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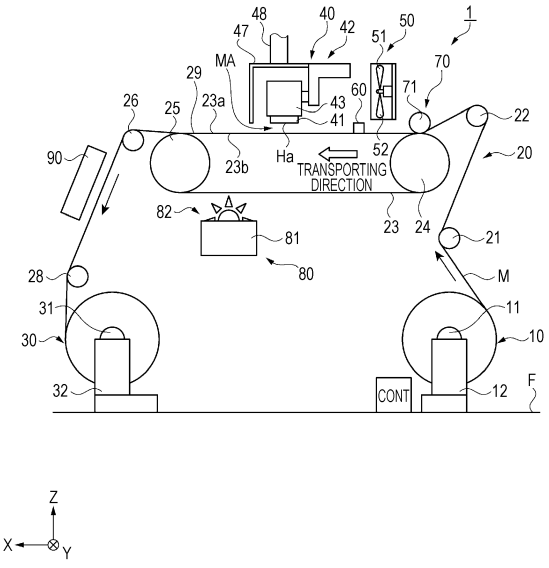
(54) INK JET TEXTILE PRINTING APPARATUS

(57) Provided is an ink jet textile printing apparatus (1) which includes a head (41) which discharges ink in a liquid droplet state through nozzles, a head moving portion (42) which moves the head, a fabric transporting portion (20) which includes a transporting belt (23) for transporting a fabric (M), and a fan (50) which generates an air flow, in which the fan is disposed further on an upstream side in a transporting direction of the fabric than the head and a flow velocity of the air flow generated, by the fan, in a movement area within which the head moves is set to be in a range of 0.3 m/s to 0.5 m/s.

FIG. 1



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Description

BACKGROUND

1. Technical Field

[0001] The present invention relates to an ink jet textile printing apparatus.

2. Related Art

[0002] Traditionally, a screen textile printing apparatus using a printing pattern has been used for performing textile-printing on fabric, such as cotton, silk, wool, chemical fibers, and a mixed fabric. However, in recent years, an ink jet textile printing apparatus performing ink jet type textile-printing has attracted attention in accordance with improvements in ink jet printer technology. A printing pattern which is necessary for the screen textile printing apparatus is not necessary for the ink jet textile printing apparatus, and thus a digitized design can be used in the ink jet textile printing apparatus. Therefore, it is possible to quickly deal with, for example, a minute design change according to a requirement from a customer, and thus the production time can be significantly reduced. Furthermore, there is an advantage in that the degree of freedom in design is great, for example, the ability to express many different color gradations. The ink jet textile printing apparatus described above includes a transporting belt for transporting fabric as a recording medium, and a head for discharging ink onto the fabric transported by the transporting belt (for example, see JP-A-2009-173443).

[0003] Meanwhile, in some cases, when ink is discharged, ink mist is generated in an ink jet type recording apparatus. In this case, when the ink mist adheres to a nozzle plate or a nozzle portion of the head, discharge failure, such as nozzle clogging or ink flight deviation, occurs. Thus, there is a problem in that image quality is deteriorated. Furthermore, fabric is used in an ink jet textile printing apparatus, as a recording medium. A surface of the fabric is fuzzy, and thus a distance (a printing gap) between a recording head and a recording medium is set to be larger, compared to a case using a general printing paper sheet as a recording medium, such that the recording head does not come into contact with the fabric. However, when the printing gap increases, an amount of the generated ink mist tends to increase. As a result, an additional countermeasure against the ink mist is necessary for the ink jet textile printing apparatus.

SUMMARY

[0004] The invention can be realized in the following forms or application examples.

Application Example 1

[0005] According to this application example, there is provided an ink jet textile printing apparatus which includes a head which discharges ink in a liquid droplet state through nozzles, a head moving portion which moves the head, a fabric transporting portion which includes a transporting belt for transporting fabric, and a fan which generates an air flow, in which the fan is disposed further on an upstream side in a transporting direction of the fabric than the head and a flow velocity of the air flow generated, by the fan, in a movement area within which the head moves is set to be in a range of 0.3 m/s to 0.5 m/s.

[0006] In this case, the air flow having the flow velocity in the range of 0.3 m/s to 0.5 m/s is generated in the movement area within which the head moves. In other words, the wind having a predetermined flow velocity (in the range of 0.3 m/s to 0.5 m/s) blows to a space between the transported fabric and the head. This air flow causes the ink mist, which is generated at the time of ink discharging, to be removed in the vicinity of the head. When the blowing speed of air is less than 0.3 m/s, the flow velocity is equal to or slower than the predetermined flow velocity, and thus the ink mist remains in the movement area of the head. The remaining mist adheres to the head and this results in nozzle clogging or ink flight deviation. When the flow velocity is faster than 0.5 m/s, the flow velocity is equal to or faster than the predetermined flow velocity, and thus this influences flight of a liquid droplet discharged through the head. Accordingly, flight of the liquid droplet is deviated and this results in deterioration in ink-droplet landing position accuracy. Therefore, when the flow velocity in the movement area of the head is regulated in the range of 0.3 m/s to 0.5 m/s, the ink mist is removed in the vicinity of the head, without hindering flight of the liquid droplet at the time of liquid droplet discharging. As a result, adhesion of the ink mist to the head is suppressed, and thus it is possible to form a high-quality image. Particularly, a relatively large printing gap is set in the ink jet textile printing apparatus where a fabric is used, and thus the ink mist is likely to adhere to the head. However, since the air flow having the predetermined flow velocity is generated, as described above, the ink mist is reliably removed. As a result, it is possible to form a high-quality image.

Application Example 2

[0007] In the ink jet textile printing apparatus according to the application example, it is preferable that a fabric floating detection unit be disposed in a portion between the head moving portion and the fan to detect floating of the transported fabric with respect to the transporting belt.

[0008] In this case, since the fabric floating detection unit is disposed on the upstream side of the head in the transporting direction of the fabric, it is detected whether

the floating of the fabric occurs, immediately before the ink is discharged onto the fabric. Accordingly, when, for example, the floating of the fabric is detected, the apparatus is stopped before application of the ink is performed on the fabric and floating of the fabric can be corrected. As a result, it is possible to prevent failure in advance.

Application Example 3

[0009] The ink jet textile printing apparatus according to the application example may further include a printing gap adjustment mechanism which adjusts a distance between a front surface of the transporting belt and a discharge surface of the head. In addition, it is preferable that a distance between the transporting belt and the fan be adjusted, in conjunction with the printing gap adjustment mechanism.

[0010] In this case, the distance (the printing gap) between the front surface of the transporting belt and the nozzle surface is adjusted in accordance with the type, the thickness, or the shape of the fabric. In other words, a constant printing gap can be maintained, relative to any type of fabric. Accordingly, the fabric is prevented from coming into contact with the nozzles, and thus discharge failure, transport failure, or the like can be prevented. Furthermore, the distance between the transporting belt and the fan is adjusted in conjunction with a printing gap adjustment. As a result, the air flow having the predetermined flow velocity can be stably generated in the movement area of the head. In addition, the ink mist is removed, and thus it is possible to form a high-quality image.

Application Example 4

[0011] In the ink jet textile printing apparatus according to the application example, it is preferable that the speed (number of revolutions per minute) of the fan be changed in accordance with the position of the head.

[0012] In this case, the number of revolutions per minute of the fan is changed in accordance with an operation position of the head, which is set by the head moving portion. Therefore, the ink mist can be removed in such a manner that the air flow having the predetermined flow velocity is generated, in the movement area of the head, by driving the fan of which the position corresponds to the position of the head. Meanwhile, the fans except for the fan of which the position corresponds to the position of the head can be switched to a non-driving state. As a result, electric power consumption can be reduced.

Application Example 5

[0013] In the ink jet textile printing apparatus according to the application example, it is preferable that the number of revolutions per minute of the fan be changed in accordance with a distance between a front surface of the transporting belt and a nozzle surface or types of the fabric.

[0014] In this case, it can be conceived that the state of the air flow passing through the movement area of the head is changed in accordance with, for example, the distance between the front surface of the transporting belt and the nozzle surface, that is, the printing gap or types of the fabric. Here, since the number of the revolutions per minute of the fan is changed in accordance with the conditions described above, the constant flow velocity of the air flow can be ensured in the movement area of the head.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] 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 is a side view of a configuration of an ink jet textile printing apparatus.
Fig. 2 is a partial plan view illustrating the configuration of the ink jet textile printing apparatus.
Fig. 3 is an evaluation result illustrating flow velocities of air flows in a head movement area and whether discharge failure occurs.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0016] Hereinafter, embodiments of the invention will be described with reference to the accompanying drawings. In the drawings described below, a scale of each component or the like is different from the actual scale, such that the scale of the component or the like is enlarged to the recognizable extent.

[0017] First, the configuration of an ink jet textile printing apparatus will be described. The ink jet textile printing apparatus is an apparatus which performs textile-printing on a fabric in such a manner that an image is formed on the fabric by discharging ink onto the fabric as a recording medium. The ink jet textile printing apparatus includes a head which discharges the ink in a liquid-droplet state through nozzles, a head moving portion which moves the head, a fabric transporting portion which includes a transporting belt for transporting the fabric, and a fan which generates an air flow. The fan is disposed further on an upstream side in a fabric transporting direction than the head. A flow velocity of the air flow generated by the fan in a movement area within which the head moves is set in a range of 0.3 m/s to 0.5 m/s. Hereinafter, description will be described in detail. Examples of the fabric used in the ink jet textile printing apparatus of this embodiment include cotton, silk, wool, chemical fibers, and mixed fabrics. In this embodiment, a configuration in which an image is formed on a rolled fabric M having a strap shape is exemplified. However, without being limited thereto, an image may be formed on the fabric M having another

shape (for example, a single sheet shape).

[0018] Fig. 1 is a side view illustrating a configuration of the ink jet textile printing apparatus and Fig. 2 is a partial plan view illustrating the configuration of the ink jet textile printing apparatus. An ink jet textile printing apparatus 1 includes a fabric supply portion 10, a fabric transporting portion 20, a fabric recovery portion 30, a head unit 40, a fan unit 50, a fabric floating detection unit 60, a floating prevention portion 70, a cleaning unit 80, and the like, as illustrated in Fig. 1. In addition, a controller CONT is provided to control the members described above.

[0019] The fabric supply portion 10 supplies, to the head unit 40 side, the fabric M which has not yet been subjected to image forming. The fabric supply portion 10 has a supply shaft portion 11 and bearing portions 12.

[0020] The supply shaft portion 11 is formed in a cylindrical shape or a column shape. The supply shaft portion 11 can rotate in a circumferential direction. The fabric M having a strap shape is wound around the supply shaft portion 11 in a rolled shape. The supply shaft portion 11 is attachably/detachably mounted on the bearing portions 12. Therefore, the supply shaft portion 11 around which, for example, the fabric M is wound in advance can be installed in the bearing portions 12.

[0021] The bearing portions 12 rotatably support both ends of the supply shaft portion 11 in an axial direction. The bearing portions 12 have a rotational driving portion (not illustrated) for rotationally driving the supply shaft portion 11. The rotational driving portion rotates the supply shaft portion 11 in a direction in which the fabric M is fed. An operation of the rotational driving portion is controlled by, for example, the controller CONT.

[0022] The fabric transporting portion 20 transports the fabric M from the fabric supply portion 10 to the fabric recovery portion 30. The fabric transporting portion 20 includes a transport roller 21, a transport roller 22, a transporting belt 23, a belt rotating roller 24, a belt driving roller (a driving roller) 25, a transport roller 26, and a transport roller 28.

[0023] The transport rollers 21 and 22 relay the fabric M from the fabric supply portion 10 to the transporting belt 23. The transporting belt 23 transports the fabric M. The transporting belt 23 is formed in an endless shape and wound around the belt rotating roller 24 and the belt driving roller 25. The transporting belt 23 is held in a state where predetermined tension is applied to the transporting belt 23 such that a portion between the belt rotating roller 24 and the belt driving roller 25 is set to be parallel to a floor surface F. An adhesive layer 29 is provided on a front surface 23a (a support surface 23a) of the transporting belt 23, such that the fabric M adheres to the adhesive layer 29. In the transporting belt 23, the fabric M is supported (held) on the support surface 23a on which the adhesive layer 29 is provided.

[0024] The belt rotating roller 24 and the belt driving roller 25 support an inner circumferential surface 23b of the transporting belt 23. A support portion for supporting the transporting belt 23 may be provided in a portion between the belt rotating roller 24 and the belt driving roller 25.

[0025] The transporting belt 23 is moved in accordance with the rotation of the belt driving roller 25 and the movement of the transporting belt 23 causes the belt rotating roller 24 to rotate. The fabric M supported on the transporting belt 23 is transported in a predetermined transporting direction, in accordance with the movement of the transporting belt 23. In this embodiment, a direction directed from the belt rotating roller 24 to the belt driving roller 25 is set to the transporting direction. Accordingly, when the arrangement position of the belt rotating roller 24 is compared to that of the belt driving roller 25, for example, the belt rotating roller 24 is arranged further on the upstream side in the transporting direction than the belt driving roller 25. That is, the belt driving roller 25 is arranged further on a downstream side in the transporting direction than the belt rotating roller 24.

[0026] The transport rollers 26 and 28 relay the fabric M from the transporting belt 23 to the fabric recovery portion 30. In this embodiment, a drying unit 90 is provided in a portion between the transport roller 26 and the transport roller 28. The drying unit 90 dries an image formed on fabric. The drying unit 90 includes, for example, a heater. The drying unit 90 drives the heater to dry the image formed on the fabric.

[0027] The fabric recovery portion 30 recovers the fabric M transported by the fabric transporting portion 20. The fabric recovery portion 30 has a winding shaft portion 31 and bearing portions 32.

[0028] The winding shaft portion 31 is formed in a cylindrical shape or a column shape. The winding shaft portion 31 can rotate in a circumferential direction. The fabric M having a strap shape is wound around the winding shaft portion 31 in a rolled shape. The winding shaft portion 31 is attachably/detachably mounted on the bearing portions 32. Therefore, the fabric M can be removed with the winding shaft portion 31, in such a manner that the winding shaft portion 31 is removed from the bearing portions 32 in a state where the fabric M is wound around the winding shaft portion 31.

[0029] The bearing portions 32 rotatably support both ends of the winding shaft portion 31 in the axial direction. The bearing portions 32 have a rotational driving portion (not illustrated) for rotationally driving the winding shaft portion 31. The rotational driving portion rotates the winding shaft portion 31 in a direction in which the fabric M is wound. An operation of the rotational driving portion is controlled by, for example, the controller CONT.

[0030] The floating prevention portion 70 presses the fabric M to the transporting belt 23. The floating prevention portion 70 is disposed further on the upstream side in the transporting direction than the head unit 40. The floating prevention portion 70 includes a pressing roller 71. The pressing roller 71 is formed in a cylindrical shape or a column shape and can rotate about an axis. The pressing roller 71 is arranged in a state where an axial

direction of the pressing roller 71 intersects with the transporting direction. The fabric M is pressed to the transporting belt 23 by pressing the pressing roller 71 against the transported fabric M. Therefore, the fabric M can reliably adhere to the adhesive layer 29 provided on the support surface 23a of the transporting belt 23, and thus it is possible to prevent the fabric M from floating on the transporting belt 23.

[0031] The cleaning unit 80 is disposed below the transporting belt 23 and performs a maintenance operation, such as cleaning of the transporting belt 23. The cleaning unit 80 includes, for example, a cleaning container 81 in which cleaning solution is stored, and a removing portion 82 which removes foreign matter, such as ink, dust, and yarn waste, adhering to the transporting belt 23. The removing portion 82 has a shaft portion and a removing member, such as a brush, which is provided around the shaft portion. In the removing portion 82, a motor is connected to the shaft portion and the shaft portion is rotationally driven by driving the motor. The removing member is rotatably driven in accordance with the rotational driving of the shaft portion. The shaft portion is disposed along a direction intersecting with the movement direction (the transporting direction of the fabric M) of the transporting belt 23. The shaft portion extends in the direction intersecting with the movement direction of the transporting belt 23.

[0032] The head unit 40 has, for example, a head 41 of an ink jet type in which the ink in a liquid-droplet state is discharged onto the fabric M and a head moving portion 42 which moves the head 41. The head unit 40 is disposed above the arrangement position of the transporting belt 23. A nozzle plate is provided on the head 41 and a plurality of nozzles through which the ink is discharged are formed on the nozzle plate. In this case, a nozzle plate surface is set to a discharge surface Ha through which the ink is discharged. The discharge surface Ha is directed to the fabric M transported by the transporting belt 23.

[0033] The head moving portion 42 causes the head 41 to move in the direction (a Y axis direction (a width direction of the fabric M), in this embodiment) intersecting with the transporting direction of the fabric M. The head moving portion 42 includes a carriage 43 on which the head 41 is mounted and a movement mechanism which moves the carriage 43 in the Y axis direction. The carriage 43 is supported on a guide rail extending in the Y axis direction and is reciprocatable in the Y axis direction by the movement mechanism. Examples of the movement mechanism include a mechanism in which a ball screw and a ball nut are used in combination, and a linear guide mechanism. In the movement mechanism, a motor is provided as a driving source for moving the carriage 43 in the Y axis direction. Examples of the motor include various types of a motor, such as a stepper motor, a servo motor, and a linear motor. Power from the motor is transmitted to the carriage 43 through the movement mechanism described above. Therefore, the carriage 43 reciprocates along the guide rail, that is, in the Y axis direction, as illustrated in Fig. 2. The carriage 43 reciprocatably moves, and thus the head 41 can reciprocatably move in the Y axis direction.

[0034] In this embodiment, a cover 47 for covering the carriage 43 is provided in the head unit 40, as illustrated in Fig. 1. Since the cover 47 is installed, foreign matter, such as dust, can be prevented from adhering to the head 41 and the carriage 43. In addition, it is possible to ensure the safety of a user. A through-hole is formed in a part of the cover 47, which faces the carriage 43 from above, and an exhaust tube 48 is connected to the through-hole. A suction mechanism is connected to the exhaust tube 48 to perform air-suction. The air in a portion of the carriage 43, which is covered by the cover 47, is exhausted to the outside through the exhaust tube 48. In this embodiment, an exhaust mechanism including the exhaust tube 48 is provided. However, this mechanism need not be provided.

[0035] A fan unit 50 is provided further on the upstream side in the transporting direction of the fabric M than the head 41. The fan unit 50 includes a fan (an air blower) 51. The fan 51 has a vane wheel 52 and generates an air flow in such a manner that the vane wheel 52 rotates. The fan 51 is controlled such that the air flow of the flow velocity in a range of 0.3 m/s to 0.5 m/s flows from the upstream side to the downstream side in the transporting direction of the fabric M, in a movement area MA within which the head 41 moves. Therefore, when the ink is discharged through the head 41, the generated ink mist is removed from the vicinity of the head to the downstream side, by the air flow. The ink mist removed to the downstream side is discharged to the outside through a flow path constituted by the cover 47 and the exhaust tube 48. As a result, the ink mist is prevented from adhering to the fabric M on which an image is formed by the head 41.

[0036] In this embodiment, a plurality (five, for example) of fans 51 are provided and these fans 51 are aligned in the movement direction of the head 41, as illustrated in Fig. 2. The fans 51 are arranged in a state where an area in which the fans 51 are arranged is larger than the maximum range of the movement area MA within which the head 41 moves. The head 41 and the fans 51 are arranged so as to be spaced apart from each other at a predetermined distance in the transporting direction of the fabric M. Accordingly, the air flow generated by the fans 51 can flow over the entirety of the movement area MA of the head, at a substantially constant flow velocity. Driving of each fan 51 is controlled. Thus, individual differences are reduced and the air flow can be effectively generated, relative to the movement of the head 41.

[0037] Fig. 3 is an evaluation result illustrating flow velocities of air flows in a head movement area and whether discharge failure occurs. Specifically, Fig. 3 shows whether discharge failure occurs and an image quality evaluation result, under a condition described below. The ink is discharged while moving the head 41 in the move-

ment area MA and the number of revolutions of the fan 51 is controlled. In addition, the flow velocity of the air flow is changed (including an OFF state) in the movement area MA. In the evaluation result, "O" indicates that discharge failure is not detected or no problem is detected in image quality and "x" indicates that discharge failure occurs or a problem is detected in image quality, that is, image-quality failure is detected.

[0038] Other conditions in the evaluation are as follows. A printing gap is in the worst condition in which the printing gap is large (2.7 mm). In addition, a printing mode is set at 720X720 dpi and to a 4 pass mode. A printing width is 1100 mm. Driving voltages of the head are set to three different levels (a proper voltage, a proper voltage +2 V, and a proper voltage -2 V). In this case, the weight of a discharged liquid droplet is 5.9 ng to 8.2 ng for each shot and the velocity of the discharged liquid droplet is 5.0 to 7.7 m/s. The print speed is 27 m^2/h and the print length 50 m. When the flow velocity of the air flow is in the range of 0.3 m/s to 0.5 m/s, favorable results are obtained without detecting discharge failure and image-quality failure, as illustrated in Fig. 3. However, when the flow velocity of the air flow is in the range of 0 m/s to 0.2 m/s, discharge failure (nozzle clogging or ink flight deviation) is detected. The reason for this is that the flow velocity of the air flow is slow, and thus the ink mist remains in the movement area MA of the head 41 and the remaining mist adheres to the head. When the flow velocity is 0 m/s, the fan 51 is not driven. In addition, when the flow velocity of the air flow is in the range of 0.6 m/s to 0.7 m/s, discharge failure (ink flight deviation) or image-quality failure is detected. The reason for this is that the flow velocity of the air flow is fast, and thus this influences on the flight of the liquid droplet discharged through the head 41.

[0039] Next, a relationship between the head unit 40 and the fan unit 50 will be described. A printing gap adjustment mechanism is provided in the head unit 40 of this embodiment. The printing gap adjustment mechanism adjusts a distance (a printing gap) between the front surface 23a of the transporting belt 23 and the discharge surface Ha of the head 41. The printing gap adjustment mechanism adjusts, for example, a vertical position of the head 41 in a Z axis direction, in accordance with the thickness of the fabric M. An adjustment operation can be performed by, for example, a mechanism in which a ball screw and a ball nut are used in combination. Accordingly, even when the thickness of the fabric M is changed, a predetermined printing gap is maintained, and thus discharge properties can be ensured. A distance between the transporting belt 23 and the fan 51 (the fan unit 50) is adjusted, in conjunction with the printing gap adjustment mechanism. The adjustment operation can be performed by the mechanism in which a ball screw and a ball nut are used in combination. Alternatively, the adjustment operation can also be performed by a mechanism in which the head unit 40 and the fan unit 50 are fixed to the same support body and the head unit 40 and the fan unit 50 move at the same time. As a result, the air flow having a predetermined flow velocity can be generated in the movement area MA of the head 41.

[0040] Next, a driving control method of the fan 51 will be described. In this embodiment, the number of revolutions of the fan 51 is subjected to a variable control, in accordance with the position of the head 41. Specifically, only the fan 51 of which the position corresponds to the position of the head 41 in an X axis direction is driven and other fans 51 are not driven. Therefore, the ink mist can be removed in such a manner that the air flow having the predetermined flow velocity is generated in the movement area MA of the head 41. Meanwhile, the fans 51 of which the position corresponds to the position outside the position of the head 41 in the X axis direction are not driven. As a result, electric power consumption can be reduced.

[0041] The fabric floating detection unit 60 detects floating of the transported fabric M in the transporting belt 23, that is, floating of the transported fabric M with respect to the transporting belt 23. In this embodiment, the fabric floating detection unit 60 is disposed, in the transporting direction of the fabric M, in a portion between the head 41 and the fan 51 (the fan unit 50). In the fabric floating detection unit 60, a light emitting portion 60a and a light receiving portion 60b are disposed, facing each other, in end portions (in the width direction of the fabric M) of the transporting belt 23 in a Y axis direction. A light beam emitted from the light emitting portion 60a is received by the light receiving portion 60b. When, for example, there is no floating of the fabric M, the light beam emitted from the light emitting portion 60a is received by the light receiving portion 60b. On the contrary, when there is floating of the fabric M, the light beam emitted from the light emitting portion 60a is blocked before being received by the light receiving portion 60b. In this manner, it is detected whether there is floating of the fabric M. In addition, when floating of the fabric M occurs, driving of the ink jet textile printing apparatus 1 is stopped based on, for example, a detection result of the fabric floating detection unit 60. Subsequently, an operator or the like corrects floating of the fabric M, and then the ink jet textile printing apparatus 1 is operated again. As a result, image forming failure can be prevented in advance.

[0042] According to the embodiment described above, the following effects can be obtained.

[0043] In the movement area MA within which the head 41 moves, the air flow having the flow velocity in the range of 0.3 m/s to 0.5 m/s is generated by the driven fan 51. In other words, the wind having the predetermined flow velocity blows to a space between the transported fabric M and the head 41. Since the air flow is generated, the ink mist generated at the time of ink discharging is removed from the vicinity of the head 41. Accordingly, adhesion of the ink mist to the head 41 is reduced, and thus it is possible to form a high-quality image. Particularly, in the ink jet textile printing apparatus 1 using the fabric M,

the printing gap is set to be relatively large, and thus the ink mist is likely to adhere to the head. However, since the air flow having the predetermined flow velocity is generated, the ink mist is reliably removed. As a result, it is possible to form a high-quality image.

[0044] The invention is not limited to the embodiment described above and various changes, modifications or the like can be applied to the embodiment described above. Modification examples will be described below.

Modification Example 1

[0045] In the embodiment described above, the printing gap adjustment mechanism for adjusting the printing gap is provided, and thus the distance between the transporting belt 23 and the fan 51 (the fan unit 50) is adjusted, in conjunction with the printing gap adjustment mechanism. However, the configuration is not limited thereto. The number of revolutions of the fan 51 may be subjected to a variable control, in accordance with the distance (the printing gap) between the front surface 23a of the transporting belt 23 and the discharge surface Ha. When, for example, the printing gap is set to be large by the printing gap adjustment mechanism, the movement area MA (a space) of the head 41 in this state becomes extended, and thus it can be conceived that the state of the air flow is changed in the movement area MA. Here, since the number of revolutions of a fan is changed in accordance with the conditions described above, the flow velocity of the air flow can be controlled in the movement area MA of the head 41 so as to be within a predetermined range. Alternatively, the number of revolutions of the fan 51 may be subjected to a variable control, in accordance with types of the fabric M. Even in this case, it can be conceived that the state of the air flow is changed in the movement area MA (the space), every time the fabric M is changed. Here, since the number of revolutions of a fan is changed in accordance with the conditions described above, the flow velocity of the air flow is controlled in the movement area MA of the head 41, so as to be within the predetermined range. As a result, discharge properties can be ensured.

Modification Example 2

[0046] In the embodiment described above, the number of revolutions of the fan 51 of the plurality of the fans 51, of which the position corresponds to the position of the head 41, is changed. However, the configuration is not limited thereto. The fan 51 may be disposed in, for example, the carriage 43 on which the head 41 is mounted. In this case, when the head 41 moves, the fan 51 also moves. Therefore, the air flow can be reliably generated in the position of the head 41. In addition, a control method of the fan unit 50 can be simplified.

Modification Example 3

[0047] In the embodiment described above, the air flow in a +X axis direction is generated, in the movement area MA of the head 41, by driving the fan 51. However, the configuration is not limited thereto. Air in the movement area MA of the head 41 may be, for example, sucked by driving the fan 51. Even in this case, the air flow is generated in the movement area MA, and thus the ink mist is removed. As a result, it is possible to improve discharge properties. Modification Example 4

[0048] In the embodiment described above, the distance between the transporting belt 23 and the fan 51 (the fan unit 50) is adjusted. However, the configuration is not limited thereto. For example, an angle of the fan 51 (the fan unit 50) to the transporting belt 23 may be changed. In this case, a flowing direction of the air flow flowing from the fan 51 or the flow velocity of the air flow in the movement area MA is also changed in accordance with an installation angle of the fan 51. As a result, the air flow having the predetermined flow velocity can be generated in the movement area MA, in accordance with the printing gap or the shape of the fabric M.

Claims

1. An ink jet textile printing apparatus (1) comprising:

a head (41) adapted to discharge ink in a liquid droplet state through nozzles;
a head moving portion (42) adapted to move the head;
a fabric transporting portion (20) which includes a transporting belt (23) for transporting a fabric (M); and **characterized by**
a fan (50) adapted to generate an air flow,
wherein the apparatus (1) is adapted to adjust the number of revolutions per minute of the fan (50) in accordance with at least one of the position of the head (41) and a type of the fabric (M).

2. The ink jet textile printing apparatus according to Claim 1,
wherein a fabric floating detection unit (60) is disposed in a portion between the head moving portion and the fan to detect floating of the transported fabric with respect to the transporting belt.

3. The ink jet textile printing apparatus according to Claim 1 or Claim 2, further comprising:

a printing gap adjustment mechanism adapted to adjust a distance between a front surface (23a) of the transporting belt (23) and a discharge surface (Ha) of the head,
wherein a distance between the transporting belt and the fan is adjustable, in conjunction with

the printing gap adjustment mechanism.

4. The ink jet textile printing apparatus according to any one of the preceding claims adapted to adjust the number of revolutions per minute of the fan also in accordance with a distance between a front surface (23a) of the transporting belt (23) and a discharge surface (Ha) of the head.

5. The ink jet textile printing apparatus according to any one of the preceding claims, wherein the fan is disposed further on an upstream side in a transporting direction (X) of the fabric than the head.

6. The ink jet textile printing apparatus according to any one of the preceding claims, wherein a flow velocity of the air flow generated, by the fan, in a movement area within which the head moves is set to be in a range of 0.3 m/s to 0.5 m/s.

FIG. 1

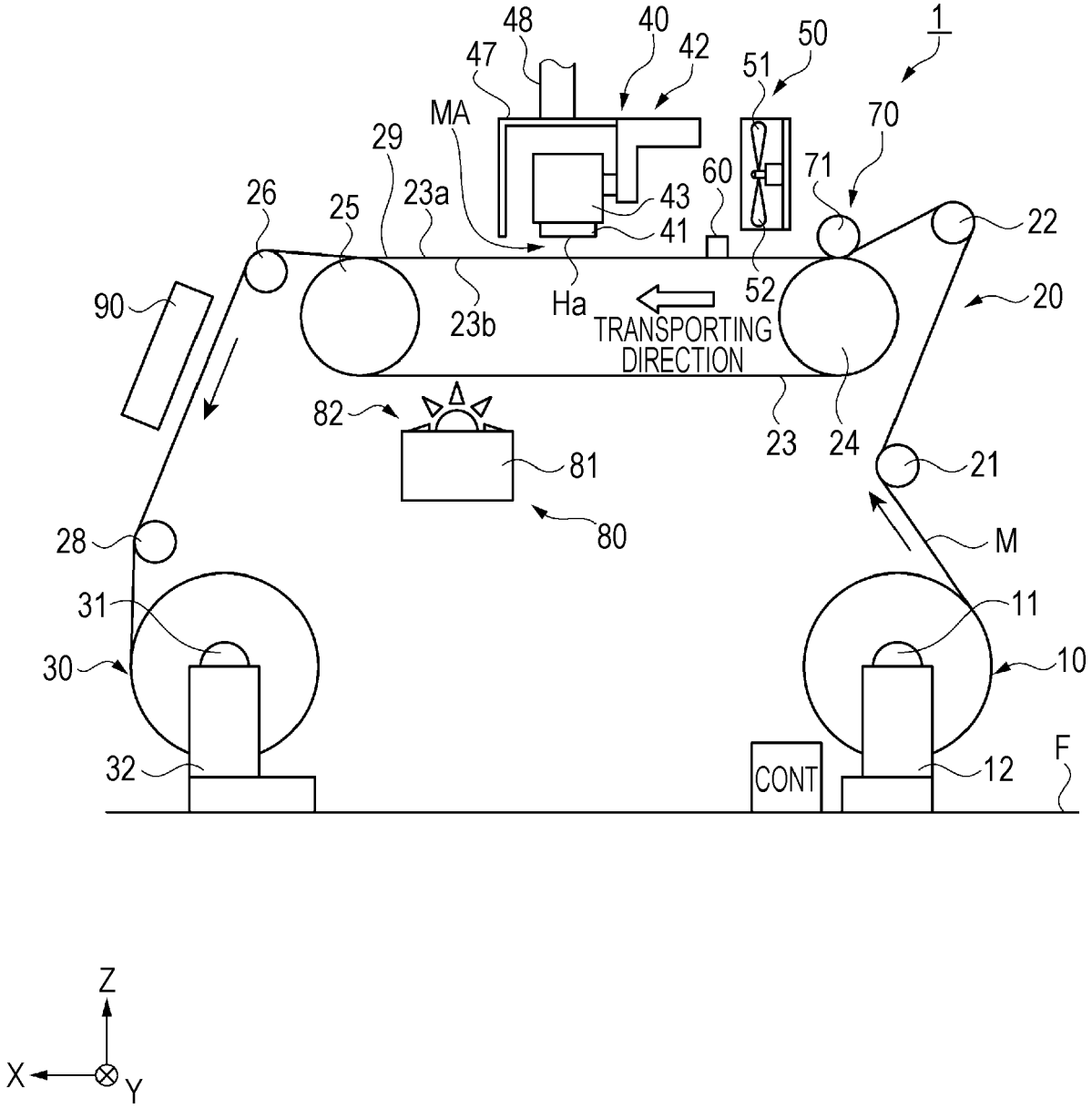
48
40
42
50
1
47
51
MA
70
29
60
71
26
25
23a
43
22
41
90
23b
Ha
52
20
TRANSPORTING DIRECTION
82
23
24
81
21
28
80
M
31
11
30
10
32
CONT
12
F
Z
X
Y

FIG. 2

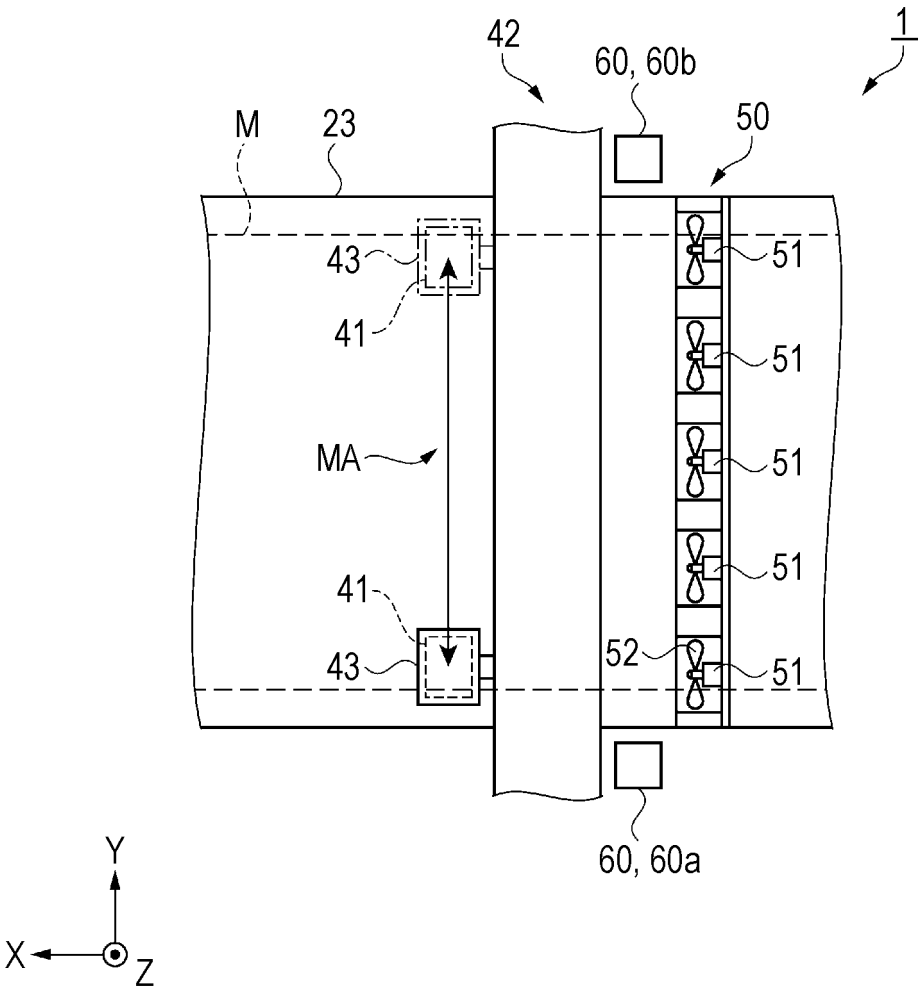

FIG. 3

FLOW VELOCITY [m/s]	EVALUATION RESULT
0	×
0.1	×
0.2	×
0.3	○
0.4	○
0.5	○
0.6	×
0.7	×

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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