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(71) Applicant: **Konica Minolta, Inc.**
Tokyo 100-7015 (JP)

(72) Inventor: **Kimoto, Hiroya**
Tokyo, Tokyo 100-7015 (JP)

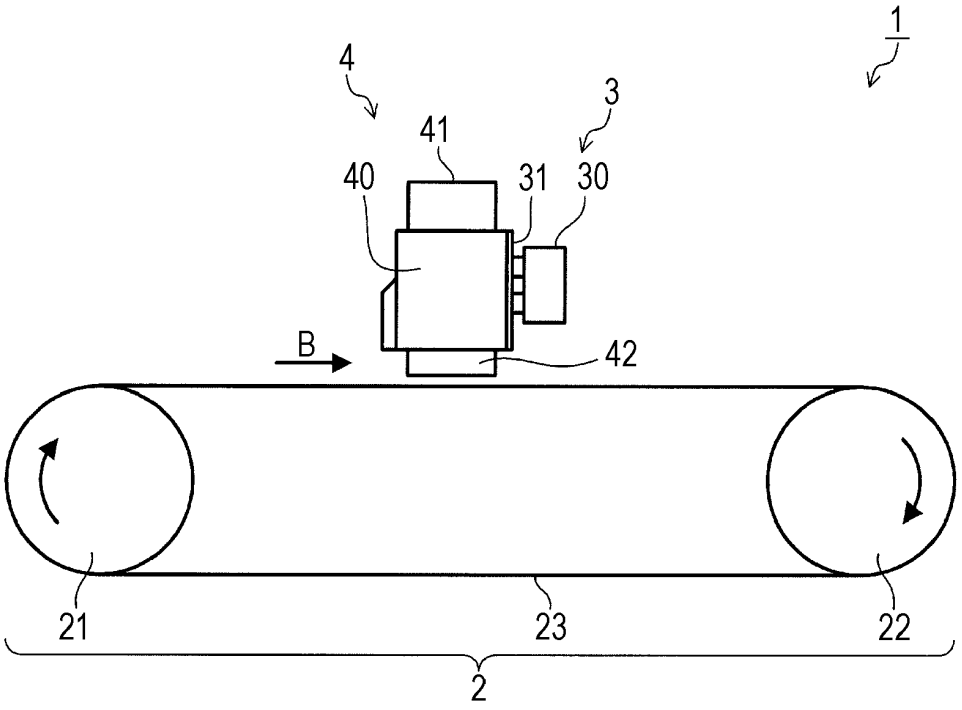
(74) Representative: **Alton, Andrew**
Urquhart-Dykes & Lord LLP
Arena Point
Merrion Way
Leeds LS2 8PA (GB)

(54) ADHESIVE APPLICATOR AND INKJET IMAGE FORMING APPARATUS

(57) To provide an adhesive applicator (4) and an inkjet image forming apparatus (1) enabled to apply an adhesive (AD) with a constant thickness to a conveying belt (23).

An adhesive applicator (4) includes: a conveying belt (23) that conveys a recording medium (P) on which an image is to be printed; an adhesive supply unit (40) that supplies an adhesive (AD) to the conveying belt (23); a blade (42) that levels on the conveying belt (23) the adhesive (AD) supplied; and a moving unit that moves the adhesive supply unit (40) and the blade (42) in a direction intersecting with a conveying direction of the conveying belt (23).

FIG. 2



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Description

Background

Technological Field

[0001] The present invention relates to an adhesive applicator and an inkjet image forming apparatus.

Description of the Related art

[0002] In recent years, an inkjet image forming apparatus has been widely used as an apparatus for recording high-definition images on various recording media such as paper and fabric. In particular, in a case where the recording medium has a long web-like form, a belt conveying device including an endless conveying belt is used, and the recording medium is conveyed in close contact with the conveying belt (for example, see JP 2012-116092 A).

[0003] In an inkjet image forming apparatus that uses fabric as a recording medium (also referred to as a "fabric printing apparatus"), it is important to convey the fabric without causing wrinkles, and perform recording on the fabric maintained to have no wrinkles. For this reason, an adhesive called "fixation" is uniformly applied on the surface of the conveying belt that conveys the fabric, and the fabric is caused to adhere to the surface of the conveying belt, whereby the surface of the fabric is maintained to have no wrinkles during conveying and image formation.

[0004] Such an adhesive is a liquid having a paste-like viscosity, and is applied to the surface of the conveying belt to form a film, thereby functioning as functions as a bonding agent that causes the fabric to adhere to the surface of the conveying belt. The fabric is stretched and brought into close contact with the surface of the conveying belt to which the adhesive is applied in a film-like form, whereby the fabric can be conveyed while being maintained to have no wrinkles.

[0005] Regarding the application of the adhesive, in the technology described in JP 2012-116092 A, to freely and easily adjust the thickness of the adhesive applied to the conveying belt, a configuration is adopted in which an application blade is arranged in the width direction of the conveying belt, and the height can be adjusted of the application blade with respect to an application target surface of the conveying belt.

[0006] However, in the configuration described in JP 2012-116092 A, in the process of supplying the adhesive to the conveying belt, there are many aspects that depend on manual work by an operator, and there has been a problem that it is difficult to supply the adhesive accurately with a constant thickness in the width direction of the conveying belt.

Summary

[0007] An object of the present invention is to provide an adhesive applicator and an inkjet image forming apparatus enabled to apply the adhesive with a constant thickness to the conveying belt.

[0008] To achieve the abovementioned object, according to an aspect of the present invention, an adhesive applicator reflecting one aspect of the present invention comprises a conveying belt that conveys a recording medium on which an image is to be printed, an adhesive supply unit that supplies an adhesive to the conveying belt, a blade that levels on the conveying belt the adhesive supplied, and a moving unit that moves the adhesive supply unit and the blade in a direction intersecting with a conveying direction of the conveying belt.

Brief Description of the Drawings

[0009] The advantages and features provided by one or more embodiments of the invention will become more fully understood from the detailed description given hereinbelow and the appended drawings which are given by way of illustration only, and thus are not intended as a definition of the limits of the present invention:

Figs. 1A and 1B are side views illustrating a schematic configuration of a conventional inkjet image forming apparatus and a conventional example of a method of applying an adhesive;

Fig. 2 is a side view illustrating a schematic configuration of an inkjet image forming apparatus in a present embodiment;

Figs. 3A and 3B are a rear view and a side view illustrating a configuration example of an adhesive applicator in the present embodiment;

Fig. 4 is a diagram illustrating a specific example of a mounting structure of a blade in the present embodiment;

Fig. 5 is a bottom view illustrating a modification of the blade in the present embodiment;

Fig. 6 is a diagram illustrating a preferred configuration example in a case where the adhesive is peeled off from a conveying belt; and

Fig. 7 is a rear view illustrating a configuration example of the adhesive applicator in a case where an inkjet head is of a single-pass system.

Detailed Description of Embodiments

[0010] Hereinafter, one or more embodiments of the present invention will be described with reference to the drawings. However, the scope of the invention is not limited to the disclosed embodiments.

[0011] An inkjet image forming apparatus according to the present embodiment will be described in detail with reference to the drawings. First, with reference to Figs. 1A and 1B, description will be made of a schematic con-

figuration of a conventional inkjet image forming apparatus that is a premise of the present embodiment and a conventional example of a method of applying an adhesive.

[0012] Fig. 1A is a schematic configuration diagram illustrating an example of a conventional inkjet image forming apparatus 100 that is the premise of the present embodiment. The inkjet image forming apparatus 100 includes a belt conveying device 2, an image forming unit 3, and the like.

[0013] In the belt conveying device 2, a conveying belt 23 being endless and having a predetermined width is stretched across a plurality of (two in the illustrated example) rollers 21 and 22 arranged in parallel at a predetermined interval. The upper surface of the conveying belt 23 stretched between the rollers 21 and 22 is a placement surface on which a recording medium P is placed in close contact. The roller 21 is a drive roller driven by a sub-scanning motor (not illustrated), and the roller 22 is a driven roller.

[0014] In the belt conveying device 2, the drive roller 21 is rotated by rotational driving of the sub-scanning motor at a predetermined speed in the counterclockwise direction in Fig. 1A (see arrows), whereby the conveying belt 23 stretched between the drive roller 21 and the driven roller 22 is rotationally moved. With such operation, the recording medium P placed on the upper surface of the conveying belt 23 is conveyed in an arrow A direction in Fig. 1A, which is a sub-scanning direction.

[0015] For the recording medium P, for example, a recording medium can be used usually used for inkjet recording, such as paper, fabric, plastic film, glass plate, or the like. The recording medium P may be in the form of a sheet cut into a predetermined size, or may be in the form of a long sheet continuously fed out from an original roll wound in a roll shape.

[0016] In the present embodiment, it is assumed that a long web-like fabric is used as the recording medium P. For this reason, it is necessary to apply an adhesive called fixation (hereinafter simply referred to as "adhesive") to the surface of the conveying belt 23 to bring the conveyed fabric into close contact with the upper surface of the conveying belt 23. An example of the conventional method of applying the adhesive will be described later with reference to Fig. 1B.

[0017] In a case where the long web-like fabric is used as the recording medium P, a pressing roller 24 is arranged at a position facing the driven roller 22 as illustrated in Fig. 1A. On the upstream side of the conveying belt 23 in the conveying direction of the recording medium P, a fabric-dedicated feeding device including a feeding roller 25 is arranged. Since these structures are well-known, detailed description is omitted.

[0018] The image forming unit 3 includes a guide member 30 and a carriage 31 in which an inkjet head 35 is accommodated and that is movable along the guide member 30. The guide member 30 is a long member extending in the width direction of the conveying belt 23 (a horizontal direction orthogonal to a moving direction, that is, a page vertical direction in Fig. 1A), and is arranged to have a predetermined interval above the conveying belt 23. The carriage 31 is attached to two rails 301 and 301 provided on a facing side surface of the guide member 30, and driving force of a drive source such as a motor (not illustrated) in the carriage 31 is transmitted, whereby the carriage 31 is moved along the length direction of the guide member 30.

[0019] The inkjet head 35 is accommodated (mounted) in the carriage 31, and an ink discharge surface (nozzle surface) 31a of the inkjet head 35 coincides with the lower surface of the carriage 31. The lower surface of the carriage 31 is adjusted so that a predetermined gap is formed above the surface on which the recording medium P is placed on the conveying belt 23. In the image forming unit 3, ink droplets are discharged from a number of nozzles provided on the lower surface of the carriage 31, whereby a desired image is formed on the recording medium P conveyed by the rotational movement of the conveying belt 23.

[0020] The carriage 31 and the inkjet head 35 illustrated in Fig. 1A are of a scanning system that discharges ink while moving in a direction orthogonal to the conveying direction of the recording medium P, and the inkjet head 35 is a shuttle type head that reciprocates in a main scanning direction orthogonal to the conveying direction of the medium P intermittently conveyed.

[0021] In such a configuration, driving of the sub-scanning motor and the drive roller 21 is controlled so that the conveying belt 23 performs intermittent operation that repeats a standby state and a driving state during image formation. The conveying pitch in such intermittent operation can be arbitrarily set with the head length of the inkjet head 35 (the length of the N, first to Nth, ink discharge nozzles (not illustrated) arranged in the conveying direction) as the maximum value.

[0022] A belt cleaning device that cleans the conveying belt 23, and the like are arranged on the lower surface side of the conveying belt 23, and since such a device, and the like have known configurations, illustration and description thereof are omitted.

[0023] In the conventional inkjet image forming apparatus 100 as described above, operation of supplying or applying the adhesive described above to the conveying belt 23 has been mainly performed by manual work of an operator. Hereinafter, with reference to Fig. 1B, an example will be described of the operation of applying the adhesive to the conveying belt 23 in the conventional inkjet image forming apparatus 100.

[0024] In the conventional example illustrated in Fig. 1B, in a state where an application blade 500 having a length greater than or equal to the width of the conveying belt 23 is fixedly arranged in the width direction of the conveying belt 23, an adhesive AD is supplied (poured) from a container 501 toward the conveying belt 23, whereby the adhesive AD has been applied onto the conveying belt 23. At this time, the conveying belt 23 is driven

to rotate in the clockwise direction opposite to the rotation direction during printing (see an arrow B in Fig. 1B). The thickness of the adhesive AD applied onto the conveying belt 23 can be finely adjusted by changing the height (gap) of the application blade 500 with respect to the conveying belt 23.

[0025] In the conventional example, it has been necessary for the operator to adjust by manual work the gap on the tip (the lower end in Fig. 1B) side of the application blade 500 with respect to the conveying belt 23, and manually move the container 501 in the width direction so that the adhesive AD flowing out from the container 501 is supplied almost evenly in the width direction of the conveying belt 23.

[0026] However, in such a method, there has been a problem that it is not easy to uniformly supply the adhesive AD in the width direction of the conveying belt 23, and that the operation requires skill. In addition, depending on the manufacturing accuracy and durability of the application blade 500, the tip side of the application blade 500 is not perfectly straight and has unevenness, and there has been a problem that partial application irregularity is caused in the width direction of the conveying belt 23.

[0027] In view of the above-described problems, in an inkjet image forming apparatus in the present embodiment, an adhesive applicator is provided that applies the adhesive AD in a direction intersecting with the conveying direction of the recording medium P on the conveying belt 23 (the arrow A direction in Fig. 1A). Hereinafter, with reference to Fig. 2 and the subsequent drawings, description will be made of the adhesive applicator and the inkjet image forming apparatus according to the present embodiment. For the sake of simplicity, the same parts as those in the conventional example illustrated in Figs. 1A and 1B described above are denoted by the same reference signs, and description thereof will be omitted as appropriate. For the sake of simplicity, the inkjet head 35 is not illustrated in Fig. 2 and the subsequent drawings.

[0028] Fig. 2 is a side view illustrating a schematic configuration of an inkjet image forming apparatus 1 including an adhesive applicator 4 according to the present embodiment. Figs. 3A and 3B are a rear view and a side view illustrating a configuration example of the adhesive applicator 4.

[0029] As can be seen in comparison with the conventional configuration illustrated in Fig. 1B, the inkjet image forming apparatus 1 of the present embodiment includes the adhesive applicator 4 in the image forming unit 3 described above.

[0030] Specifically, the adhesive applicator 4 includes: an adhesive supply unit 40 including nozzles 40a and 40b that discharge the adhesive AD; an adhesive storage tank 41 that stores the adhesive AD and supplies the adhesive AD to the adhesive supply unit 40; and a blade 42 that is provided to extend along the moving direction of the conveying belt 23 and levels on the conveying belt 23 the adhesive AD supplied. Here, the adhesive storage tank 41 and the adhesive supply unit 40 are connected together via a tube (not illustrated) that serves as a flow path for the adhesive AD.

[0031] The adhesive supply unit 40 is fixed to the side surface of the carriage 31 described above. The adhesive storage tank 41 is fixed to the upper surfaces of the adhesive supply unit 40 and the carriage 31 in the example illustrated in Figs. 3A and 3B. Thus, the adhesive applicator 4 (the adhesive supply unit 40 and the adhesive storage tank 41) is movable along the guide member 30 together with the carriage 31 (see arrows A and B in Fig. 3A). In the present embodiment, a drive source such as a motor in the carriage 31 constitutes a "moving unit" of the present invention.

[0032] In the present embodiment, the adhesive supply unit 40 includes a known liquid fixed quantity discharge device (not illustrated) such as a dispenser. The blade 42 is arranged on the lower surface (bottom) of the adhesive supply unit 40 to face the surface (upper surface) of the conveying belt 23 and extend in the moving direction (sub-scanning direction) of the conveying belt 23. The nozzles 40a and 40b of the liquid fixed quantity discharge device that discharges the adhesive AD are provided on both sides (respective side surface sides) of the blade 42 on the lower surface of the adhesive supply unit 40.

[0033] In the adhesive supply unit 40 of the present embodiment, a plurality of the nozzles 40a and a plurality of the nozzles 40b are formed along the length direction of the blade 42 (a length W direction illustrated in Fig. 3B). In this example, four nozzles 40a are formed on the right side surface side of the blade 42 with reference to Fig. 3A (see Fig. 3B), and similarly, four nozzles 40b are formed on the left side surface side of the blade 42.

[0034] The adhesive supply unit 40 discharges the adhesive AD provided from the adhesive storage tank 41 by a constant amount from the nozzles 40a or the nozzles 40b with the liquid fixed quantity discharge device, and the adhesive AD discharged is applied with the blade 42, and details of this operation will be described later.

[0035] As illustrated in Fig.3B, the blade 42 is arranged on the lower surface of the adhesive supply unit 40 to extend along the moving direction of the conveying belt 23, and the length W of the blade 42 is shorter than the width of the conveying belt 23 (see Fig. 3A). With such a configuration, compared with the conventional application blade 500 (see Fig. 1B) extending in the width direction of the conveying belt 23, the accuracy of the gap with the conveying belt 23 is increased, and the adhesive AD can be more uniformly applied on the conveying belt 23.

[0036] To enable adjustment of the thickness of the adhesive AD applied on the conveying belt 23, it is desirable to provide a gap adjusting unit that adjusts the gap between the blade 42 and the conveying belt 23.

[0037] Here, depending on the model of the inkjet image forming apparatus, there is a type in which the carriage 31 can be moved up and down in the vertical direction (the separation/contact direction from/with the con-

veying belt 23). In the case of such a model, the gap between the blade 42 and the conveying belt 23 can be adjusted even in a case where the blade 42 is fixed to the lower surface of the adhesive supply unit 40 with screws or the like. That is, in the present embodiment, since the carriage 31 and the adhesive supply unit 40 move integrally, if the model is a type in which the carriage 31 moves up and down in the vertical direction, the blade 42 fixed to the adhesive supply unit 40 moves up and down together with the carriage 31 that moves up and down, and the gap with the conveying belt 23 can be adjusted.

[0038] On the other hand, in the case of a model in which the carriage 31 does not move up and down (in the separation/contact direction from/with the conveying belt 23), as illustrated in Fig. 4, an opening 40r having a shape corresponding to the cross-sectional shape of the blade 42 is formed at the lower surface of the adhesive supply unit 40, and the blade 42 is enabled to move up and down through the opening 40r in the vertical direction (the separation/contact direction from/with the conveying belt 23, see a double arrow in Fig. 4). Further, as illustrated in Fig. 4, the adhesive supply unit 40 is preferably provided with a drive unit 43 such as a solenoid that moves the blade 42 up and down. By providing the gap adjusting unit having such a configuration, even if the model is a type in which the carriage 31 does not move up and down, it is possible to adjust the gap with the conveying belt 23 by moving the blade 42 up and down with respect to the adhesive supply unit 40 by operation of the drive unit 43.

[0039] Hereinafter, an example will be described of operation of applying the adhesive AD to the conveying belt 23 in the present embodiment.

[0040] In the present embodiment, setting is performed such that the conveying belt 23 is intermittently driven at a constant feed amount, and in a standby state in the intermittent drive, the constant amount of the adhesive AD is discharged from the adhesive supply unit 40 (nozzles 40a or 40b), and the carriage 31 and the adhesive supply unit 40 are moved after the discharge or with the discharge operation.

[0041] In the present embodiment, regarding the rotation direction of the conveying belt 23 during the intermittent drive, the conveying belt 23 is driven in the direction opposite to the conveying direction of the recording medium P (see Fig. 2), as in the conventional example (see Fig. 1B). However, this is not a limitation, and the rotation direction of the conveying belt 23 may be set to the same direction as the conveying direction of the recording medium P (see Fig. 1A).

[0042] In addition, in the present embodiment, the setting is performed such that the operation of discharging the adhesive AD from the nozzles (40a, 40b) is switched depending on the moving direction of the adhesive supply unit 40. Specifically, in a case where the adhesive supply unit 40 moves from the left side to the right side in Fig. 3A (first direction) (see the arrow A in Fig. 3A), the setting is performed such that the adhesive AD is discharged from the (four) nozzles 40a provided in the right side surface side (first side surface side) of the blade 42. In addition, in the opposite case, that is, in a case where the adhesive supply unit 40 moves from the right side to the left side (second direction) in Fig. 3A (see the arrow B in Fig. 3A), the setting is performed such that the adhesive AD is discharged from the (four) nozzles 40b provided in the left side surface side (second side surface side) of the blade 42.

[0043] With such a configuration and setting, in any operation in which the adhesive supply unit 40 moves to the right side or the left side in Fig. 3A, the constant amount of the adhesive AD discharged onto the conveying belt 23 can be uniformly applied with the blade 42.

[0044] The feed amount of the conveying belt 23 is set to an amount based on the length W (see Fig. 3B) of the blade 42 in the conveying direction (moving direction of the conveying belt 23). In one specific example, the feed amount of the conveying belt 23 is set to an amount somewhat shorter than the length W of the blade 42 so that the end sides overlap each other in the conveying direction of the adhesive AD supplied to the conveying belt 23 by a plurality of times of movement in the width direction.

[0045] Alternatively, depending on the setting of the discharge amount of the adhesive AD, a case is also considered where the adhesive AD flows out from both ends of the blade 42. In such a case, the feed amount of the conveying belt 23 may be set to an amount somewhat longer than the length W of the application blade 42.

[0046] Further, to prevent or suppress the adhesive AD from flowing out from both ends in the length direction of the blade 42 as described above, as illustrated in Fig. 5, a flow stop portion 42e may be provided at each end of the blade 42, the flow stop portion 42e having a shape in which corner portions of the blade 42 protrude outward. With the blade 42 including the flow stop portion 42e, it can be effectively prevented or suppressed that the adhesive AD flows out from the end of the application blade 42 to the outside in the operation of applying the adhesive AD discharged from the nozzles 40a or 40b onto the conveying belt 23.

[0047] As another specific example for preventing or suppressing the adhesive AD from flowing out from both ends in the length direction of the blade 42, the flow rate of the adhesive AD discharged is preferably set for each of the plurality of nozzles (40a or 40b) formed along the length direction of the blade 42. Specifically, for the two nozzles 40a (see Fig. 3A) or 40b positioned on the both end sides in the length W direction of the blade 42, the discharge amount of the adhesive AD is set to be less than that for the other two nozzles 40a or 40b positioned on the center side. It is sufficient that the setting is performed such that, for example, the diameter of the nozzle is reduced, or the discharge amount of the liquid fixed quantity discharge device is adjusted for each nozzle flow path.

[0048] On the basis of the configuration and setting as described above, for example, an adhesive application button (not illustrated) is turned ON before the operation start of printing, whereby operation is started of applying the adhesive AD to the conveying belt 23 by the adhesive supply unit 40. Specifically, at the start of the operation, the carriage 31 and the adhesive supply unit 40 appropriately move so that the blade 42 is positioned on the end side (left side in Fig. 3A) of the conveying belt 23.

[0049] From this state, a preset amount of the adhesive AD is discharged from each of the nozzles 40a (four nozzles 40a in this example), and the carriage 31 and the adhesive supply unit 40 move at a constant speed toward a second end side (right side in Fig. 3A in this example) of the conveying belt 23 that is stationary (standby state). The moving operation stops at a timing when the blade 42 reaches the second end side of the conveying belt 23. By this moving operation, a predetermined amount of the adhesive AD discharged onto the conveying belt 23 is leveled by the blade 42 and applied onto the conveying belt 23 with a constant thickness.

[0050] Subsequently, the conveying belt 23 is driven in an arrow B direction in Fig. 2 with a set feed amount (for example, a feed amount less than the length W of the blade 42). During the driving of the conveying belt 23, the adhesive supply unit 40 (the blade 42, the nozzles 40b, and the like) stands by while remaining stationary on the second end side (the right side in Fig. 3A) of the conveying belt 23.

[0051] When the conveying belt 23 is again in the standby state, the adhesive supply unit 40 discharges a preset amount of the adhesive AD from each of the nozzles 40b (four nozzles 40b in this example), and moves at a constant speed together with the carriage 31 toward a first end side (left side in Fig. 3A) of the conveying belt 23 that is stationary (standby state). Similarly, the moving operation stops at a timing when the blade 42 reaches the first end side of the conveying belt 23. By this moving operation, a predetermined amount of the adhesive AD discharged onto the conveying belt 23 is leveled by the blade 42 and applied onto the conveying belt 23 with a constant thickness.

[0052] Thereafter, the above-described operation is repeatedly performed, whereby the adhesive AD is applied to the entire surface of the conveying belt 23.

[0053] According to the present embodiment that performs the above-described operation, the adhesive AD can be applied to the conveying belt 23 with a constant thickness, and the adhesive AD can be accurately applied in the width direction of the conveying belt 23 with a film thickness of, for example, 0.1 mm.

[0054] In addition, according to the present embodiment, since the conveying belt 23 and the adhesive supply unit 40 can be simply operated, in advance, setting is performed of the feed amount of the conveying belt 23, the gap between the conveying belt 23 and the blade 42, the moving distance or stop position of the adhesive supply unit 40 in the width direction, and the like, whereby the above effect can be obtained without requiring complicated control.

[0055] The above-described embodiment has been described as a configuration for applying the adhesive AD on the conveying belt 23. On the other hand, the configuration of the above-described embodiment can also be used during operation of peeling the adhesive AD on the conveying belt 23.

[0056] In a case where the adhesive AD on the conveying belt 23 is peeled off, operations has been conventionally performed in which a solvent (not illustrated) is applied to the conveying belt 23 to dissolve the adhesive AD, and the dissolved adhesive AD is scraped with a rubber or plastic spatula, or the like, and most of these operations has been performed by manual work.

[0057] On the other hand, according to the configuration of the above-described embodiment, the solvent of the adhesive AD is stored in the adhesive storage tank 41 described above, and the solvent is discharged from the adhesive supply unit 40 (nozzles 40a and 40b), whereby the operation can be automatically performed of applying the solvent onto the conveying belt 23. During applying the solvent, the gap between the conveying belt 23 and the blade 42 is preferably set larger than that in the case during applying the adhesive AD described above.

[0058] Thus, the application is completed of the solvent to the entire surface of the conveying belt 23, and the adhesive AD is dissolved and a state is reached where the adhesive AD is easily peeled off, and then setting is performed of making the gap small between the conveying belt 23 and the blade 42. In addition, on the both end sides in the width direction of the conveying belt 23, tubs (not illustrated) are respectively placed for accommodating the adhesive AD. Thereafter, the moving operation of the adhesive supply unit 40 and the intermittent drive operation of the conveying belt 23 are performed similarly to those during applying the adhesive AD described above.

[0059] That is, at the start of the operation, the carriage 31 and the adhesive supply unit 40 appropriately move so that the blade 42 is positioned on the end side (left side in Fig. 3A) of the conveying belt 23.

[0060] From this state, the carriage 31 and the adhesive supply unit 40 move at a constant speed toward the second end side (the right side in Fig. 3A in this example) of the conveying belt 23 that is stationary (standby state). The moving operation stops at a timing when the blade 42 reaches the second end side of the conveying belt 23. By this moving operation, the adhesive AD dissolved on the conveying belt 23 is peeled off (scraped) by the blade 42, falls from the second end of the conveying belt 23, and is accommodated in one of the tubs described above.

[0061] Subsequently, the conveying belt 23 is driven in the arrow B direction in Fig. 2 with a set feed amount (for example, a feed amount less than the length W of the blade 42). During the driving of the conveying belt

23, the adhesive supply unit 40 (the blade 42, the nozzles 40b, and the like) stands by while remaining stationary on the second end side (the right side in Fig. 3A) of the conveying belt 23.

[0062] When the conveying belt 23 is again in the standby state, the adhesive supply unit 40 moves at a constant speed together with the carriage 31 toward the first end side (left side in Fig. 3A) of the conveying belt 23. Similarly, the moving operation stops at a timing when the blade 42 reaches the first end side of the conveying belt 23. By this moving operation, the adhesive AD dissolved on the conveying belt 23 is scraped off by the blade 42, falls from the first end of the conveying belt 23, and is accommodated in the other of the tubs.

[0063] Thereafter, the above-described operation is repeatedly performed, whereby all the adhesive AD is peeled off from the conveying belt 23.

[0064] In the above description, the configuration has been described in which the blade 42 is used for both application and peeling of the adhesive AD. On the other hand, depending on the material, shape, and the like of the blade 42, double use of the blade 42 may not be appropriate as the blade for peeling the adhesive AD. For this reason, it is desirable that the adhesive supply unit 40 is configured so that the blade 42 for applying the adhesive AD and a dedicated peeling blade (not illustrated) for peeling the adhesive AD can be replaced with each other (for example, each blade is fixed to the adhesive supply unit 40 with screws).

[0065] Fig. 6 illustrates a more preferred configuration example in a case where the adhesive AD is peeled off from the conveying belt 23 by the adhesive supply unit 40. Fig. 6 illustrates a state where the solvent is applied on the conveying belt 23 and the adhesive AD is dissolved.

[0066] In the example illustrated in Fig. 6, a cover member 44 is detachably provided on the lower surface of the carriage 31, the cover member 44 covering the ink discharge surface (nozzle surface) 31a of the inkjet head 35 (see Fig. 1A). With such a configuration, even in a case where the adhesive AD is scattered when the adhesive AD on the conveying belt 23 is peeled off by the blade 42 (or the dedicated peeling blade), since the adhesive AD adheres to the cover member 44, the ink discharge surface 31a is directly protected by the cover member 44. Thus, the adhesive AD can be effectively prevented from adhering to the ink discharge surface (nozzle surface) 31a when the adhesive AD is peeled off. The cover member 44 may be mounted before the above-described operation of applying the adhesive AD.

[0067] In addition, in the example illustrated in Fig. 6, a suction unit 50 is provided that sucks the adhesive AD peeled off from the conveying belt 23. In this example, the suction unit 50 is arranged between the adhesive supply unit 40 and the carriage 31. The suction unit 50 is a hollow tubular body, the tip is a suction nozzle 51, and another end side is connected to a suction pump (not illustrated). The suction unit 50 is also connected to a drive source such as a solenoid (not illustrated), and driving force of the drive source is transmitted, whereby the suction unit 50 is movable in the vertical direction with respect to the carriage 31 (see a double arrow in Fig. 6).

[0068] According to such a configuration example, even in a case where the adhesive AD is scattered on the lower surface side of the carriage 31 when the adhesive AD on the conveying belt 23 is peeled off by the blade 42 (or the dedicated peeling blade), the ink discharge surface 31a is protected by the cover member 44, and the adhesive AD unnecessary and the solvent component volatilizing can be sucked by the suction unit 50. In addition, in this configuration example, the height of the suction nozzle 51 of the suction unit 50 can be adjusted, so that the height of the suction nozzle 51 can be set to an optimal position depending on the height of the scattered adhesive AD and the like.

[0069] Since it is necessary to apply a large amount of a volatile solvent on the conveying belt 23 in advance in a case where the operation is performed of peeling the adhesive AD from the conveying belt 23, the health of the operator has conventionally been a concern in a case where the operator continues such operation for a long time. On the other hand, according to the present embodiment, most or all of the application and peeling operations of the adhesive AD can be automated, so that the operation by the operator during the application and peeling of the adhesive AD can be minimized and eventually unmanned. For this reason, according to the present embodiment, the degree of sealing may be increased of an apparatus exterior part (such as a housing) surrounding the inkjet image forming apparatus 1, and the solvent volatilizing from the adhesive AD may be exhausted from the apparatus exterior part. In one specific example, the top plate of the housing (not illustrated) of the inkjet image forming apparatus 1 is provided with an exhaust port through which the solvent component volatilizing from the adhesive AD is exhausted.

[0070] In the above-described embodiment, the example has been described in which the nozzles (40a and 40b) that discharge the adhesive AD are provided on the respective side surface sides of the blade 42. As another example, the nozzles that discharge the adhesive AD may be provided only on one side surface side of the blade 42, and for example, only the nozzles 40a on the right side of Figs. 3A and 3B may be provided. In this case, it is sufficient that operation is repeated in which the adhesive AD is discharged from the nozzles 40a in a case where the carriage 31 and the adhesive supply unit 40 move from the left side to the right side in Figs. 3A and 3B while the conveying belt 23 is caused to stand by, and the carriage 31 and the adhesive supply unit 40 are moved from the right side to the left side in Figs. 3A and 3B during intermittent drive of the conveying belt 23.

[0071] In addition, in the above-described embodiment, the adhesive applicator 4 (adhesive supply unit 40) is configured to supply the adhesive AD with the liquid fixed quantity discharge device. As another example, the

adhesive supply unit 40 may have a large number of nozzles having a structure equivalent to that of the inkjet head 35, and discharge (supply) the adhesive AD from each of the nozzles.

[0072] The various configuration examples described above can be combined as appropriate.

[0073] In the above-described embodiment and each configuration example, the configuration has been described in which the adhesive supply unit 40 moves integrally with the carriage 31 (that is, the inkjet head 35) as the moving unit. As another configuration example of the moving unit, the adhesive supply unit 40 may be configured to move separately from the carriage 31 (inkjet head 35). In this case, although it is necessary to separately provide drive sources for moving a member corresponding to the above-described guide member 30 and the adhesive supply unit 40 to enable the adhesive supply unit 40 to move along the width direction of the conveying belt 23, a distance can be increase between the adhesive supply unit 40 and the carriage 31 (inkjet head 35). That is, by increasing the distance between the adhesive supply unit 40 and the carriage 31 (inkjet head 35), there is a merit that problems can be suppressed that the ink discharge surface 31a of the inkjet head 35 become dirty by the adhesive AD scattered during application or peeling of the adhesive AD, and the like. In addition, with this configuration, there is a merit that it can be applied even in a case where the inkjet head 35 is of a single-pass system that discharges ink without moving on the conveying belt 23.

[0074] In a case where the inkjet head 35 is a head of the single-pass system that discharges ink without moving on the conveying belt 23, there is a model including a cleaning device 9 that cleans the ink discharge surface 31a of the inkjet head 35 as illustrated in Fig. 7. In the example illustrated in Fig. 7, the image forming unit 3 on which a plurality of inkjet heads 35 is mounted (accommodated) is movable in the separation/contact direction from/with the conveying belt 23 (see a double arrow in the vertical direction in Fig. 7), and the ink discharge surface 31a on the bottom surface of the image forming unit 3 is cleaned by the cleaning device 9. Specifically, during head cleaning, the image forming unit 3 moves downward from the state illustrated in Fig. 7, and the cleaning device 9 is moved, by operation of a drive source (not illustrated) provided in the cleaning device 9, along a guide rail 91 provided along the width direction of the conveying belt 23 (see a double arrow in the horizontal direction in Fig. 7), and the cleaning device 9 comes in contact with the ink discharge surface 31a of the image forming unit 3 and cleans the ink discharge surface 31a. In the case of such a configuration, it is sufficient that, for example, as illustrated in Fig. 7, the above-described adhesive supply unit 40 is fixed to the cleaning device 9 and setting is performed so that operation is performed similarly as described above.

[0075] Although embodiments of the present invention have been described and illustrated in detail, the disclosed embodiments are made for purposes of illustration and example only and not limitation. The scope of the present invention should be interpreted by terms of the appended claims. That is, the present invention can be implemented in various forms without departing from the gist or main features thereof.

Claims

1. An adhesive applicator (4) comprising:

   a conveying belt (23) that conveys a recording medium (P) on which an image is to be printed;
   an adhesive supply unit (40) that supplies an adhesive (AD) to the conveying belt (23);
   a blade (42) that levels on the conveying belt (23) the adhesive (AD) supplied; and
   a moving unit that moves the adhesive supply unit (40) and the blade (42) in a direction intersecting with a conveying direction of the conveying belt (23).

2. The adhesive applicator (4) according to claim 1, further comprising:

   a carriage (31) in which an inkjet head (35) that discharges ink toward the conveying belt (23) is accommodated and that is movable in a width direction of the conveying belt (23); and
   a guide member (30) that guides the carriage (31) movably in the direction intersecting with the conveying direction of the conveying belt (23), wherein
   the moving unit moves the adhesive supply unit (40) and the blade (42) along the guide member (30) together with the carriage (31).

3. The adhesive applicator (4) according to claim 1 or 2, wherein
   a length of the blade (42) along a moving direction of the conveying belt (23) is shorter than a width of the conveying belt (23).

4. The adhesive applicator (4) according to any of claims 1 to 3, further comprising a gap adjusting unit that adjusts a gap between the blade (42) and the conveying belt (23).

5. The adhesive applicator (4) according to claim 4, wherein
   the gap adjusting unit adjusts the gap with the conveying belt (23) by moving the blade (42) up and down, together with the carriage (31) that moves up and down.

6. The adhesive applicator (4) according to claim 4 or 5, wherein

the gap adjusting unit includes a drive unit (43) that moves the blade (42) up and down.

7. The adhesive applicator (4) according to any of claims 1 to 6, wherein
flow stop portions (42e) are formed respectively at both ends in a length direction of the blade (42), the flow stop portions (42e) preventing the adhesive (AD) supplied from flowing out from the ends in the length direction of the blade (42).

8. The adhesive applicator (4) according to any of claims 1 to 7, wherein

the blade (42) is provided at a bottom of the adhesive supply unit (40), and
nozzles (40a, 40b) that discharge the adhesive (AD) are formed on respective side surface sides of the blade (42) in the adhesive supply unit (40).

9. The adhesive applicator (4) according to claim 8, wherein
the adhesive supply unit (40) discharges the adhesive (AD) from the nozzles (40a) on a first side surface side of the blade (42) when moving in a first direction, and discharges the adhesive (AD) from the nozzles (40b) formed on a second surface side of the blade (42) when moving in a second direction.

10. The adhesive applicator (4) according to any of claims 1 to 9, wherein
a plurality of nozzles (40a, 40b) that discharges the adhesive (AD) is formed along the length direction of the blade (42).

11. The adhesive applicator (4) according to claim 10, wherein
a flow rate of the adhesive (AD) to be discharged is set for each of the nozzles (40a, 40b) to suppress the adhesive (AD) from flowing out from the end in the length direction of the blade (42).

12. The adhesive applicator (4) according to any of claims 1 to 11, further comprising
an adhesive storage tank that stores the adhesive (AD) and supplies the adhesive (AD) to the adhesive supply unit (40).

13. The adhesive applicator (4) according to any of claims 1 to 12, wherein

the conveying belt (23) is intermittently driven with a constant feed amount, and
the adhesive supply unit (40) supplies the adhesive (AD) when the conveying belt (23) intermittently driven is in a standby state.

14. The adhesive applicator (4) according to claim 13, wherein
the feed amount of the conveying belt (23) is an amount based on the length of the blade (42).

15. The adhesive applicator (4) according to claim 14, wherein
the feed amount of the conveying belt (23) is an amount in which the adhesives (AD) supplied to the conveying belt (23) by a plurality of times of movement by the moving unit overlap each other in the conveying direction.

16. The adhesive applicator (4) according to any of claims 1 to 15, wherein
the adhesive supply unit (40) includes a dispenser that supplies the adhesive (AD).

17. An inkjet image forming apparatus (1) comprising:

an adhesive applicator (4) according to any of claims 1 to 16; and
an inkjet head (35) that faces the conveying belt (23).

18. The inkjet image forming apparatus (1) according to claim 17, wherein

the inkjet head (35) is a head that discharges ink while moving in a direction orthogonal to a conveying direction of the recording medium (P), and
the moving unit moves the adhesive supply unit (40) and the blade (42) separately from the inkjet head (35).

19. The inkjet image forming apparatus (1) according to claim 17 or 18, wherein
the adhesive supply unit (40) uses the blade (42) as a peeling blade that peels the adhesive (AD) from the conveying belt (23).

20. The inkjet image forming apparatus (1) according to any of claims 17 to 19, wherein
the blade (42) and a peeling blade that peels the adhesive (AD) from the conveying belt (23) are replaceable with each other in the adhesive supply unit (40).

21. The inkjet image forming apparatus (1) according to any of claims 17 to 20, further comprising a suction unit (50) that sucks the adhesive (AD) peeled off from the conveying belt (23).

22. The inkjet image forming apparatus (1) according to claim 21, further comprising

a carriage (31) in which the inkjet head (35) is

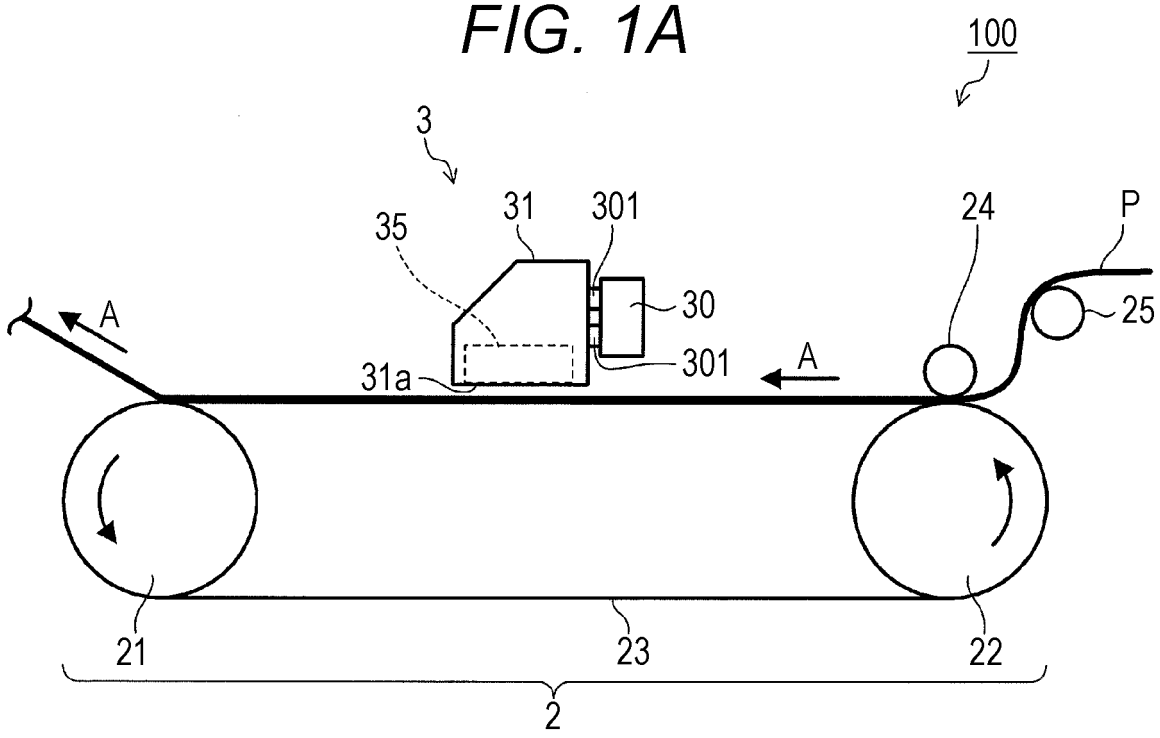
accommodated and that is movable in a width direction of the conveying belt (23), wherein the suction unit (50) is provided between the adhesive supply unit (40) and the carriage (31).

23. The inkjet image forming apparatus (1) according to claim 17, wherein

the inkjet head (35) is a head that discharges ink without moving on the conveying belt (23), and
the moving unit moves the adhesive supply unit (40) and the blade (42) together with a cleaning device (9) that cleans an ink discharge surface (31a) of the inkjet head (35).

24. The inkjet image forming apparatus (1) according to any of claims 17 to 23, wherein
an apparatus exterior part that surrounds the inkjet image forming apparatus (1) is provided with an exhaust port through which a solvent component volatilizing from the adhesive (AD) is exhausted.

FIG. 1A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3
35
31
301
24
P
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25
A
301
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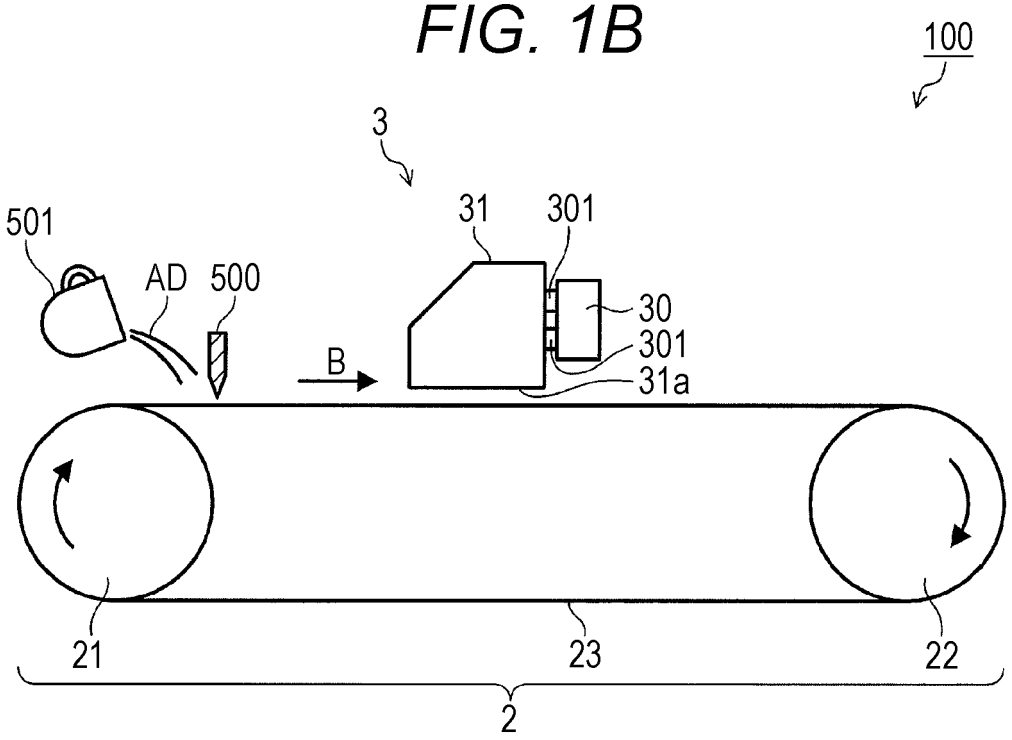
31a
21
23
22
2

FIG. 1B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21
23
22
2

FIG. 2

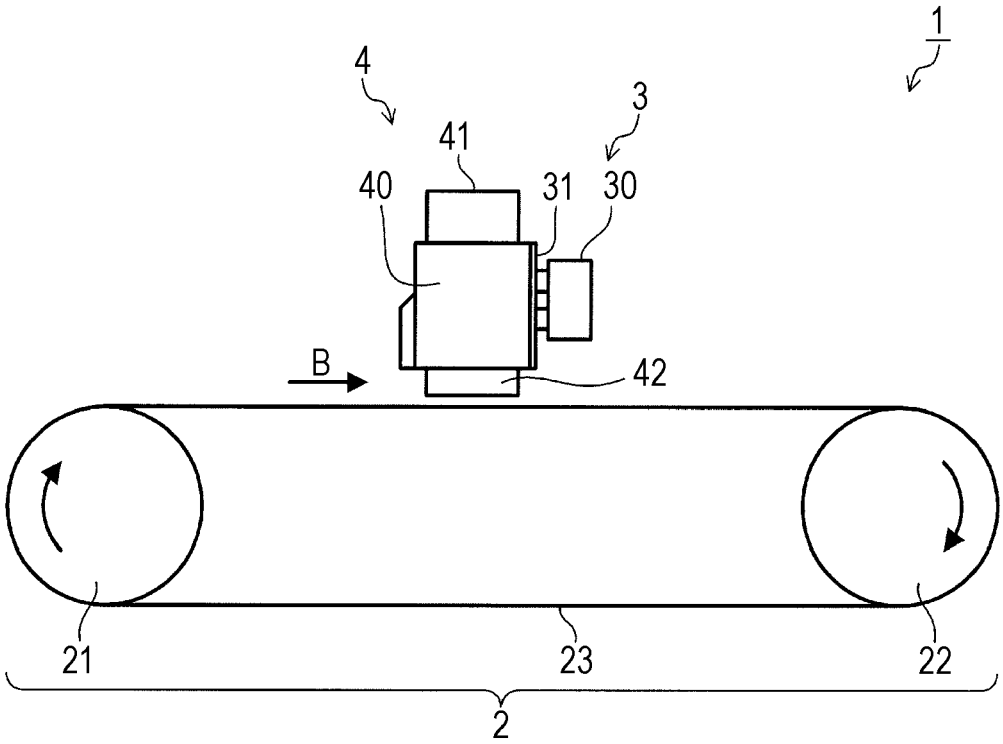
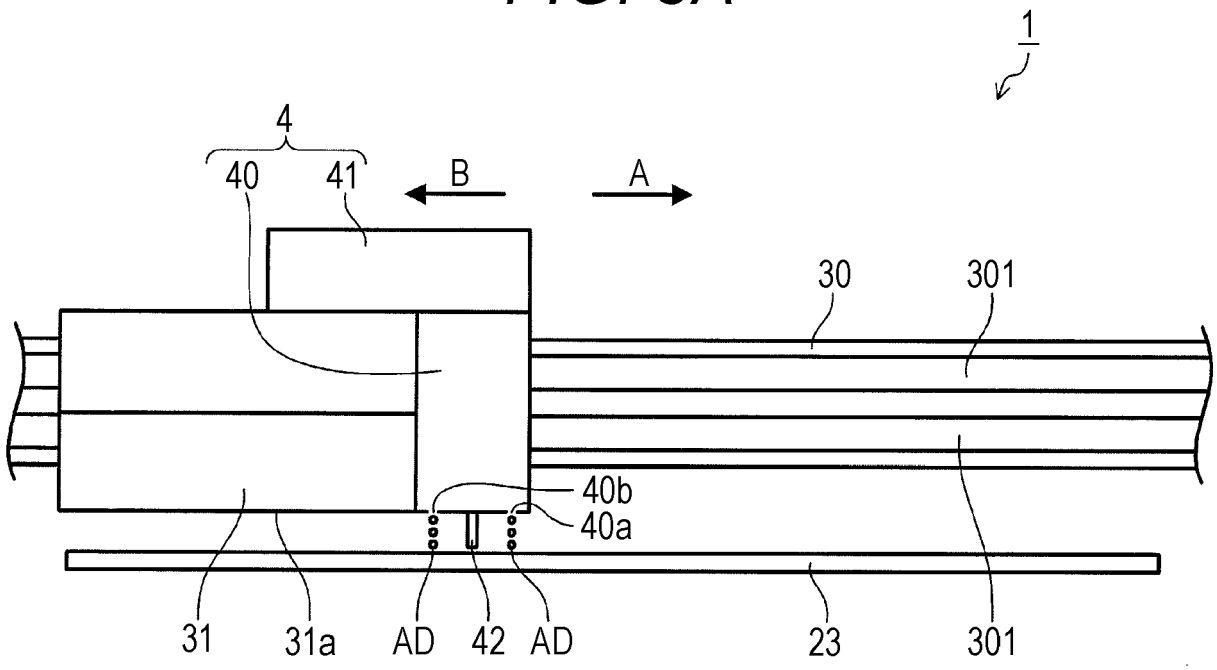


FIG. 3A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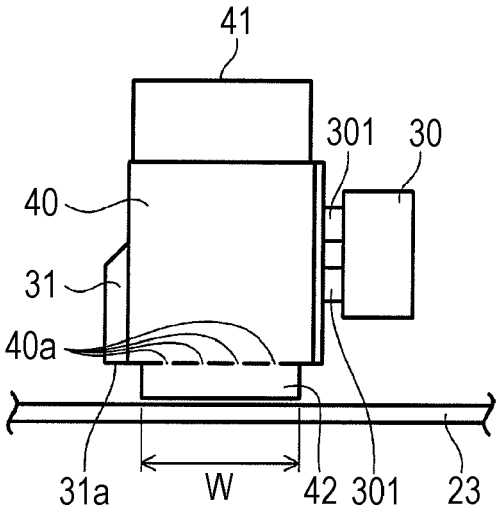
40b
40a
31
31a
AD
42
AD
23
301

FIG. 3B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30
40
31
40a
31a
W
42
301
23

FIG. 4

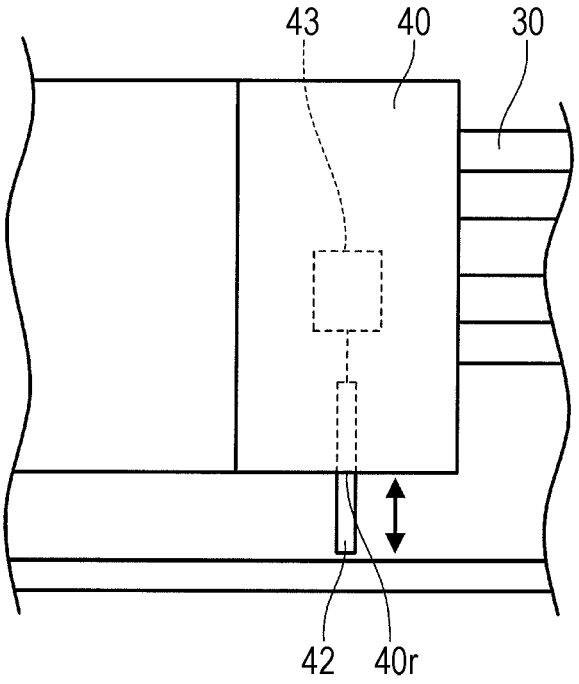


FIG. 5

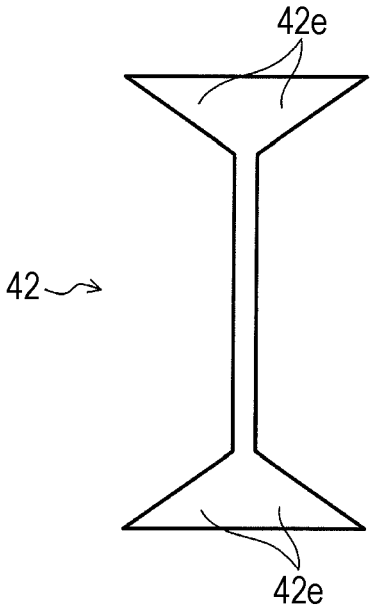
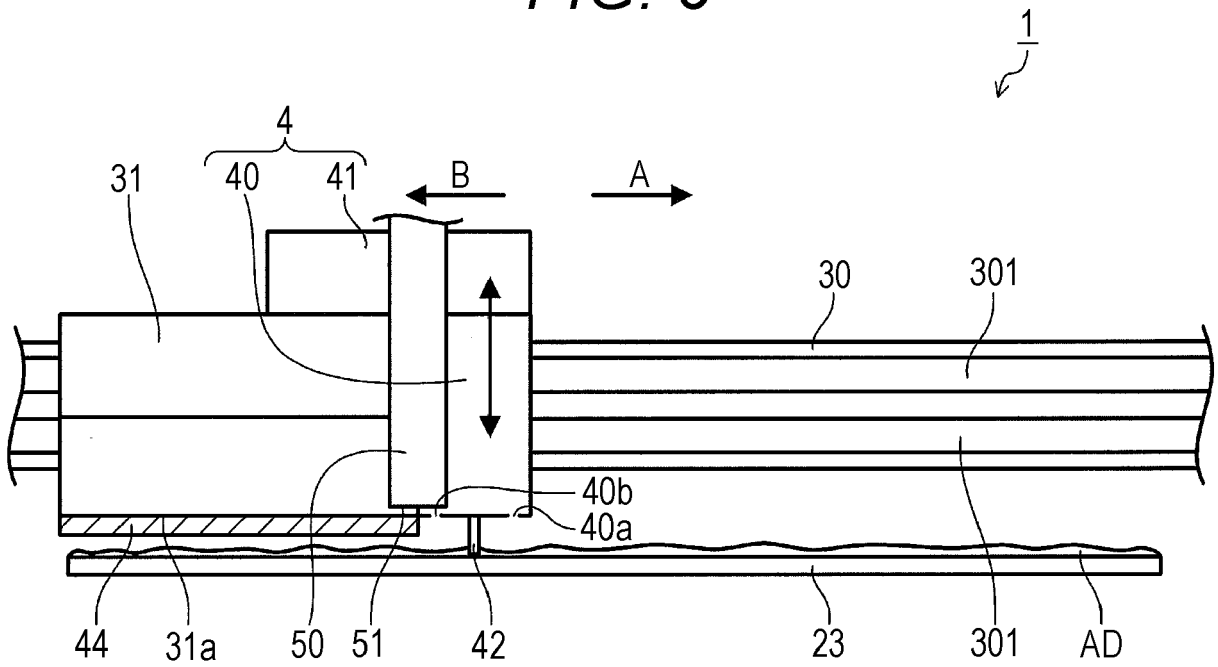


FIG. 6


1
4
31
40
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B
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30
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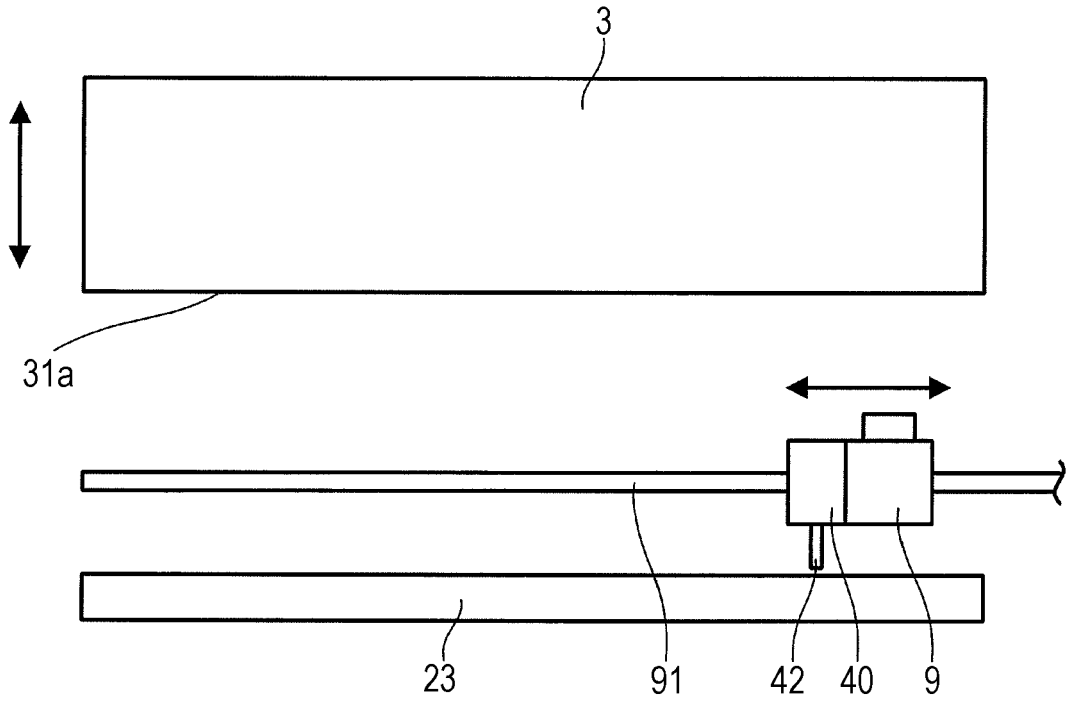
40b
40a
44
31a
50
51
42
23
301
AD

FIG. 7


3
31a
23
91
42
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9

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EUROPEAN SEARCH REPORT

Application Number
EP 19 20 3235

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
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