabric medium M1, and causes the heads H11 to H12 to eject the ink through the nozzle NZ. Each time the heads H1 to H12 has scanned the raw fabric medium M1 one time in the width direction, the main controller 300 moves the raw fabric medium M1 in the transport direction by a predetermined distance (S1). The main controller 300 rotates the belt rotation roller 25 by a predetermined angle when the raw fabric medium is moved once. In this manner, the main controller 300 intermittently moves the raw fabric medium M1 in the transport direction, and causes the heads H1 to H12 to scan the raw fabric medium and to eject the ink through the nozzle NZ, thereby forming a predetermined image on the raw fabric medium M1.

[0084] The main controller 300 moves the raw fabric medium M1 on which the image is formed to a downstream side of the transport belt 23. The raw fabric medium M1 moved to the downstream side of the transport belt 23 reaches the recording medium collection unit 30 through the transport roller 26, the drying unit 27 and the transport roller 28. The main controller 300 rotates the shaft portion 31 so as to wind the raw fabric medium M1 around the shaft portion 31. In this manner, the raw fabric medium M1 (regularly printed material) on which the image is formed is collected.

[0085] As described above, according to the embodiment, when producing the printing sample by using the auxiliary printing apparatus 200, it is possible to position and hold the medium sample M2 by using the end surface 70y of the printing tray 70 as a reference and by relatively easily aligning the direction of the weave pattern M2xy

of the medium sample M2 with the direction of the weave pattern of the raw fabric medium M1 in the main printing apparatus 100.

[0086] In addition, the end surface 70y of the printing tray 70 which holds the medium sample M2 is guided by the guide unit 250 by aligning the direction of the weave pattern M2xy. In this manner, it is possible to relatively easily prevent the medium sample M2 from being obliquely transported.

[0087] Therefore, in a state of repeating the direction of the weave pattern of the medium (raw fabric medium M1) which is used by the main printing apparatus 100 during the main printing, or in a state of preventing the medium sample M2 from being obliquely transported, it is possible to produce the printing sample by using the auxiliary printing apparatus 200 and to set conditions for the main printing performed by the main printing apparatus 100 with reference to a printed state thereof. Accordingly, it is possible to provide the inkjet printing system SYS which enables the main printing apparatus 100 to perform the printing to achieve a desired quality.

[0088] The technical scope of the invention is not limited to the above-described embodiment, and the embodiment can be appropriately and additionally modified without departing from the scope of the invention.

[0089] For example, in the above-described embodiment, a configuration where the main controller 300 is disposed to be independent from the main printing apparatus 100 and the auxiliary printing apparatus 200 has been described as an example, but the embodiment is not limited thereto. For example, a configuration may be made so that units having the same function as that of the main controller 300 (adjusting devices) are individually disposed inside the main printing apparatus 100 and the auxiliary printing apparatus 200, respectively. In this case, the main controller 300 transmits an adjusting signal to the units corresponding to the adjusting devices, and controls each printing operation of the main printing apparatus 100 and the auxiliary printing apparatus 200.

[0090] In addition, a configuration may be made so that the main controller 300 is internally disposed in the auxiliary printing apparatus 200 and the main controller 300 adjusts the printing operation of the auxiliary printing apparatus 200.

[0091] In addition, a configuration may be made so that multiple main controllers 300 are disposed so as to correspond to the main printing apparatus 100 and the auxiliary printing apparatus 200, respectively.

[0092] In addition, in the above-described embodiment, the configuration of transporting the raw fabric medium M1 has been described as an example, but a configuration may be made so that the raw fabric medium M1 and the head unit are relatively moved.

[0093] In addition, the head unit may be a line head type.

[0094] In the above-described embodiment, the vertical weave pattern M2y of the weave pattern M2xy of the medium sample M2 is positioned with respect to the end

surface 71y of the printing tray 70 and the bench mark 72, but the embodiment is not limited thereto. For example, if an end portion of the medium sample M2 serves as a reference point having the high repeatability, the end portion may be positioned with respect to the end surface 71y.

[0095] In the above-described embodiment, the multiple bench marks 72 are disposed to set the bench mark 72 parallel with the end surface 71y guided by the guide unit 250 as the scale. However, the bench marks serving as the scale having the constant angle (including zero degree) with respect to the end surface 71y, without being limited thereto, may be multiple lines which are perpendicular to the end surface 71y, or which have a constant angle with respect to the end surface 71y. Furthermore, the same advantageous effect can be obtained if there is provided a scale such as multiple points and cross marks which are arrayed in the direction parallel with or perpendicular to the end surface 71y, or multiple points and cross marks which have the constant angle with respect to the end surface 71y.

Claims

1. A printing method using a printing apparatus (200) that includes a head unit (H) which ejects a liquid; a printing tray (70) which holds a recording medium (M2) in a positioning state; a transport mechanism (CV) which transports the printing tray to a printing position used by the head unit; and a guide unit (250) which guides a portion of the printing tray in a transport route of the transport mechanism, wherein the printing tray holds the recording medium by using an adhesive.
2. The printing method according to claim 1, wherein a scale (72) having a constant angle with respect to an end surface (71y) of the printing tray (70) is disposed on a holding surface (70a) which holds the recording medium of the printing tray.
3. The printing method according to claim 2, wherein the guide unit guides the end surface.
4. A printing apparatus (200) comprising:
 - a head unit (H) adapted to eject a liquid;
 - a printing tray (70) adapted to hold a recording medium (M2) in a positioning state;
 - a transport mechanism (CV) adapted to transport the printing tray to a printing position used by the head unit; and
 - a guide unit (250) adapted to guide a portion of the printing tray in a transport route of the transport mechanism,
 wherein the printing tray is adapted to hold the recording medium by using an adhesive.

5. The printing apparatus according to claim 4,
wherein a scale (72) having a constant angle with
respect to an end surface (71y) of the printing tray
(70) is disposed on a holding surface (70a) for hold-
ing the recording medium on the printing tray. 5
6. The printing apparatus according to claim 5,
wherein the guide unit is adapted to guide the end
surface. 10
7. A printing system (SYS) comprising:
- a main printing apparatus (100) that has a first
head unit (HU) adapted to eject a liquid onto a
recording medium (M1) held by a medium hold-
ing unit (20) and to perform a printing operation
on the recording medium; and 15
- an auxiliary printing apparatus (200) that has a
second head unit (H) adapted to eject the liquid
onto the recording medium (M2) and to perform 20
a printing operation on the recording medium,
wherein the auxiliary printing apparatus includes
a printing tray (70) adapted to hold the recording
medium (M2) in a positioning state; a transport
mechanism (CV) adapted to transport the print- 25
ing tray to a printing position used by the second
head unit; and a guide unit (CV) adapted to guide
a portion of the printing tray in a transport route
of the transport mechanism, and
wherein the printing tray is adapted to hold the 30
recording medium (M2) by using an adhesive.
8. The printing system according to claim 7,
wherein a scale (72) having a constant angle with
respect to an end surface (71y) of the printing tray 35
(70) is disposed on a holding surface (70a) for hold-
ing the recording medium on the printing tray.
9. The printing system according to claim 8,
wherein the guide unit is adapted to guide the end 40
surface.

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FIG. 1

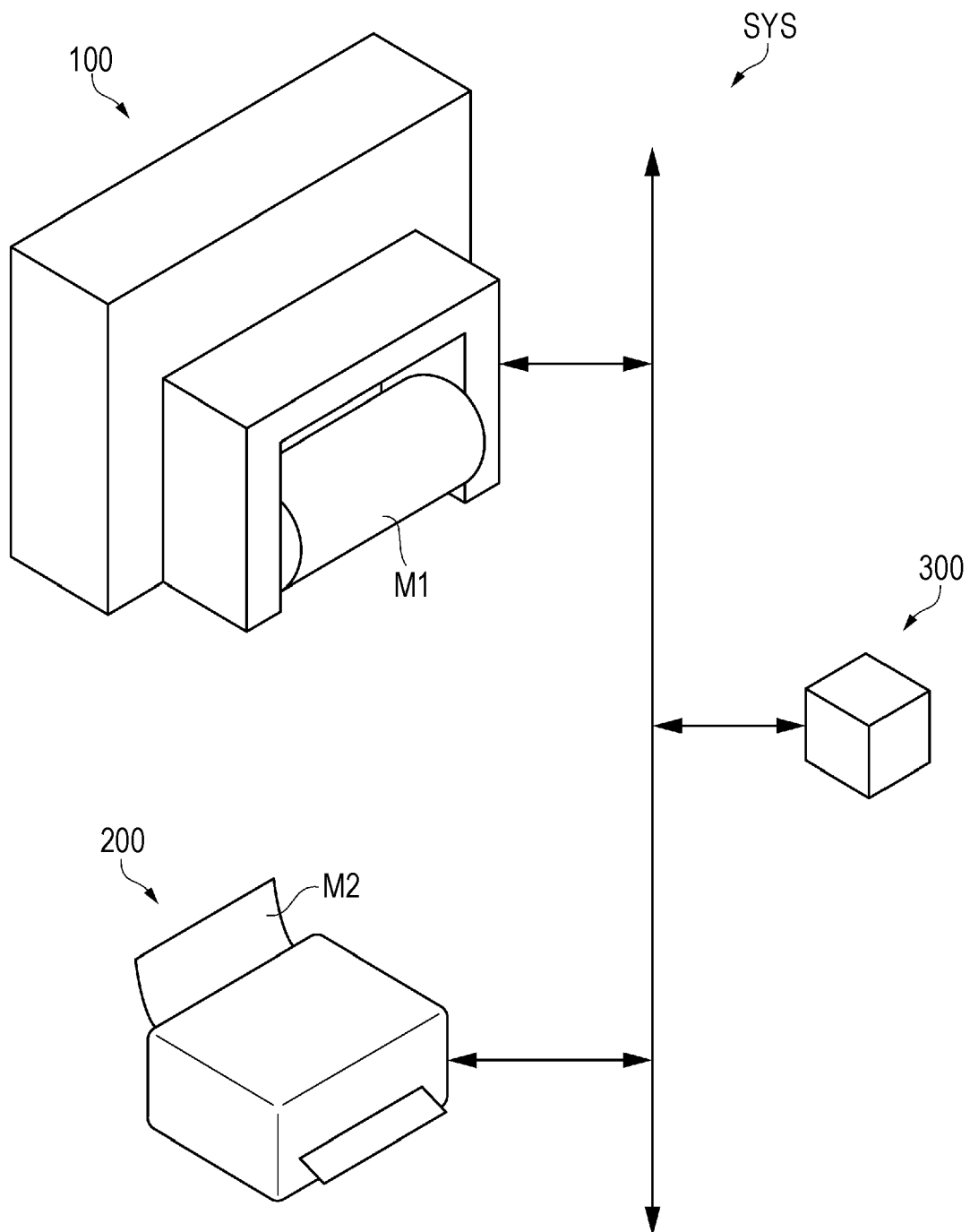


FIG. 2

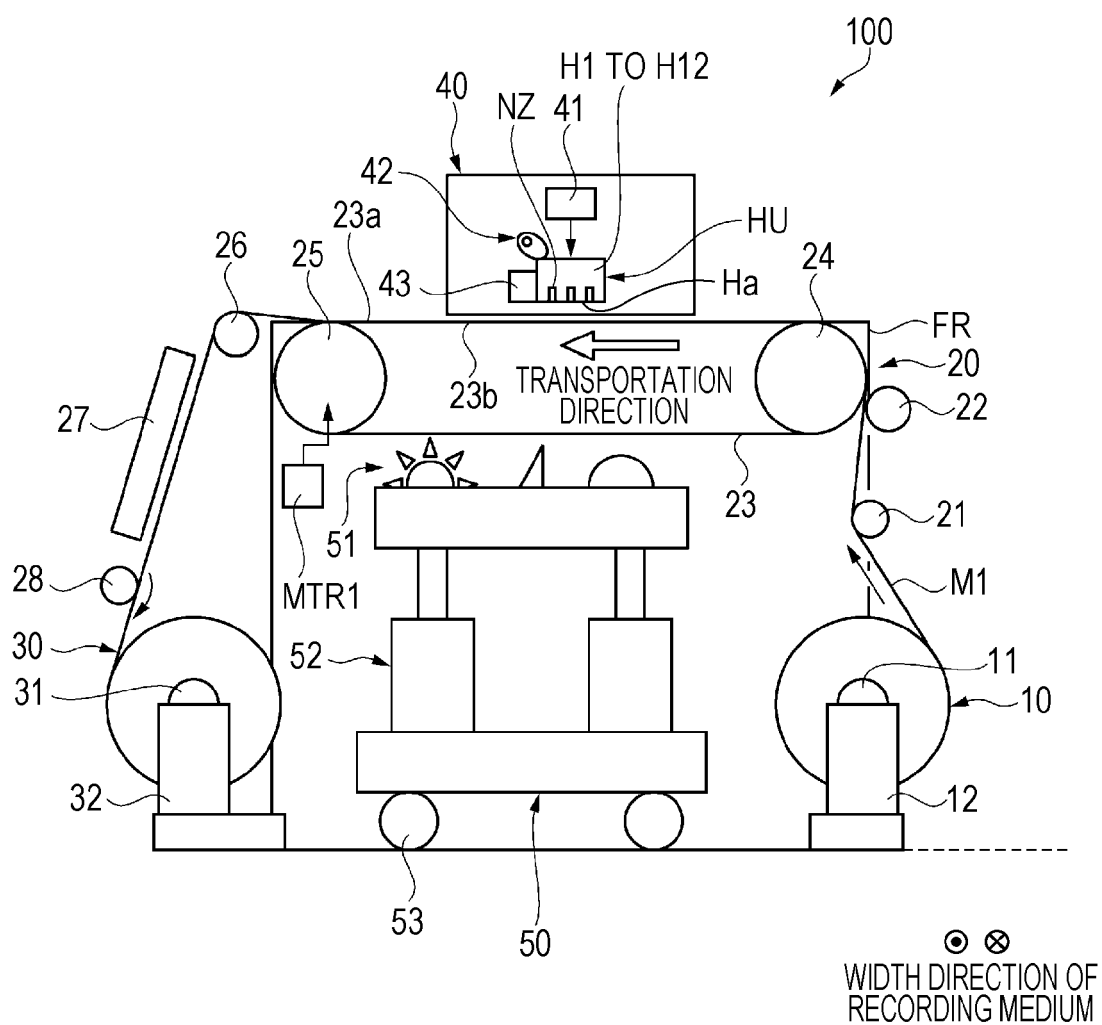


FIG. 3

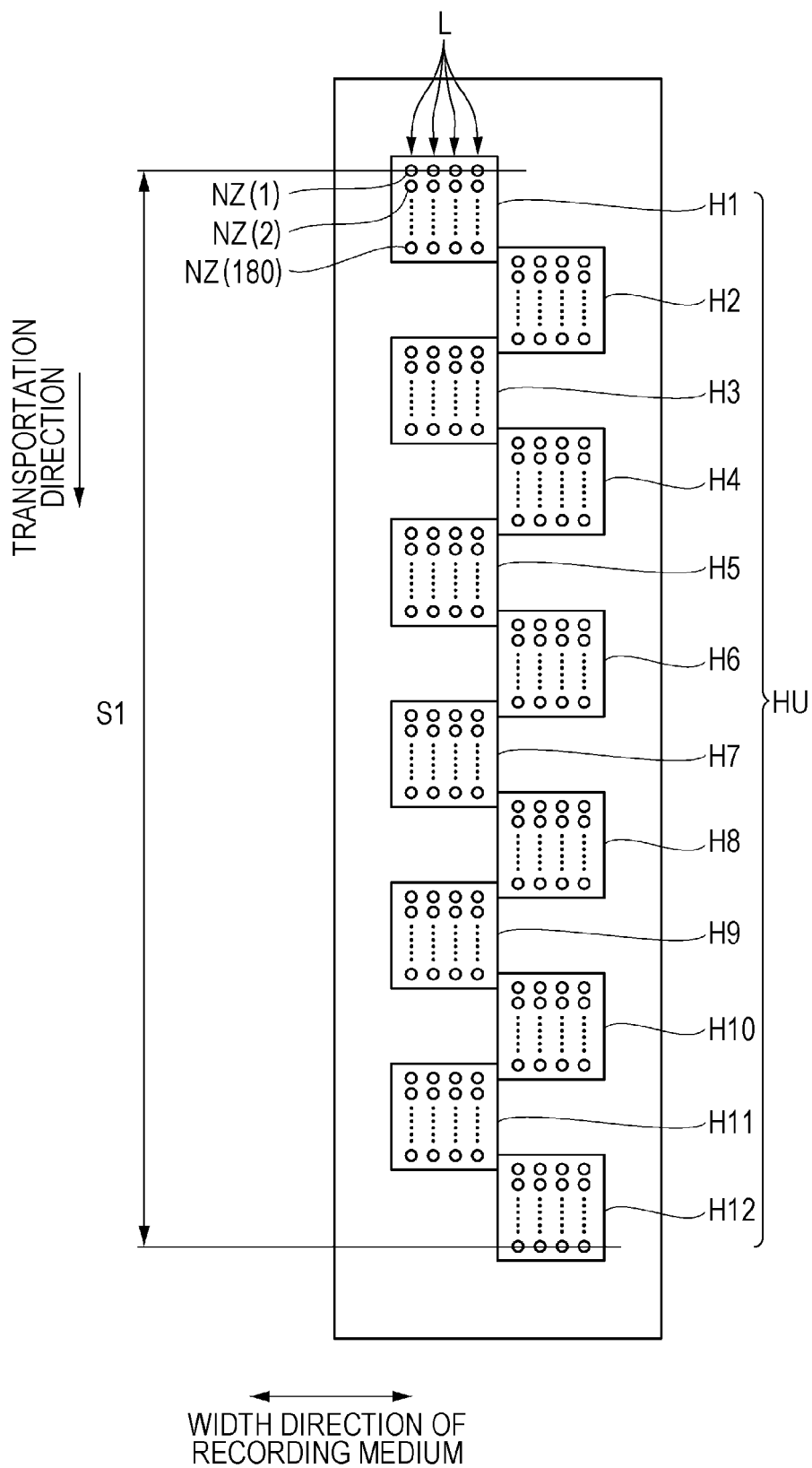


FIG. 4

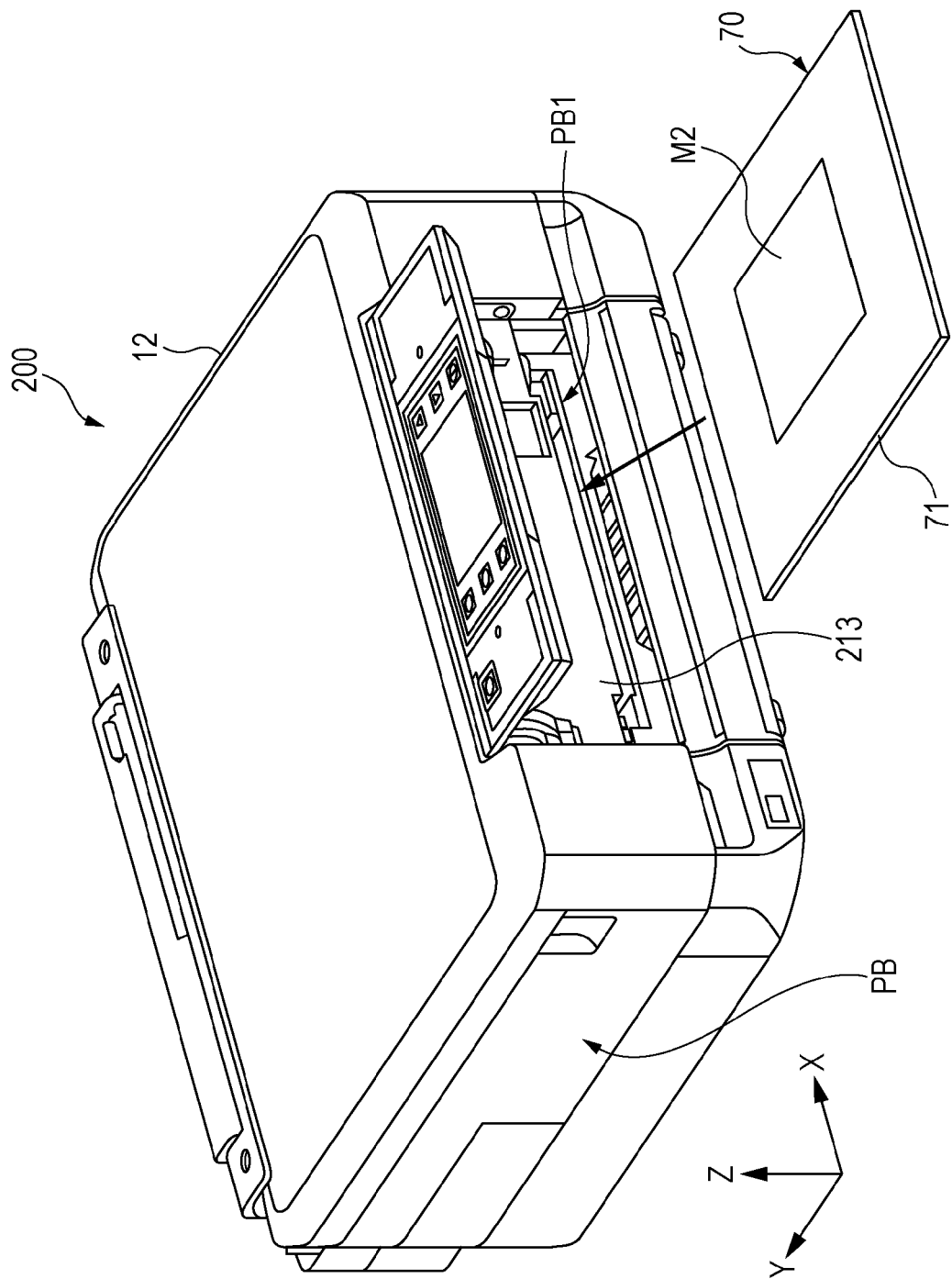


FIG. 5

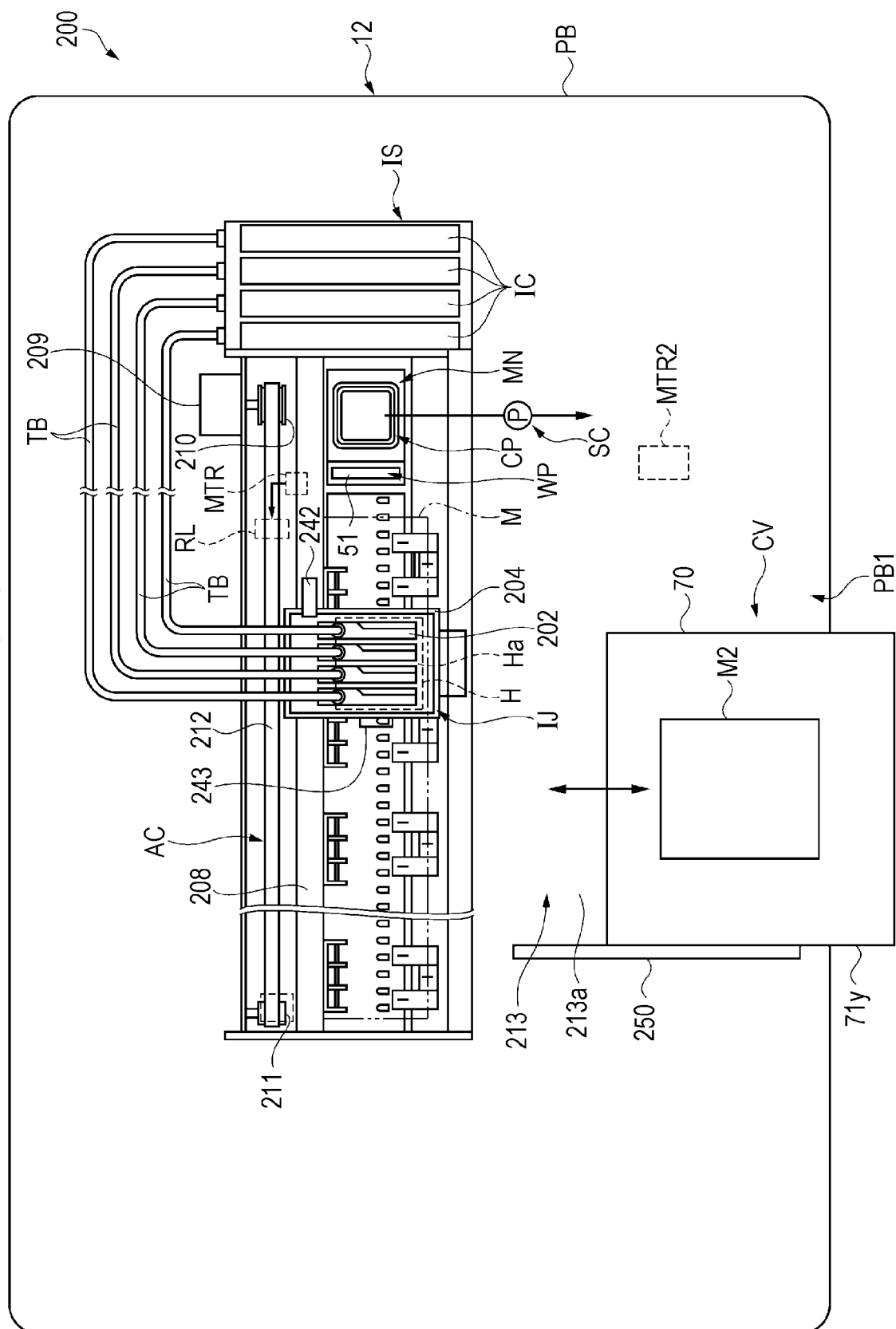


FIG. 6

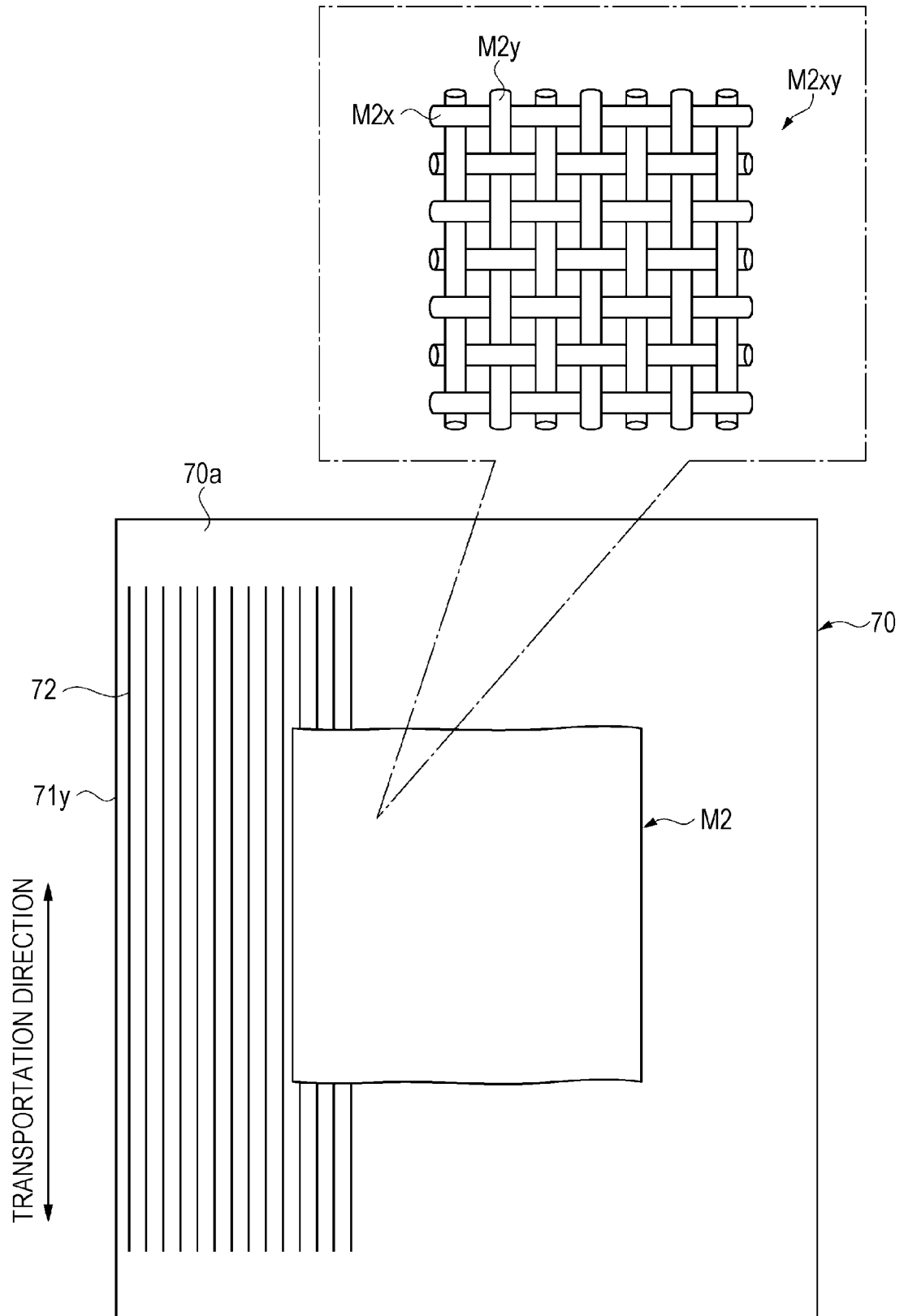


FIG. 7

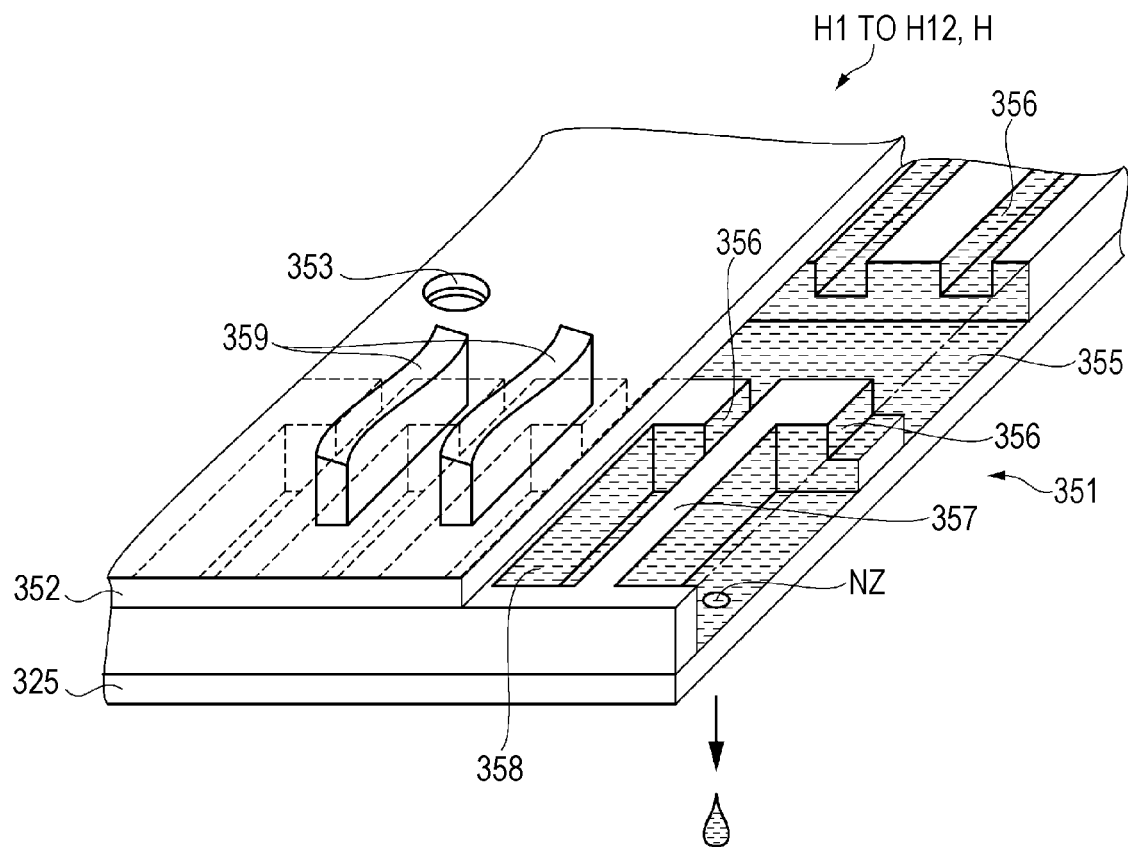
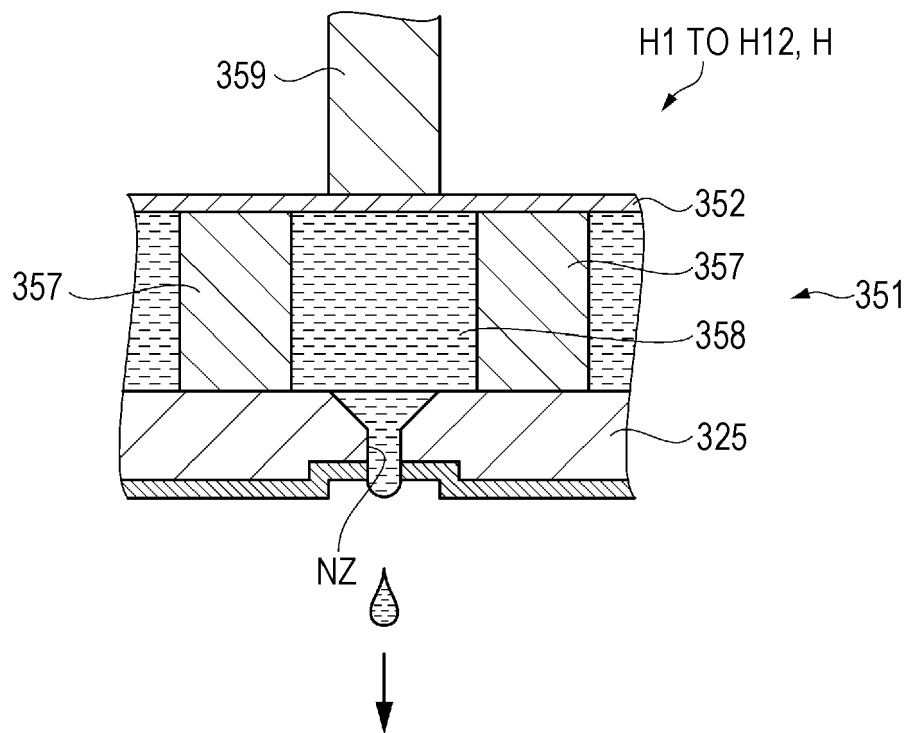


FIG. 8





EUROPEAN SEARCH REPORT

Application Number
EP 14 15 5083

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			B41J
Place of search			Examiner
The Hague			Curt, Denis
Date of completion of the search			
2 June 2014			
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