(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 756 957 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
23.07.2014 Bulletin 2014/30

(51) Int Cl.:
B41J 11/00 *(2006.01)*

(21) Application number: **14151654.2**

(22) Date of filing: **17.01.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **21.01.2013 JP 2013008501**
26.11.2013 JP 2013243759

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

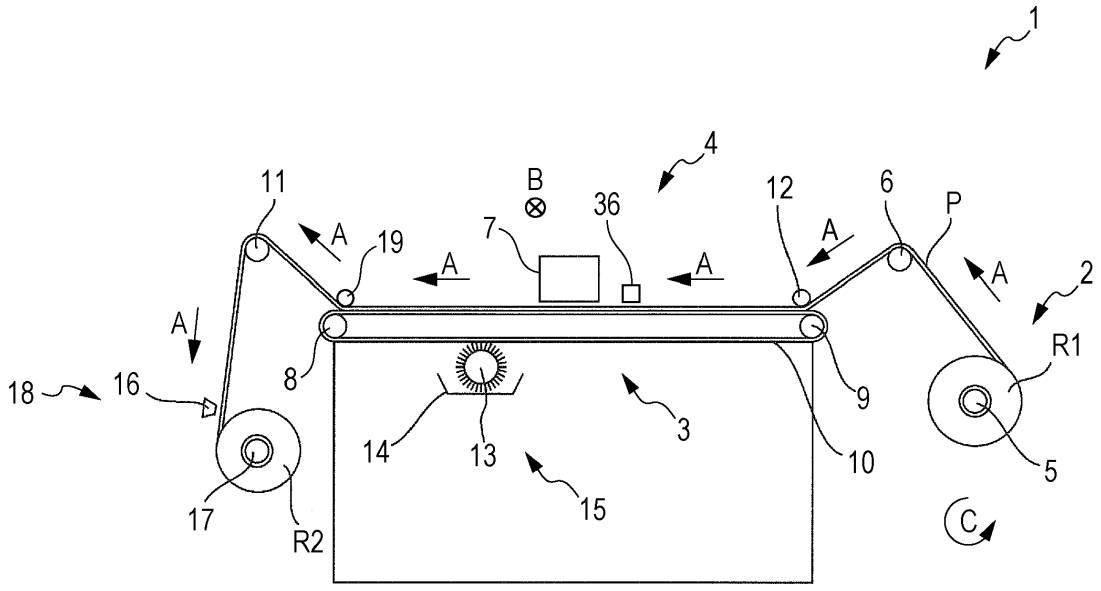
(72) Inventor: **Ishizuka, Hirotaka**
Suwa-shi, Nagano 392-8502 (JP)

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

(54) Recordng apparatus and recording method

(57) A recording apparatus (1) includes: an adhesive belt (10) configured to transport a recording medium; a drive mechanism (8, 27) configured to drive the adhesive belt; first and second press units (12, 19) configured to press the recording medium and adhere the recording medium to the adhesive belt; a recording head (7)configured to record on the recording medium; a detection unit (36) provided on a downstream side of the first press unit and on an upstream side of the recording head in a direction of transport of the recording medium and configured to detect an adhesion failure of the recording medium with respect to the adhesive belt; and a control unit (20) configured to perform control of the drive mechanism, wherein the second press unit (19) is provided on the downstream side of the recording head in the direction of transport and the control unit controls the drive mechanism in accordance with a result of detection of the detection unit.

FIG. 1



EP 2 756 957 A1

Description

BACKGROUND

1. Technical Field

[0001] The present invention relates to a recording apparatus and a recording method configured to transport a recording medium in a state of being placed on an adhesive belt.

2. Related art

[0002] In the related art, a recording apparatus provided with a transporting mechanism configured to transport a recording medium in a state of being placed on an adhesive belt is used. For example, JP-A-11-192694 discloses a recording apparatus provided with an endless belt configured to transport the recording medium in a state of being adhered and fixed thereto and a cleaning unit including a wipe-off roller having a peripheral surface formed of a high-polymeric porous material is disclosed.

[0003] In the recording apparatus having such an adhesive belt, a press unit such as a press roller configured to cause the recording medium to be adhered to the adhesive belt without an adhesion failure such as wrinkles and floating is generally provided. In contrast, when an adhesion failure of the recording medium occurs in such a recording apparatus, the recording operation is stopped once to retract a recording head, the recording medium is transported (passed) without performing printing on the adhesion failure portions, and then recording is restarted again.

[0004] However, in the recording apparatus of the related art as described above, every time an adhesion failure occurs in the recording medium, the recording medium is transported without performing recording on an adhesion failure portion. Therefore, a portion of the recording medium transported without recording is wastefully consumed.

[0005] In the recording apparatus disclosed in JP-A-11-192694, there is no description about a case where the adhesion failure of the recording medium occurs, and hence there is no description about a waste of the recording medium occurring by transporting the adhesion failure portion of the recording medium without performing printing thereon.

[0006] When an elongated recording medium is used in the recording apparatus provided with an adhesive belt of the related art, if the recording medium is moved in a direction opposite to a direction of transport thereof in order to cause the adhesion failure portion to re-adhere to the adhesive belt, a portion of the recording medium separated once from the adhesive belt is adhered again to the adhesion belt. In this case, an adhesion failure may occur in the portion of the recording medium to be adhered to the adhesive belt again, and hence the recording medium may become damaged due to interference between the recording media or interference between the recording medium and the recording head, so that the recording medium may be wasted.

SUMMARY

[0007] An advantage of some aspects of the invention is to reduce a waste of a recording medium even when an adhesion failure of the recording medium that has adhered to an adhesive belt occurs.

[0008] A first aspect of the invention is a recording apparatus including: an adhesive belt configured to transport a recording medium; a drive mechanism configured to drive the adhesive belt; first and second press units configured to press the recording medium and adhere the recording medium to the adhesive belt; a recording head configured to record on the recording medium; a detection unit provided on a downstream side of the first press unit and on an upstream side of the recording head in a direction of transport of the recording medium and configured to detect an adhesion failure of the recording medium with respect to the adhesive belt; and a control unit configured to perform control of the drive mechanism, wherein the second press unit is provided on the downstream side of the recording head in the direction of transport and the control unit controls the drive mechanism in accordance with a result of detection of the detection unit.

[0009] Here, the term "adhesion failure of the recording medium with respect to the adhesive belt" generally means a portion which is not adhered to the adhesive belt generally due to curling up, lifting, and/or wrinkling of the recording medium, which may occur when the recording medium is adhered to the adhesive belt.

[0010] In the configuration, when the adhesion failure of the recording medium adhered to the adhesive belt occurs, the adhesive belt may be moved in a direction opposite to the direction of transport. Therefore, for example, the recording medium may be moved to the upstream side of the first press unit in the direction of transport to re-adhere the adhesion failure portion.

[0011] In this configuration, with the provision of the second press unit, the adhesion failure of the recording medium with respect to the adhesive belt which may occur when re-adhering the portion separated once from the adhesive belt again to the adhesive belt is suppressed.

[0012] Therefore, a waste of recording medium may be reduced even when the adhesion failure occurs in the recording medium adhered to the adhesive belt occurs.

[0013] Preferably, the control unit controls the drive mechanism so that the recording medium moves in a direction opposite to the direction of transport when the detection unit detects the adhesion failure.

[0014] In this configuration, the adhesive belt may be moved in the direction opposite to the direction of transport when the adhesion failure occurs in the recording medium adhered to the adhesive belt. Therefore, for ex-

ample, the recording medium may be moved to the upstream side of the first press unit in the direction of transport for re-adhesion of the adhesion failure portion.

[0015] Preferably, the second press unit presses the recording medium in a non-contact state.

[0016] In this configuration, the recording medium is pressed in the non-contact state. Therefore, the recorded image in which fixation of ink is not completed is prevented from becoming damaged due to the second press unit coming into contact with a portion of the recording medium where image is recorded.

[0017] Examples of the apparatus configured to press the recording medium in the non-contact state includes an air knife.

[0018] Preferably, the control unit controls the drive mechanism so that the adhesion failure portion moves to the upstream side of the first press unit in the direction of transport when the detection unit detects the adhesion failure.

[0019] In this configuration, the adhesion failure portion moves to the upstream side of the first press unit in the direction of transport when the detection unit detects the adhesion failure. In other words, since the recording medium is separated once from the adhesive belt, the adhesion failure may be resolved by bringing the portion where the adhesion failure has occurred to be adhered to the adhesive belt.

[0020] In this configuration, when the type of the adhesion failure is lifting, the adhesion failure may be resolved automatically by bringing the recording medium to be re-adhered to the adhesive belt. When the type of the adhesion failure is wrinkles, the adhesion failure may be resolved by a user by pulling this part or the like.

[0021] Preferably, the recording apparatus includes a wrinkle reducing roller of the recording medium on the upstream side of the first press unit in the direction of transport, the wrinkle reducing roller is provided with concavo-convex on a surface thereof and has a configuration in which the concavo-convex moves from the inside to the outside in the width direction of the recording medium when the recording medium is rotated in a direction of rotation at the time of transporting the recording medium in the direction of transport, and the control unit controls the drive mechanism so that the adhesion failure portion moves to the upstream side of the wrinkle reducing roller in the direction of transport when the detection unit detects the adhesion failure.

[0022] In this configuration, since the wrinkle reducing roller is provided, the adhesion failure can hardly occur. Even when the adhesion failure occurs, since the adhesion failure portion is moved to the upstream side of the wrinkle reducing roller, the adhesion failure may be resolved automatically by bringing the portion where the adhesion failure has occurred again to be adhered to the adhesive belt.

[0023] In this configuration, the adhesion failure may be resolved automatically irrespective of the type of the adhesion failure.

[0024] Preferably, a notifying unit configured to notify the fact that the detection unit detects the adhesion failure is further provided.

[0025] In this configuration, with the provision of the notifying unit, the fact that the detection unit detects the adhesion failure may be notified to the user. Therefore, the user can know the occurrence of the adhesion failure.

[0026] For example, applicable configurations include a configuration in which when the detection unit detects the adhesion failure, a process of returning the adhesion failure portion to the upstream side of the wrinkle reducing roller and a process of transporting this part in the direction of transport are performed by several times, and when the adhesion failure is not resolved thereby, the detection of the adhesion failure is notified.

[0027] Preferably, the recording head records on the recording medium by scanning reciprocally in a scanning direction intersecting the direction of transport, and if there is a portion in the course of recording along the scanning direction when the detection unit detects the adhesion failure, the control unit controls the drive mechanism so that the recording medium moves in a direction opposite to the direction of transport after the recording of the portion in the course of recording is completed.

[0028] In the recording apparatus having a configuration in which the recording head scans reciprocally in the scanning direction for recording on the recording medium, if the recording is stopped in a state in which there is a portion in the course of recording along the scanning direction, it is difficult to continue the recording from the corresponding part, and the recording medium of this part is liable to be wasted. When stopping the recording in the state in which there is the portion in the course of printing and restarting the printing after this portion, displacement of the recording position is liable to occur before and after the stop and hence unevenness of the corresponding part is liable to occur.

[0029] The "portion in the course of printing" in this case occurs when recording is performed in a recording mode in which the recording is completed by a plurality of times of recording scan on the same recording area.

[0030] In this configuration, if there is the portion in the course of recording along the scanning direction when the detection unit detects the adhesion failure, the adhesive belt is moved in the direction opposite to the direction of transport after the recording of the portion in the course of recording is completed. Therefore, since the recording is not stopped in a state in which there is the portion in the course of recording along the scanning direction, waste of the recording medium may be suppressed.

[0031] Preferably, the second press unit is capable of changing a position with respect to the recording medium, and when transporting the recording medium in the direction of transport, the second press unit is in the non-contact state with respect to the recording medium.

[0032] In this configuration, the second press unit does not come into contact with the recording medium while the recording medium is transported in the direction of

transport. Therefore, the recorded image in which fixation of the ink is not completed is prevented from becoming damaged due to the second press unit coming into contact with the portion of the recording medium where the image is recorded.

[0033] A second aspect of the invention is a recording method configured to perform by using a recording apparatus, the recording apparatus including: an adhesive belt configured to transport a recording medium; a drive mechanism configured to drive the adhesive belt; a first press unit configured to press the recording medium and adhere the recording medium to the adhesive belt; a recording head configured to record on the recording medium; and a detection unit provided on a downstream side of the first press unit and on an upstream side of the recording head in a direction of transport of the recording medium and configured to detect an adhesion failure of the recording medium with respect to the adhesive belt, wherein the recording medium is moved in a direction opposite to the direction of transport when the detection unit detects the adhesion failure.

[0034] According to the mode described above, the adhesive belt may be moved in the direction opposite to the direction of transport when the adhesion failure occurs in the recording medium that is adhered to the adhesive belt. Therefore, for example, the recording medium may be moved to the upstream side of the first press unit in the direction of transport to bring the adhesion failure portion to be re-adhered.

[0035] According to the mode described above, with the provision of the second press unit, the adhesion failure which may occur in the recording medium with respect to the adhesive belt is suppressed when the portion separated once from the adhesive belt is re-adhered to the adhesive belt.

[0036] Therefore, it is possible to reduce a waste of recording medium even when the adhesion failure occurs in the recording medium that is adhered to the adhesive belt.

BRIEF DESCRIPTION OF THE DRAWINGS

[0037] 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 schematic side view illustrating a recording apparatus according to a first embodiment of the invention.

Fig. 2 is a schematic plan view illustrating the recording apparatus according to the first embodiment of the invention.

Fig. 3 is a schematic drawing illustrating a wrinkle reducing roller of the recording apparatus according to the first embodiment of the invention.

Fig. 4 is a block diagram of the recording apparatus according to the first embodiment of the invention.

Fig. 5 is a schematic plan view illustrating a recording apparatus according to a second embodiment of the invention.

Fig. 6 is a schematic side view illustrating a recording apparatus according to a third embodiment of the invention.

Fig. 7 is a flowchart illustrating an embodiment of a recording method of the invention.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

First Embodiment (Fig. 1 to Fig. 4)

[0038] Referring now to attached drawings, a recording apparatus according to embodiments of the invention will be described in detail.

[0039] First of all, a recording apparatus according to a first embodiment of the invention will be described.

[0040] Fig. 1 is a schematic side view of a recording apparatus 1 according to the first embodiment of the invention, and Fig. 2 is a schematic plan view of the recording apparatus 1 according to the first embodiment of the invention.

[0041] The recording apparatus 1 of the embodiment includes a set portion 2 configured to feed a roll R1 of a recording medium P, which is an elongated recording medium for printing. The recording apparatus 1 also includes a press roller 12, which functions a first press unit, and a press roller 19, which functions as a second press unit, both configured to press the recording medium P against an adhesive belt 10 and bring the same to be adhered thereto, which functions as a movable belt, and a transporting mechanism 3 configured to transport the recording medium P by the adhesive belt 10 in a direction of transport A. The recording apparatus 1 also includes a recording mechanism 4 configured to perform recording by causing a recording head 7 to scan in both directions in a scanning direction B which intersects the direction of transport A of the recording medium P. The recording apparatus 1 further includes a cleaning mechanism 15 configured to clean the adhesive belt 10. The recording apparatus 1 still further includes a winding mechanism 18 having a winding shaft 17 configured to wind the recording medium P and a cutter 16 configured to cut the wound recording medium P.

[0042] The set portion 2 includes a rotating shaft 5 which also serves as a set position of the roll R1 of the recording medium P used for recording, and has a configuration that feeds the recording medium P to the transporting mechanism 3 set on the rotating shaft 5 from the roll R1 to a driven roller 6.

[0043] When the recording medium P is fed to the transporting mechanism 3, the rotating shaft 5 rotates in a direction of rotation C.

[0044] Here, the driven roller 6 has a function of a wrinkle reducing roller configured to reduce a probability of generation of wrinkles on the recording medium P by rotating in the direction of rotation C in association with

the transport of the recording medium P in the direction of transport A.

[0045] The transporting mechanism 3 includes the adhesive belt 10 configured to transport the recording medium P fed continuously from the set portion 2 and placed thereon, and a transporting roller 8 and a driven roller 9 configured to move the adhesive belt 10. The recording medium P is placed on the adhesive belt 10 in a state of being pressed and adhered thereto by the press roller 12. When transporting the recording medium P, the transporting roller 8 rotates in the direction of rotation C.

[0046] An optical sensor 36 which functions as a detection unit that detects an adhesion failure of the recording medium P with respect to the adhesive belt 10 is provided on the downstream side of the press roller 12 and on the upstream side of the recording head 7 in the direction of transport A. The optical sensor 36 includes a light-emitting unit 36a and a light-receiving unit 36b, and detects projections caused by the adhesion failure. However, the detection unit is not limited to the detection unit having the configuration described a bove.

[0047] The transporting roller 8, which functions as a drive mechanism of the adhesive belt 10, is configured to drive the adhesive belt 10 so as to move the adhesive belt 10 in the direction opposite to the direction of transport A when the optical sensor 36 detects the adhesion failure.

[0048] The press roller 19 is provided on the downstream side of the transporting mechanism 3 in the direction of transport A. The press roller 19 is provided at a position where the recording medium P is separated from the adhesive belt 10 in the case where the recording medium P is transported in the direction of transport A, and a position where the recording medium P is placed on (adhered to) the adhesive belt 10 when moving the recording medium in the direction opposite to the direction of transport A. With the provision of the press roller 19 at this position, there is a reduced probability that the adhesion failure occurs again when moving the recording medium P in the direction opposite to the direction of transport A, that is, when a portion of the recording medium P separated from the adhesive belt 10 once is re-adhered to the adhesive belt 10.

[0049] Therefore, there is a reduced probability of occurrence of such an event that the new adhesion failure occurs again, and hence the recording medium becomes damaged due to interference between the recording media or interference between the recording medium and the recording head, and hence the recording medium is wasted.

[0050] In the recording apparatus 1 of the first embodiment, when the optical sensor 36 detects the adhesion failure, the transporting roller 8 drives the adhesive belt 10 so that the adhesion failure portion moves to the upstream side of the driven roller 6, which functions as the wrinkle reducing roller, in the direction of transport A. Therefore, by using the transporting roller 8 and re-adhering the adhesion failure portion of the recording medium to the adhesive belt while resolving the adhesion failure at a portion where the adhesion failure has been occurred, the adhesion failure is automatically resolved.

[0051] However, the invention is not limited to the configuration described above, and, for example, a configuration in which the transporting roller 8 drives the adhesive belt 10 to move the adhesion failure portion to the upstream side of the press roller 12 in the direction of transport A when the optical sensor 36 detects the adhesion failure is also applicable. In this configuration as well, since the adhesion failure portion is separated once from the adhesive belt 10 and re-adhered thereto, for example, the adhesion failure such as lifting may be resolved automatically.

[0052] The recording mechanism 4 includes the recording head 7, a carriage, which is not illustrated, having the recording head 7 mounted thereon, and a carriage motor 26 (see Fig. 4) configured to move the carriage reciprocally in the scanning direction B. In Fig. 1, the scanning direction B corresponds to the direction perpendicular to the plane of the paper.

[0053] Recording is performed by causing the recording head 7 to scan reciprocally. However, during the recording scan (during the movement of the recording head), the transporting mechanism 3 stops the transport of the recording medium P. In other words, at the time of recording, the reciprocal scan of the recording head 7 and the transport of the recording medium P are performed alternately. In other words, the transporting mechanism 3 transports the recording medium P intermittently corresponding to the reciprocal scanning of the recording head 7.

[0054] The recording apparatus 1 in the first embodiment includes the recording mechanism 4 configured as described above. However, the invention is not limited thereto, and, for example, a configuration in which a recording mechanism has a line head is also applicable, the line head extending across the width of the recording medium P.

[0055] The cleaning mechanism 15 of the adhesive belt 10 includes a cleaning unit 13 having a plurality of cleaning rollers coupled in the direction of axes of rotation thereof, and a tray 14 containing detergent, which functions as a cleaning mechanism, of the cleaning unit 13.

[0056] The winding mechanism 18 is a mechanism configured to wind the recording medium P already printed and transported from the transporting mechanism 3 via the driven roller 11, and configured to wind the recording medium P as a roll R2 of the recording medium P by setting a paper tube or the like for winding the recording medium P on the winding shaft 17 and winding the recording medium P thereon.

[0057] As illustrated in Fig. 2, in the recording apparatus 1 of the first embodiment, a length L2 of the press roller 12 in the scanning direction B at a contact portion with respect to the recording medium P is longer than a length L1 of the recording medium P in the scanning direction B. Therefore, the entire recording medium P can

be pressed in the scanning direction B. In other words, since the press roller 12 is configured to press the recording medium P with a wide contact surface, an occurrence of unevenness of the thickness of the recording medium P is reduced and unevenness of recorded image is reduced.

[0058] A length L3 of the press roller 19 in the scanning direction B at the contact portion with respect to the recording medium P is longer than the length L1 of the recording medium P in the scanning direction B. Therefore, when the adhesive belt 10 is driven, the detection unit 36 detects the adhesion failure of the recording medium P with respect to the adhesive belt 10 and the transporting roller 8 moves the adhesive belt 10 in the direction opposite to the direction of transport A, the entire part of the recording medium P in the scanning direction B is pressed. In other words, the probability of the adhesion failure which may occur in the recording medium P with respect to the adhesive belt 10 is reduced when re-adhering a portion separated once from the adhesive belt 10 again to the adhesive belt 10.

[0059] In order to suppress the press roller 19 from causing the recorded image to become damaged by coming into contact with the recorded image on which ink is not completely fixed, an ink fixation accelerating mechanism may be provided between the recording mechanism 4 and the press roller 19 in the direction of transport A. Examples of the ink fixation accelerating mechanism include a heater, an air knife, and the like.

[0060] Subsequently, a configuration of the wrinkle reducing roller in the recording apparatus 1 of the embodiment will be described.

[0061] Fig. 3 is a schematic drawing illustrating the driven roller 6, which functions as the wrinkle reducing roller in the recording apparatus 1 of the first embodiment.

[0062] As illustrated in Fig. 3, the driven roller 6 of the first embodiment is provided on the upstream side of the press roller 12 in the recording apparatus 1 of the first embodiment in the direction of transport A, and has a concavo-convex shape on the surface thereof. When the driven roller 6 is rotated in the direction of rotation C, which is the direction of rotation at the time of transporting the recording medium P in the direction of transport A, the concave-convex surface moves from the inside to the outside in the width direction of the recording medium P (the same direction as the scanning direction B in the first embodiment).

[0063] In this configuration, the driven roller 6 of the first embodiment stretches the recording medium P in the width direction to achieve a state in which generation of wrinkles or the like is prevented. The recording apparatus 1 of the first embodiment places the recording medium P in the state described above on the adhesive belt 10.

[0064] Subsequently, an electrical configuration in the recording apparatus 1 of the first embodiment will be described.

[0065] Fig. 4 is a block diagram of the recording apparatus 1 of the first embodiment.

[0066] The control unit 20 is provided with a CPU 21 configured to control the recording apparatus 1 as a whole. The CPU 21 is connected via a system bus 22 to a ROM 23 in which various control programs that the CPU 21 executes are stored and a RAM 24 in which data can be stored temporarily. The CPU 21 is connected via the system bus 22 to a head drive unit 25 configured to drive the recording head 7.

[0067] The CPU 21 is connected to a motor drive unit 32 configured to drive the carriage motor 26, a transporting motor 27, a feed motor 28, and a winding motor 29 via the system bus 22.

[0068] Here, the carriage motor 26 is a motor configured to move a carriage on which the recording head 7 is mounted. The transporting motor 27 is a motor configured to drive the transporting roller 8. The feed motor 28 is a rotary mechanism for the rotating shaft 5, and is a motor configured to drive the rotating shaft 5 for feeding the recording medium P to the transporting mechanism 3. The winding motor 29 is a drive motor configured to rotate the winding shaft 17.

[0069] The CPU 21 is connected via the system bus 22 to a cutter drive unit 33 configured to cause the cutter 16 to be driven to cut the recording medium P.

[0070] Furthermore, the CPU 21 is connected to the optical sensor 36 which functions as a detection unit configured to detect the adhesion failure of the recording medium P with respect to the adhesive belt 10, a monitor 34 and a control panel 35 provided on the recording apparatus 1, and an interface 31 configured to be used for input of recording data or the like from an external apparatus such as a PC, via an input and output unit 30 configured to transmit and receive data and signals.

[0071] The monitor 34 also has a role as a notifying unit configured to notify the fact that the optical sensor 36 detects the adhesion failure of the recording medium P with respect to the adhesive belt 10. However, the invention is not limited to such a configuration. For example, a mechanism which generates an alarm sound may be provided as the notifying unit.

[0072] The control unit 20 of the first embodiment performs control of the respective drive units of the recording apparatus 1 as a whole. Therefore, when the optical sensor 36 detects the adhesion failure, the transporting roller 8 drives the adhesive belt 10 to move the adhesive belt 10 in the direction opposite to the direction of transport A under the control of the control unit 20. The control unit 20 also drives the adhesive belt 10 to move so that the adhesion failure portion moves to the upstream side of the driven roller 6. In other words, the control unit 20 controls the transporting roller 8 in accordance with the result of detection of the optical sensor 36. Furthermore, the control to cause the monitor 34 to display the fact that the optical sensor 36 has detected the adhesion failure of the recording medium P with respect to the adhesive belt 10 at this time is also performed by the control unit 20.

[0073] In the recording apparatus 1 of the first embod-

iment, in the case where there is a portion in the course of recording along the direction of transport A when the optical sensor 36 detects the adhesion failure, the transporting roller 8 drives the adhesive belt 10 to be moved in the direction opposite to the direction of transport A after the completion of the recording of the portion in the course of being recorded on. Therefore, by stopping the recording in a state in which there is the portion in the course of printing and restarting the printing after this portion, a problem that displacement of the recording position occurs before and after the stop and hence unevenness of the corresponding part occurs is prevented.

[0074] The "portion in the course of printing" in this case occurs when recording is performed in a recording mode in which the recording is completed by a plurality of times of recording scan on the same recording area. For example, in the case where there is a portion where the recording scan has been performed only once in a recording mode in which the recording on the same recording area is to be completed by two times of the recording scan, the portion in which the recording scan has been performed only once corresponds to the portion in the course of recording. In such a case, the recording apparatus 1 of the first embodiment performs the recording scan for the second time on the portion where the recording scan has been performed only once, and hence moves the adhesive belt 10 in the direction opposite to the direction of transport A. The control of the respective drive units relating to the operation of the recording apparatus 1 is performed by the control unit 20.

[0075] In addition, in the recording apparatus 1 of the first embodiment, the control unit 20 performs control to display the fact that the optical sensor 36 detects the adhesion failure of the recording medium P with respect to the adhesive belt 10 on the monitor 34 every time it occurs. However, the invention is not limited to the method described above. For example, applicable configurations include a configuration in which, when the optical sensor 36 detects the adhesion failure, a process of returning the recording medium P to the upstream side of the driven roller 6 and a process of transporting the recording medium P in the direction of transport A are performed several times, and when the adhesion failure is not resolved thereby, the detection of the adhesion failure is notified.

[0076] In the recording apparatus 1 of the first embodiment, the press roller 19 presses the recording medium P during transportation of the recording medium P in the direction of transport A. However, the invention is not limited thereto. For example, applicable configurations include a configuration in which the control unit 20 controls to move the press roller 19 to a position away from the recording medium so that pressing by the press roller 19 is not performed when transporting the recording medium P in the direction of transport A, and move the press roller to a position where the recording medium P is pressed to transport the recording medium P in the direction opposite to the direction of transport A when the optical sensor 36 detects the adhesion failure. In this configuration, the recorded image in which fixation of the ink is not completed is prevented from becoming damaged due to the press roller 19 coming into contact with the portion of the recording medium P where image is recorded.

Second Embodiment (Fig. 5)

[0077] Subsequently, a recording apparatus according to a second embodiment of the invention will be described.

[0078] Fig. 5 is a schematic plan view illustrating the recording apparatus according to the second embodiment of the invention. Components common to those of the first embodiment have the same reference signs and detailed description will be omitted.

[0079] The recording apparatus 1 of the second embodiment is different from the recording apparatus 1 of the first embodiment in that a press roller 37 which functions as a second press unit, has a non-contact portion 39 which does not contact with the recording medium P.

[0080] As illustrated in Fig. 5, the press roller 37 of the second embodiment includes the non-contact portion 39 having a rod shape extending in a direction along the axis of rotation (the scanning direction B) and configured not to come into contact with the recording medium P, and contact portions 38 configured to come into contact with the recording medium P, provided on both sides of the non-contact portion 39, and having a column shape extending in the axis of rotation. Therefore, by recording an image on an inner part of the recording medium P in the width direction (scanning direction B), contact between the press roller 37 and the image is prevented. In other words, the recorded image in which fixation of the ink is not completed is prevented from becoming damaged due to the second press unit coming into contact with the portion of the recording medium P where the image is recorded.

[0081] In other words, the recording apparatus 1 of the second embodiment is capable of reducing the probability of the occurrence of the adhesion failure at the portion separated once from the adhesive belt 10 when being adhered again to the adhesive belt 10 in comparison with the case where the press roller 37 is not provided while reducing the probability of causing damage to the recorded image.

Third Embodiment (Fig. 6)

[0082] Subsequently, a recording apparatus according to a third embodiment of the invention will be described.

[0083] Fig. 6 is a schematic side view illustrating the recording apparatus according to the third embodiment of the invention. Components common to those of the above-described embodiments have the same reference signs and detailed description will be omitted.

[0084] The recording apparatus 1 of the third embod-

iment is different from the recording apparatus 1 of the first embodiment in that an air knife 40 which functions as the second press unit, is provided.

[0085] The air knife 40 of the third embodiment has a configuration in which air can be blown toward the recording medium P. Therefore, fixation of the ink recorded on the recording medium P may be accelerated. Since the air knife 40 does not contact with the recording medium P, the recorded image in which fixation of the ink is not completed is prevented from becoming damaged due to the second press unit (the air knife 40) coming into contact with the portion of the recording medium P where the image is recorded.

[0086] The recording apparatus 1 of the third embodiment is capable of reducing the probability of the occurrence of the adhesion failure at the portion separated once from the adhesive belt 10 when being adhered again to the adhesive belt 10 while reducing the probability of causing damages on the recorded image. The air knife 40 of the third embodiment can also be used in conjunction of the press roller 19, 37 of the first or second embodiments.

Example of Recording Method (Fig. 7)

[0087] Subsequently, a recording method according to an example of the invention will be described.

[0088] Fig. 7 is a flowchart illustrating the recording method according to the example of the invention.

[0089] The recording method of this example is an example of a method performed by using the recording apparatus 1 of the first embodiment.

[0090] When the recording medium P is placed on the adhesive belt 10 and the recording data is input to the recording apparatus 1 as a print-start command, in Step S110, the recording apparatus 1 transports the recording medium P to a predetermined position, and detects adhesion of the recording medium P to the adhesive belt 10 with the optical sensor 36.

[0091] Subsequently, in Step S120, the control unit 20 determines presence or absence of the adhesion failure from the result of detection of Step S110. When it is determined that the adhesion failure occurs in Step S120, the procedure goes to Step S130, and when it is determined that no adhesion failure occurs, the procedure goes to Step S150.

[0092] In Step S130, the control unit 20 controls the transporting roller 8, and the transporting roller 8 moves the adhesive belt 10 in the direction opposite to the direction of transport A. When the adhesive belt 10 moves in the direction opposite to the direction of transport A, the recording medium P separated from the adhesive belt 10 is pressed again with the press roller 19 and is re-adhered to the adhesive belt 10.

[0093] When the adhesive belt 10 moves in the direction opposite to the direction of transport A in Step S140, the recording medium P is pressed again by the press roller 12.

[0094] In the recording method of this example, Step S130 and Step S140 are performed simultaneously.

[0095] When Step S130 and Step S140 are not performed simultaneously, the press roller 12 is moved upward at the time of execution of Step S130. When the adhesive belt 10 moves in the direction of transport A in Step S140, the recording medium P is pressed again by the press roller 12 and is adhered to the adhesive belt 10.

[0096] Then, when Step S130 and Step S140 are terminated, the procedure goes back to Step S110.

[0097] In Step S150, the control unit 20 determines whether or not the recording of the recording data input to the recording apparatus 1 is terminated. When it is determined that the recording is not terminated in this step, Step S110 to Step S150 are repeated until it is determined that the recording is terminated. When it is determined that the recording is terminated, the recording method in this example is terminated.

[0098] In the recording method of this example, the respective steps from Step S110 to Step S150 are performed corresponding to each recording scan of the recording head 7.

[0099] The foregoing description has been given by way of example only and it will be appreciated by a person skilled in the art that modifications can be made without departing from the scope of the present invention.

Claims

1. A recording apparatus (1) comprising:

an adhesive belt (10) configured to transport a recording medium (P);
a drive mechanism (8, 27) configured to drive the adhesive belt;
first and second press units (12, 19) configured to press the recording medium and adhere the recording medium to the adhesive belt;
a recording head (7) configured to record on the recording medium;
a detection unit (36) provided on a downstream side of the first press unit (12) and on an upstream side of the recording head (7) in a direction of transport (A) of the recording medium and configured to detect an adhesion failure of the recording medium with respect to the adhesive belt; and
a control unit (20) configured to perform control of the drive mechanism, wherein
the second press unit (19) is provided on the downstream side of the recording head (7) in the direction of transport (A) and
the control unit (20) is adapted to control the drive mechanism in accordance with a result of detection of the detection unit.

2. The recording apparatus according to Claim 1,

wherein
the control unit (20) is adapted to control the drive mechanism so that the recording medium moves in a direction opposite to the direction of transport when the detection unit detects the adhesion failure.

3. The recording apparatus according to Claim 1 or Claim 2, wherein
the second press unit (40) is adapted to press the recording medium in a non-contact state.

4. The recording apparatus according to any one of the preceding claims, wherein
the control unit (20) is adapted to control the drive mechanism so that the adhesion failure portion moves to the upstream side of the first press unit when the detection unit detects the adhesion failure.

5. The recording apparatus according to Claim 4, wherein
the recording apparatus includes a wrinkle reducing roller (6) for the recording medium on the upstream side of the first press unit (12) in the direction of transport,
the wrinkle reducing roller is provided with concavo-convex on a surface thereof and has a configuration in which the concavo-convex moves from the inside to the outside in the width direction (B) of the recording medium (P) when the recording medium is rotated in a direction of rotation at the time of transporting the recording medium in the direction of transport, and
the control unit (20) is adapted to control the drive mechanism so that the adhesion failure portion moves to the upstream side of the wrinkle reducing roller (6) when the detection unit detects the adhesion failure.

6. The recording apparatus according to any one of the preceding claims, comprising:

a notifying unit (34) configured to notify the fact that the detection unit detects the adhesion failure.

7. The recording apparatus according to any one of the preceding claims, wherein
the recording head (7) is adapted to record on the recording medium by scanning reciprocally in a scanning direction intersecting the direction of transport, and
if there is a portion in the course of recording along the scanning direction when the detection unit detects the adhesion failure, the control unit (20) is adapted to control the drive mechanism so that the recording medium moves in a direction opposite to the direction of transport after the recording of the portion in the course of recording is completed.

8. The recording apparatus according to any one of the preceding claims, wherein
the second press unit (19) is capable of changing a position with respect to the recording medium, and
when transporting the recording medium in the direction of transport, the second press unit is adapted to be in a non-contact state with respect to the recording medium.

9. A recording method configured to perform by using a recording apparatus (1), the recording apparatus comprising:

an adhesive belt (10) configured to transport a recording medium (P);
a drive mechanism (8, 27) configured to drive the adhesive belt;
a first press unit (12) configured to press the recording medium and adhere the recording medium to the adhesive belt;
a recording head (7) configured to record on the recording medium; and
a detection unit (36) provided on a downstream side of the first press unit and on an upstream side of the recording head in a direction of transport (A) of the recording medium and configured to detect an adhesion failure of the recording medium with respect to the adhesive belt, wherein
the recording medium is moved in a direction opposite to the direction of transport when the detection unit detects the adhesion failure.

FIG. 1

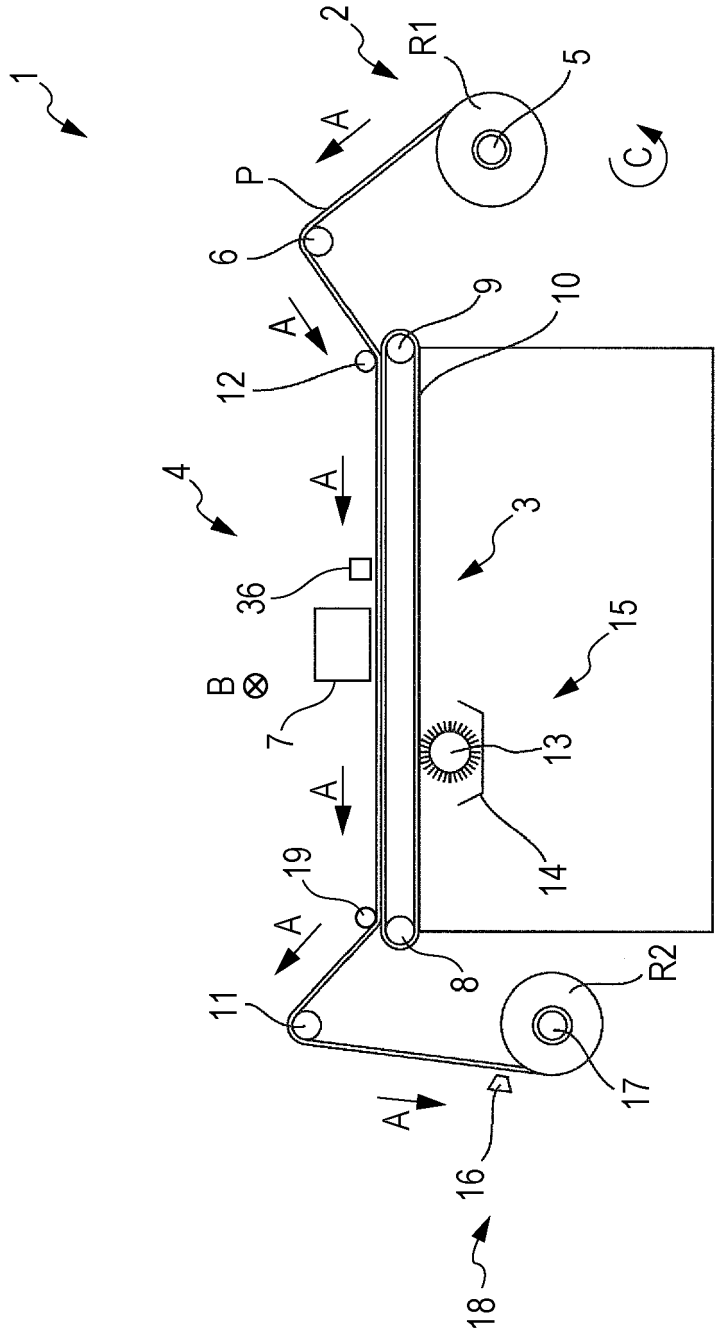


FIG. 2

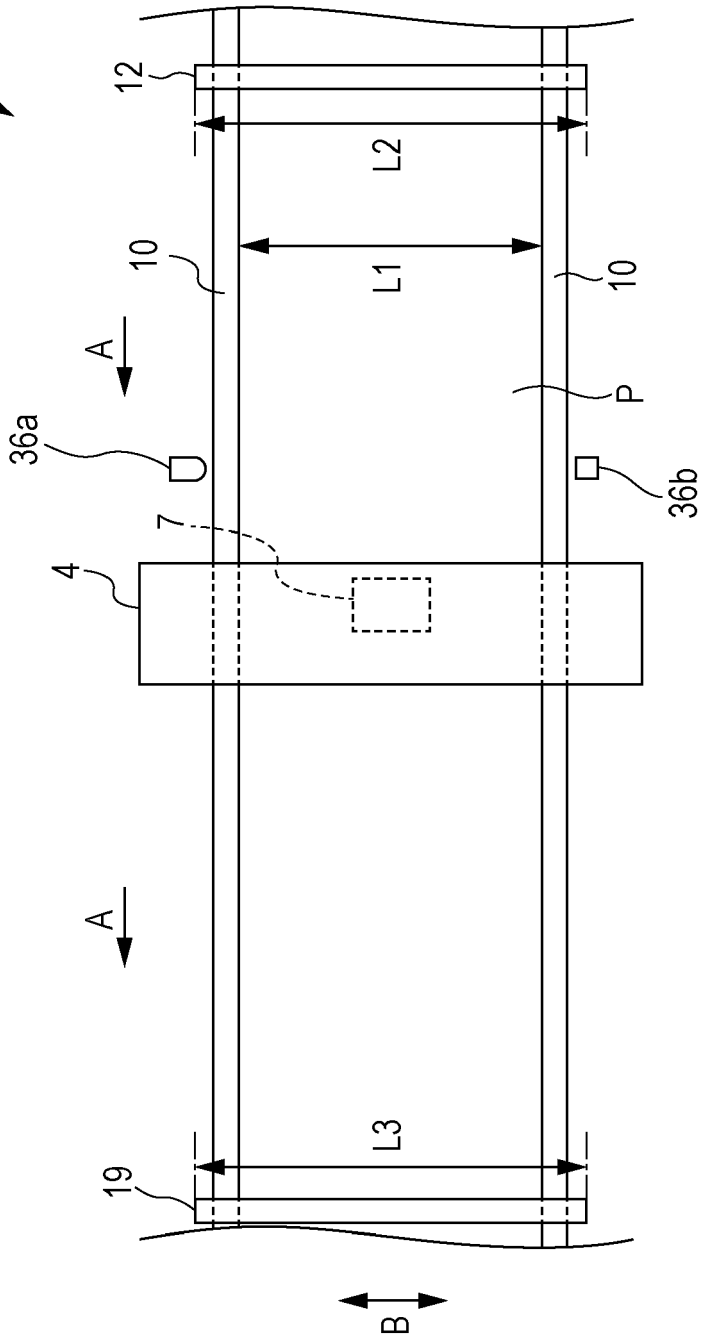


FIG. 3

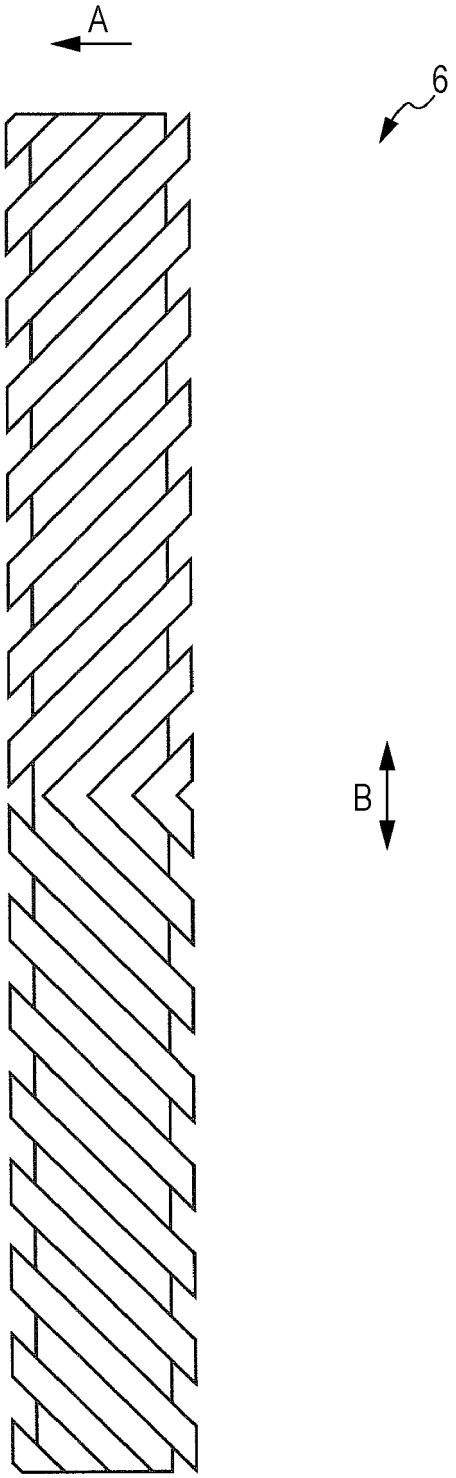


FIG. 4

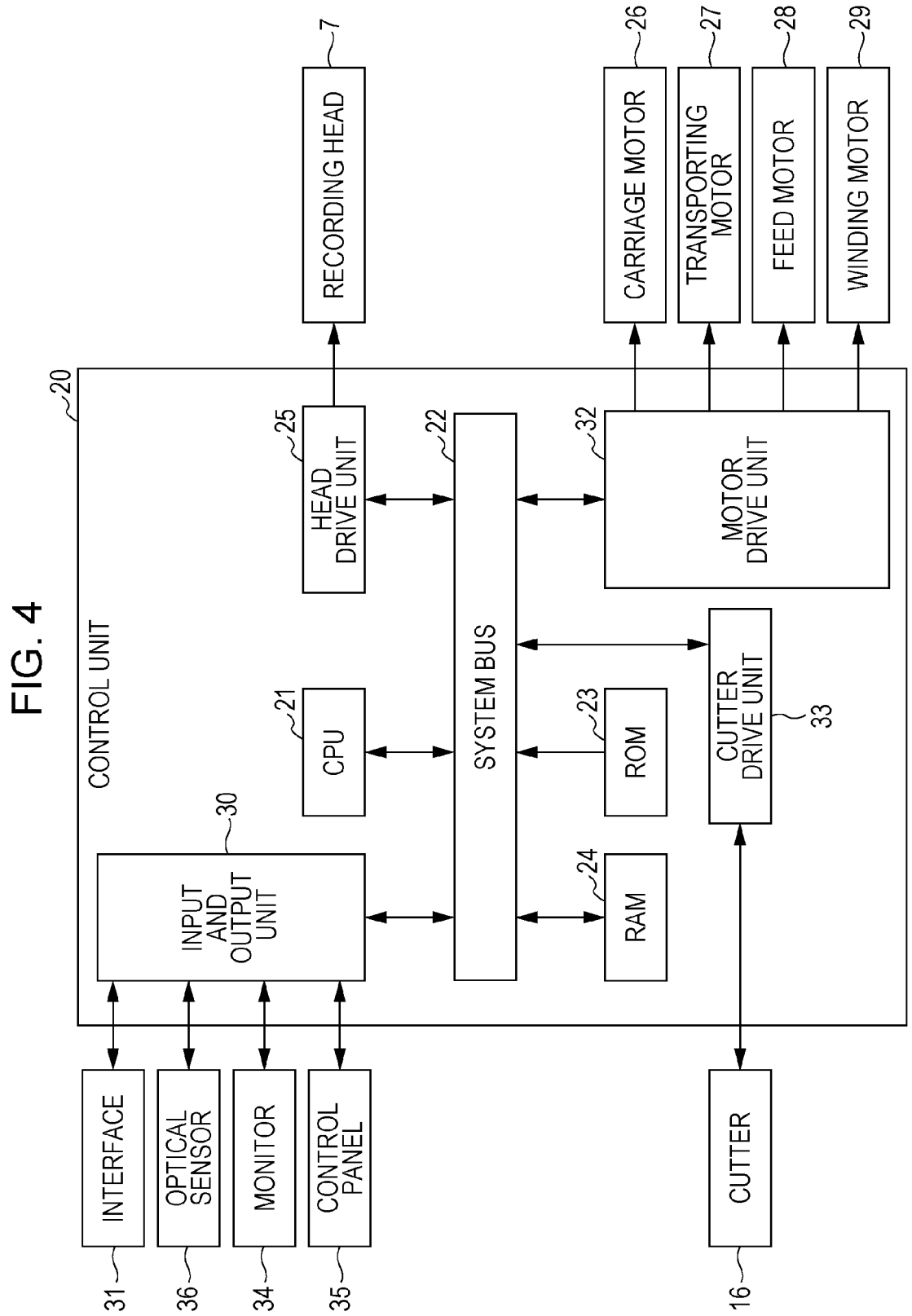

CONTROL UNIT
20
RECORDING HEAD
7
CARRIAGE MOTOR
26
TRANSPORTING MOTOR
27
FEED MOTOR
28
WINDING MOTOR
29
HEAD DRIVE UNIT
25
SYSTEM BUS
22
MOTOR DRIVE UNIT
32
CPU
21
ROM
23
CUTTER DRIVE UNIT
33
INPUT AND OUTPUT UNIT
30
RAM
24
INTERFACE
31
OPTICAL SENSOR
36
MONITOR
34
CONTROL PANEL
35
CUTTER
16

FIG. 5

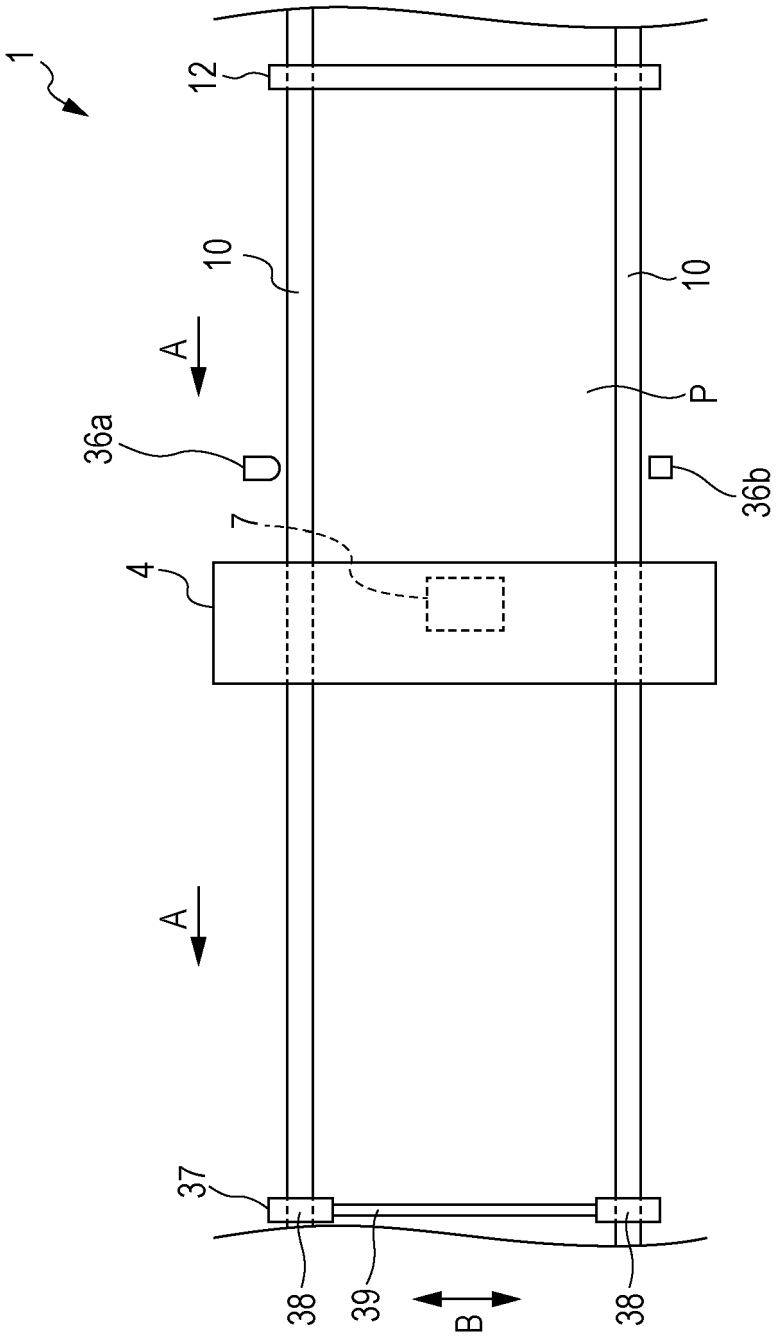


FIG. 6

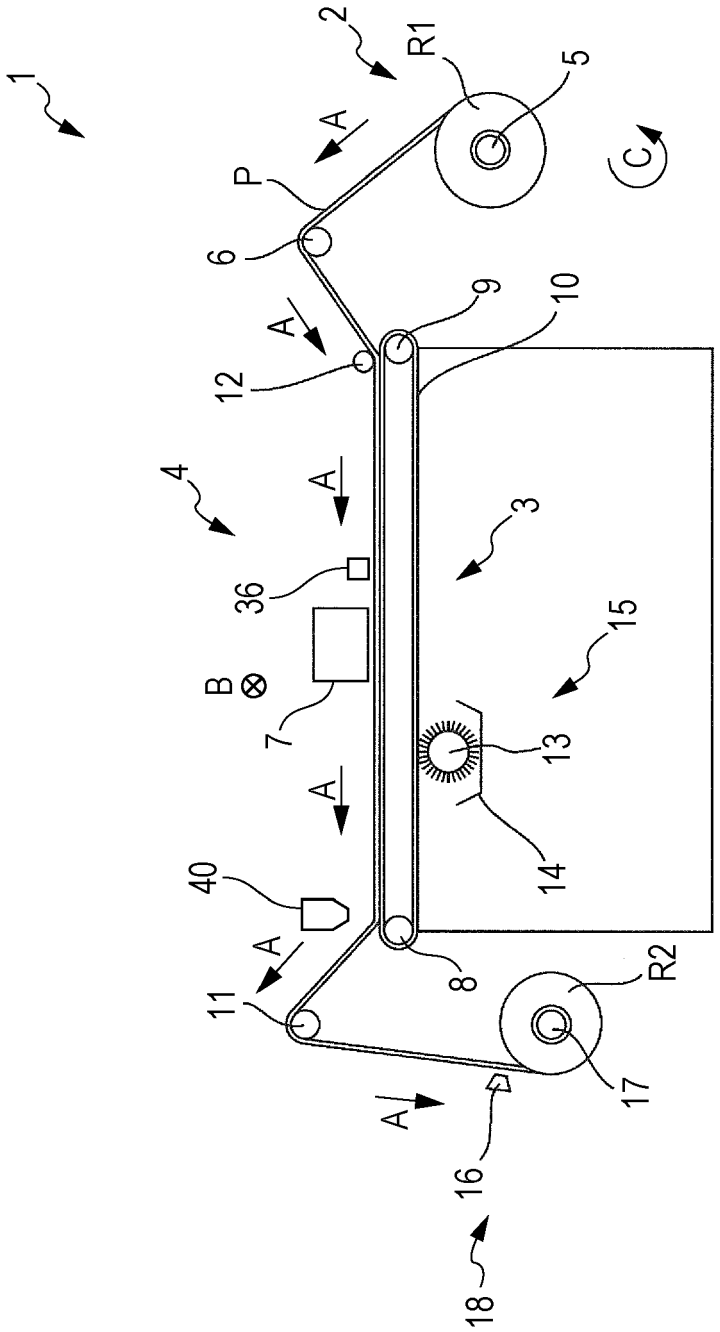
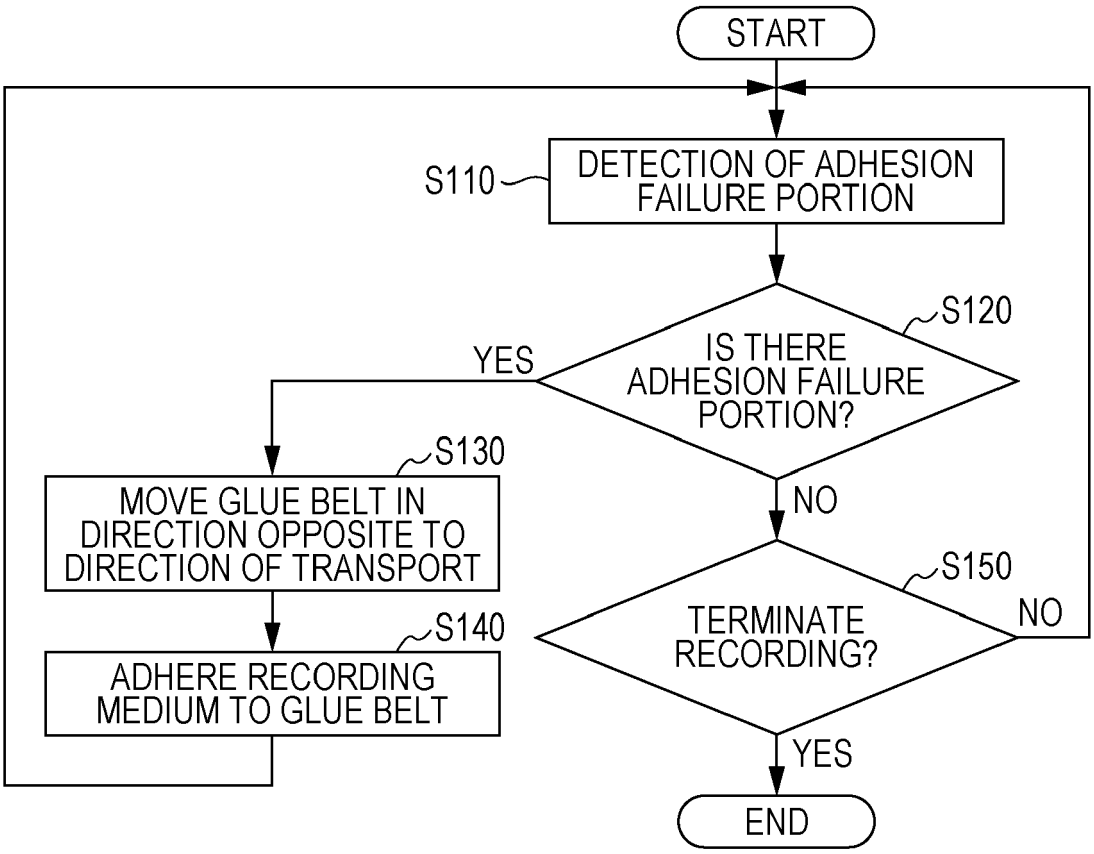


FIG. 7


START
S110
DETECTION OF ADHESION FAILURE PORTION
S120
IS THERE ADHESION FAILURE PORTION?
YES
NO
S130
MOVE GLUE BELT IN DIRECTION OPPOSITE TO DIRECTION OF TRANSPORT
S140
ADHERE RECORDING MEDIUM TO GLUE BELT
S150
TERMINATE RECORDING?
NO
YES
END

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 15 1654

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	EP 1 782 959 A1 (RISO KAGAKU CORP [JP]) 9 May 2007 (2007-05-09) * paragraph [0047]; figure 10 * * paragraph [0059] *	1,9 2,4	INV. B41J11/00
A	US 2009/167833 A1 (MOCHIZUKI SEIJI [JP]) 2 July 2009 (2009-07-02) * paragraph [0054] - paragraph [0083] *	1,9	
A	US 2010/118098 A1 (EBIHARA TOSHIYUKI [JP]) 13 May 2010 (2010-05-13) * the whole document *	1,2,9	
A	US 2006/192830 A1 (LEE KILHUN [KR]) 31 August 2006 (2006-08-31) * paragraphs [0011], [0039] *	1,9	
A	US 2008/122890 A1 (YORIMOTO MAMORU [JP]) 29 May 2008 (2008-05-29) * paragraph [0018] - paragraph [0020] *	1,2,4,9	
A	US 2002/054781 A1 (KOREM AHARON [IL]) 9 May 2002 (2002-05-09) * the whole document *	1,9	TECHNICAL FIELDS SEARCHED (IPC) B41J
E	EP 2 689 934 A1 (RICOH CO LTD [JP]) 29 January 2014 (2014-01-29) * paragraph [0069] - paragraph [0072]; figure 8 *	1,9	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 March 2014	Curt, Denis

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 15 1654

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

19-03-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1782959 A1	09-05-2007	EP 1782959 A1	09-05-2007
		JP 5046508 B2	10-10-2012
		JP 2007130761 A	31-05-2007
		US 2007103534 A1	10-05-2007
US 2009167833 A1	02-07-2009	NONE	
US 2010118098 A1	13-05-2010	JP 5286038 B2	11-09-2013
		JP 2010115808 A	27-05-2010
		US 2010118098 A1	13-05-2010
US 2006192830 A1	31-08-2006	CN 1593915 A	16-03-2005
		DE 602004009508 T2	21-08-2008
		EP 1512540 A1	09-03-2005
		ES 2293132 T3	16-03-2008
		JP 2007504970 A	08-03-2007
		KR 20050025492 A	14-03-2005
		RU 2348536 C2	10-03-2009
		TR 200601011 T2	22-01-2007
		TW I269715 B	01-01-2007
		US 2006192830 A1	31-08-2006
		WO 2005023551 A1	17-03-2005
US 2008122890 A1	29-05-2008	CN 101190613 A	04-06-2008
		JP 5122794 B2	16-01-2013
		JP 2008132606 A	12-06-2008
		US 2008122890 A1	29-05-2008
US 2002054781 A1	09-05-2002	AU 1517902 A	21-05-2002
		US 2002054781 A1	09-05-2002
		WO 0238855 A2	16-05-2002
EP 2689934 A1	29-01-2014	CN 103568602 A	12-02-2014
		EP 2689934 A1	29-01-2014
		JP 2014024282 A	06-02-2014
		US 2014029023 A1	30-01-2014

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 11192694 A **[0002] [0005]**