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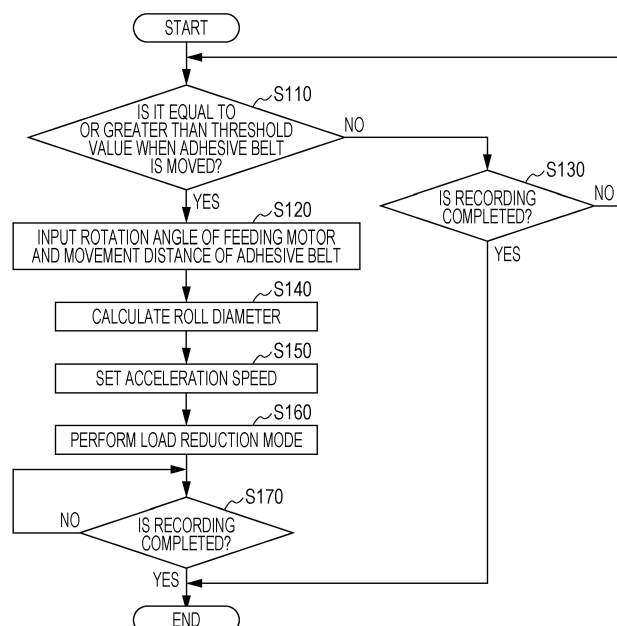
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(54) **Recording apparatus and recording method**

(57) A recording apparatus includes a transport mechanism that can intermittently move a movable belt capable of supporting a recording medium; a feeding unit that feeds the recording medium left in a stretched state to the movable belt by receiving tension from the recording medium in response to the intermittent movement of the movable belt; and a recording mechanism that per-

forms recording by causing a recording head to reciprocate in a direction which intersects a transport direction of the recording medium. When the load sensor detects the load which is equal to or greater than a predetermined threshold value, a load reduction mode for decelerating an acceleration speed during the intermittent movement of the movable belt is performed.

FIG. 5



Description

BACKGROUND

1. Technical Field

[0001] The present invention relates to a recording apparatus that includes a transport mechanism which supports and transports a recording medium by using a movable belt, and to a recording method for the same.

2. Related Art

[0002] In the related art, recording apparatuses that include a transport mechanism which supports and transports a recording medium by using a movable belt have been used. Out of the recording apparatuses as described above, a recording apparatus that includes a feeding unit which feeds the recording medium to the movable belt capable of supporting the recording medium has been used. For example, JP-A-2005-219845 discloses an image forming apparatus serving as the recording apparatus, which includes a recording medium supply device serving as the feeding unit.

[0003] In a recording apparatus that includes a feeding unit which feeds a recording medium to a movable belt capable of supporting the recording medium, depending on the type and size of the recording medium or environmental conditions, in some cases, an excessive load is applied to a feeding motor which drives the feeding unit. The description, "the excessive load is applied to the feeding motor" means that an excessive force is applied to the recording medium since the recording medium is pulled to the feeding unit side from a movable belt. In some cases, the recording medium is damaged or wrinkles are caused to occur thereon. Heat generation or breakdown due to the excessive load applied to the feeding motor can be settled by taking a countermeasure of using a feeding motor which has long durability or which is produced based on high torque specifications. However, it is not possible to prevent the recording medium from being damaged or wrinkled, and additionally the feeding motor becomes expensive. Therefore, in the related art, in order to prevent the excessive load from being applied to the motor (the excessive force from being applied to the recording medium), a load sensor is disposed. In this manner, if the load sensor detects that the excessive load is applied to the motor, a feedback control is performed by rotating the motor so as to reduce the load.

[0004] However, in the above-described feedback control, the motor is rotated after the excessive load is applied to the motor. Consequently, in some cases, an advantageous effect cannot be sufficiently obtained when preventing the excessive load from being applied to the motor. The load applied to the motor reaches a peak before the rotor is rotated (moment when the force is applied to the motor left in a stopped state). Therefore, even if the motor is rotated after detecting that the ex-

cessive load is applied to the motor, the load is repeatedly applied thereto. Then, the load is gradually accumulated in the motor, thereby resulting in a case where the motor becomes hot, for example.

[0005] That is, in the related art, in the recording apparatus that includes a movable belt capable of supporting a recording medium and a feeding unit which feeds the recording medium to the movable belt, it is insufficient to prevent the excessive load from being applied to the feeding motor of the feeding unit.

SUMMARY

[0006] An advantage of some aspects of the invention is to prevent an excessive load from being applied to a feeding motor which drives a feeding unit, in a recording apparatus that includes a movable belt capable of supporting a recording medium and the feeding unit which feeds the recording medium to the movable belt.

[0007] According to an aspect of the invention, there is provided a recording apparatus including a transport mechanism that can intermittently move a movable belt capable of supporting a recording medium; a feeding unit that feeds the recording medium left in a stretched state to the movable belt by receiving tension from the recording medium in response to the intermittent movement of the movable belt; and a recording mechanism that performs recording by causing a recording head to reciprocate in a direction which intersects a transport direction of the recording medium. The feeding unit has a feeding motor serving as a drive source and a load sensor of the feeding motor which can detect a load based on the tension. When the load sensor detects the load which is equal to or greater than a predetermined threshold value, a load reduction mode for decelerating (reducing) an acceleration speed (acceleration) during the intermittent movement of the movable belt is performed.

[0008] Here, the aspect may include a configuration where it is possible "to feed the recording medium to the movable belt in the stretched state of the recording medium". If it is possible to feed the recording medium to the movable belt in the stretched state of the recording medium, the aspect may include a configuration where it is also possible to feed the recording medium to the movable belt in a slack state of the recording medium.

[0009] In addition, the description, "that the recording medium left in a stretched state is fed to the movable belt by receiving tension from the recording medium in response to the intermittent movement of the movable belt" means that the recording medium is fed to the movable belt after the tension from the recording medium is received. That is, in addition to a configuration where the feedback control in the related art can be performed, in a configuration where the force is applied to the recording medium, that is, to a side opposite to a side where the recording medium is fed to the movable belt in the feeding unit (configuration where a so-called back tension is applied), the meaning also includes a configuration where

the recording medium is fed by the drive force of the movable belt by releasing the force of the opposite side after the feeding unit receives the tension applied from the recording medium. Furthermore, the meaning also includes a configuration where the recording medium is caused to maintain the stretched state by using the weight of the recording medium itself and the recording medium is fed by mainly using the drive force of the movable belt.

[0010] In addition, the description, "decelerating the acceleration speed during the intermittent movement of the movable belt" means decelerating (reducing) the acceleration speed (acceleration) in a state where the movable belt is stopped and then is caused to move during the intermittent movement of the movable belt. That is, it does not mean decelerating (reducing) the maximum speed when the movable belt is moved.

[0011] In this case, the acceleration speed during the intermittent movement of the movable belt is decelerated. Accordingly, it is possible to prevent the load from being applied to the feeding motor during the intermittent movement. In addition, only the acceleration speed during the intermittent movement of the movable belt is decelerated and the maximum speed is not decelerated. In this manner, it is possible to prevent throughput from being decreased.

[0012] In the recording apparatus, the recording medium may have a roll shape. The feeding unit may feed the roll-shaped recording medium in response to a rotation drive of the feeding motor. In the load reduction mode, during the intermittent movement of the movable belt, for the recording medium having the largest roll diameter which is supposed to be used and the recording medium having the smallest roll diameter which is supposed to be used, the acceleration speed when the movable belt is moved is decelerated so that the recording medium maintains the stretched state and the load is smaller than the threshold value.

[0013] In this case, during the intermittent movement of the movable belt, for the recording medium having the largest roll diameter which is supposed to be used and the recording medium having the smallest roll diameter which is supposed to be used, the acceleration speed when the movable belt is moved is decelerated so that the recording medium maintains the stretched state. Therefore, even when using the recording medium having any roll diameter which is supposed to be used, it is possible to feed the recording medium in the stretched state of the recording medium.

[0014] In addition, in this case, during the intermittent movement of the movable belt, for the recording medium having the largest roll diameter which is supposed to be used and the recording medium having the smallest roll diameter which is supposed to be used, the acceleration speed when the movable belt is moved is decelerated so that the load is smaller than the threshold value. Therefore, even when using the recording medium having any roll diameter which is supposed to be used, it is possible

to cause the load to be smaller than the threshold value.

[0015] The recording apparatus further includes a reception unit that receives information of the roll diameter. Based on the information of the roll diameter which is received by the reception unit, the acceleration speed in the load reduction mode is adjusted.

[0016] Here, the description, "information of the roll diameter" is not particularly limited as long as the information relates to the roll diameter. For example, the information includes information output from a sensor which can measure the roll diameter, information of the roll diameter which is input from a user via a user interface and information obtained by calculating the roll diameter input as an initial value and a transport distance of the recording medium.

[0017] In this case, based on the information of the roll diameter which is received by the reception unit, it is possible to adjust the acceleration speed in the load reduction mode. Therefore, it is possible to accurately prevent the load from being applied to the feeding motor during the intermittent movement.

[0018] The recording apparatus further includes a calculation unit that calculates the roll diameter by using a rotation angle of the feeding motor and a movement distance of the movable belt. The reception unit receives a calculation result of the calculation unit.

[0019] In this case, based on the information of the roll diameter as the calculation result of the calculation unit, it is possible to adjust the acceleration speed. Therefore, it is possible to accurately prevent the load from being applied to the feeding motor during the intermittent movement.

[0020] In the recording apparatus, based on a detection result of the load sensor, the acceleration speed in the load reduction mode can be set.

[0021] In this case, based on the detection result of the load sensor, it is possible to set the acceleration speed in the load reduction mode. Therefore, it is possible to accurately prevent the load from being applied to the feeding motor during the intermittent movement.

[0022] In the recording apparatus, the movable belt may be an adhesive belt.

[0023] In the recording apparatus having the adhesive belt (belt having a coated adhesive which holds the recording medium by detachably adhering the recording medium on a surface for setting the recording medium) serving as the movable belt, it is possible to stably support the recording medium. Therefore, it is possible to preferably use the adhesive belt as the movable belt.

[0024] In this case, since the recording medium can be stably supported, it is possible to improve the quality of the recorded image.

[0025] In addition, in the recording apparatus including the adhesive belt, the recording medium firmly adheres to the adhesive belt. Accordingly, there is a tendency to increase the load which is applied to the feeding motor when the movable belt is moved. However, in this case, even in the recording apparatus including the adhesive

belt, it is possible to prevent the excessive load from being applied to the feeding motor.

[0026] According to another aspect of the invention, there is provided a recording method using a recording apparatus which includes a transport mechanism that can intermittently move a movable belt capable of supporting a recording medium; a feeding unit that feeds the recording medium left in a stretched state to the movable belt by receiving tension from the recording medium in response to the intermittent movement of the movable belt; and a recording mechanism that performs recording by causing a recording head to reciprocate in a direction which intersects a transport direction of the recording medium, in which the feeding unit has a feeding motor serving as a drive source and a load sensor of the feeding motor which can detect a load based on the tension. The method includes decelerating (reducing) an acceleration speed (acceleration) during the intermittent movement of the movable belt, when the load sensor detects the load which is equal to or greater than a predetermined threshold value.

[0027] In this case, the acceleration speed during the intermittent movement of the movable belt is decreased. Therefore, it is possible to prevent the load from being applied to the feeding motor during the intermittent movement. In addition, only the acceleration speed during the intermittent movement of the movable belt is decelerated and the maximum speed is not decelerated. In this manner, it is possible to prevent throughput from being decreased.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] 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 an embodiment of a recording apparatus of the invention.

Fig. 2 is a block diagram illustrating the embodiment of the recording apparatus of the invention.

Fig. 3 illustrates a calculation method of a roll diameter of a recording medium in the recording apparatus of the invention.

Figs. 4A and 4B illustrate a load reduction mode of the recording apparatus of the invention.

Fig. 5 is a flowchart illustrating an embodiment of a recording method of the invention.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

Embodiment of Recording Apparatus, Figs. 1 to 4B

[0029] Hereinafter, a recording apparatus according to an embodiment of the invention will be described in detail with reference to the accompanying drawings.

[0030] First, the recording apparatus according to the

embodiment of the invention will be described. The recording apparatus of the embodiment has a configuration including an adhesive belt serving as a movable belt. However, the embodiment is not limited to the above-described configuration. For example, an electrostatic adsorption type of movable belt can also be used.

[0031] Fig. 1 is a schematic side view of a recording apparatus 1 according to an embodiment of the invention.

[0032] The recording apparatus 1 of the embodiment includes a feeding unit 2 which can feed a roll R1 of a recording medium P for recording. In addition, the recording apparatus 1 includes a transport mechanism 3 which transports the recording medium P in a transport direction A by using an adhesive belt 10 serving as the movable belt. In addition, the recording apparatus 1 includes a recording mechanism 4 which performs recording by causing a recording head 7 to reciprocate in a scanning direction B which intersects the transport direction A of the recording medium P. In addition, the recording apparatus 1 includes a cleaning mechanism 15 of the adhesive belt 10. In addition, the recording apparatus 1 includes a winding mechanism 18 which has a winding shaft 17 for winding the recording medium P and a cutter 16 for cutting the wound recording medium P.

[0033] The feeding unit 2 includes a rotary shaft 5 serving as a setting position of the roll R1 of the recording medium P to be recorded. The feeding unit 2 is configured to be capable of feeding the recording medium P to the transport mechanism 3 from the roll R1 set in the rotary shaft 5 via a driven roller 6. When the recording medium P is fed to the transport mechanism 3, the rotary shaft 5 is rotated in a rotation direction C.

[0034] The rotary shaft 5 is rotatable by using a feeding motor 28 (refer to Fig. 2) as a drive source, and has a load sensor 36 (refer to Fig. 2) which can detect a load applied to the feeding motor 28 based on tension applied from the recording medium P in response to an intermittent movement of the adhesive belt 10.

[0035] The transport mechanism 3 includes the adhesive belt 10 which performs transporting by placing the recording medium P delivered from the feeding unit 2 thereon, a transport roller 8 which moves the adhesive belt 10, and a driven roller 9. The recording medium P is pressed to the adhesive belt 10 by a pressure roller 12 so that the recording medium P adheres to and is placed on the adhesive belt 10. When the recording medium P is transported, the transport roller 8 is rotated in the rotation direction C.

[0036] The recording mechanism 4 has a recording head 7, a carriage (not illustrated) on which the recording head 7 is mounted, and a carriage motor 26 (refer to Fig. 2) which causes the carriage to reciprocate in the scanning direction B. The scanning direction B in Fig. 1 is a direction perpendicular to a paper surface in Fig. 1.

[0037] During the recording, the recording scan is performed by causing the recording head 7 to reciprocate. However, during the recording scan (during the movement of the recording head 7), the transport mechanism

3 stops transporting the recording medium P. In other words, during the recording, reciprocating scanning of the recording head 7 and transporting of the recording medium P are alternately performed. That is, during the recording, corresponding to the reciprocating scan of the recording head 7, the transport mechanism 3 intermittently transports the recording medium P.

[0038] The cleaning mechanism 15 of the adhesive belt 10 has a cleaning unit 13 configured so that multiple cleaning rollers are connected to one another in a rotary shaft direction, and a tray 14 which contains a cleaning agent for cleaning the cleaning unit 13.

[0039] The winding mechanism 18 is a mechanism for winding the recorded recording medium P which is transported from the transport mechanism 3 via a driven roller 11. The winding mechanism 18 can wind the recording medium P as a roll R2 by setting a winding paper tube in the winding shaft 17 and gradually winding the recording medium around the winding paper tube.

[0040] Next, an electrical configuration in the recording apparatus 1 of the embodiment will be described.

[0041] Fig. 2 is a block diagram of the recording apparatus 1 of the embodiment.

[0042] A CPU 21 which performs overall controls of the recording apparatus 1 is disposed in a control unit 20. A ROM 23 which stores various control programs executed by the CPU 21, and a RAM 24 which can temporarily store data are connected to the CPU 21 via a system bus 22. In addition, the CPU 21 is connected to a head drive unit 25 for driving the recording head 7, via the system bus 22.

[0043] In addition, the CPU 21 is connected to a motor drive unit 32 for driving a carriage motor 26, a belt motor 27, the feeding motor 28 and a winding motor 29, via the system bus 22.

[0044] Here, the carriage motor 26 is a motor for moving the carriage on which the recording head 7 is mounted. In addition, the belt motor 27 is a motor for driving the transport roller 8. In addition, the feeding motor 28 is a rotary mechanism of the rotary shaft 5, and is a motor for driving the rotary shaft 5 in order to feed the recording medium P to the transport mechanism 3. Then, the winding motor 29 is a drive motor for rotating the winding shaft 17.

[0045] In addition, the CPU 21 is connected to a cutter drive unit 33 for driving a cutter 16 so as to cut the recording medium P, via the system bus 22.

[0046] Furthermore, the CPU 21 is connected to a monitor 34 and a control panel 35 which are disposed in the recording apparatus 1, a load sensor 36 which can detect a load applied to the feeding motor 28, and an interface 31 for inputting recording data from an external device such as a PC via an input and output unit 30 for transmitting and receiving data and signals.

[0047] The recording apparatus 1 of the embodiment has a load reduction mode in order to reduce the load applied to the feeding motor 28. Then, a program for executing these modes is stored in the ROM 23.

[0048] More specifically, in the load reduction mode, when the load sensor 36 detects the load which is equal to or greater than a predetermined threshold value, the control unit 20 controls to decelerate (reduce) the acceleration speed during the intermittent movement of the adhesive belt 10, when the adhesive belt 10 is intermittently moved several times from the second time (i.e. subsequent) movement.

[0049] In the recording apparatus 1 of the embodiment, the control unit 20 has a role as a reception unit which receives information of a roll diameter of the roll R1 of the recording medium P set on the rotary shaft 5. In the recording apparatus 1 of the embodiment, it is possible to receive the information of the roll diameter which is input from a user via a control panel 35 serving as a user interface. In addition, it is also possible to receive the information of the roll diameter which is input from an external device such as a PC via an interface 31. Furthermore, in the recording apparatus 1 of the embodiment, the control unit 20 is configured to be capable of calculating the roll diameter by using a rotation angle of the feeding motor 28 and a movement distance of the adhesive belt 10. In other words, the control unit 20 performs either or both a role serving as a calculation unit which calculates the roll diameter by using the rotation angle of the feeding motor 28 and the movement distance of the adhesive belt 10 and a role serving as a reception unit which receives a calculation result of the calculation unit.

[0050] In addition, it is also possible to adopt a configuration where a sensor which can measure the roll diameter is disposed in the recording apparatus 1 and the control unit 20 can have as an input the information output from the sensor.

[0051] Based on the information of the roll diameter, the control unit 20 adjusts the acceleration speed during the intermittent movement of the adhesive belt 10 in the load reduction mode.

[0052] In addition, in the recording apparatus 1 of the embodiment, based on the detection result of the load which is detected by the load sensor 36, it is possible to set the acceleration speed during the intermittent movement of the adhesive belt 10 in the load reduction mode. More specifically, the control of the control unit 20 enables the acceleration speed to be automatically set based on the load. Based on the detection result of the load which is detected by the load sensor 36, a user can manually set the acceleration speed via the control panel 35 serving as the user interface.

[0053] Next, a calculation method of the roll diameter of the recording medium P in the recording apparatus 1 of the embodiment will be described.

[0054] Fig. 3 illustrates the calculation method of the roll diameter of the roll R1 of the recording medium P in the recording apparatus 1 of the embodiment.

[0055] The recording apparatus 1 of the embodiment is configured to be capable of measuring a movement distance d of the adhesive belt 10 for one time based on

the intermittent transport of the recording medium P; and a rotation angle θ of the roll R1 (rotation angle of the feeding motor 28) in response to the movement of the adhesive belt 10 for one time based on the intermittent transport of the recording medium P.

[0056] Here, the movement distance d of the adhesive belt 10 is equal to a product $r\theta$ of a radius r of the roll R1 and the rotation angle θ of the roll R1. Therefore, the radius r of the roll R1 can be expressed by d/θ . The control unit 20 calculates the roll diameter of the roll R1 by using the above-described calculation method.

[0057] Next, the load reduction mode in the recording apparatus 1 of the embodiment will be described.

[0058] Figs. 4A and 4B illustrate the load reduction mode of the embodiment.

[0059] Fig. 4A illustrates a movement speed V of the adhesive belt 10 and a load L applied to the feeding motor 28 in the time corresponding thereto, when only the feedback control in the related art is performed as the load reduction mode.

[0060] In Fig. 4A, the load L applied to the feeding motor 28 corresponding to the movement start caused by the intermittent movement of the adhesive belt 10 reaches a peak, and thus, the load L at the peak is equal to or greater than a threshold value $T1$.

[0061] The threshold value $T1$ is a predetermined threshold value based on an allowable load, even when using the recording medium P having the largest roll diameter which is supposed to be used, and even when using the recording medium P having the smallest roll diameter which is supposed to be used. In addition, a threshold value $T2$ is a predetermined threshold value based on a condition that the recording medium P maintains a stretched state, even when using the recording medium P having the largest roll diameter which is supposed to be used, and even when using the recording medium P having the smallest roll diameter which is supposed to be used. That is, it is preferable that a range of the load L be equal to or greater than the threshold value $T2$, and smaller than the threshold value $T1$.

[0062] Fig. 4B illustrates the movement speed V of the adhesive belt 10 and the load L applied to the feeding motor 28 in the time corresponding thereto, when performing the load reduction mode of the embodiment. In Fig. 4B, an acceleration speed (acceleration) which is a change rate in the movement speed V when a stopped state is transferred to a movement state during the intermittent movement of the adhesive belt 10 is slower than that of Fig. 4A.

[0063] In Fig. 4B, the belt motor 27 is driven so as to decelerate (reduce) the acceleration speed (acceleration) during the intermittent movement of the adhesive belt 10. Therefore, the load L at the peak is smaller than the threshold value $T1$. That is, the range of the load L is equal to or greater than the threshold value $T2$, and smaller than the threshold value $T1$, even at the peak. It is possible to decrease the value of the load L at the peak as much as the acceleration speed during the intermittent

movement of the adhesive belt 10 is decelerated.

[0064] Instead of not performing the feedback control in the related art, the above-described load reduction mode is performed together with the feedback control in the related art. That is, in the above-described load reduction mode, the belt motor 27 is driven so as to decelerate the acceleration speed during the intermittent movement of the adhesive belt 10. However, together with the drive control of the belt motor 27, the feedback control in the related art is performed on the feeding motor 28.

Embodiment of Recording Method, Fig. 5

[0065] Next, a recording method of the embodiment will be described.

[0066] Fig. 5 is a flowchart illustrating the recording method of the embodiment.

[0067] The recording method of the embodiment is an embodiment achieved by using the recording apparatus 1 of the above-described embodiment.

[0068] In the recording method of the embodiment, if the recording apparatus 1 has recording data input thereto, initially in step S110, the control unit 20 controls the adhesive belt 10 to intermittently move. The control unit 20 causes the load sensor 36 to input the load L applied to the feeding motor 28 at that time, and determines whether or not the load L is equal to or greater than the threshold value $T1$.

[0069] In step S110, when it is determined that the load L is equal to or greater than the threshold value $T1$, the process proceeds to step S120, and the control unit 20 has input the rotation angle θ of the feeding motor 28 and the movement distance d of the adhesive belt 10 in response to the intermittent movement of the adhesive belt 10.

[0070] In step S110, when it is determined that the load L is smaller than the threshold value $T1$, the process proceeds to step S130, and the control unit 20 determines whether or not the recording of the recording data input to the recording apparatus 1 is completed. In step S130, when it is determined that the recording is not completed, the process returns to step S110 until it is determined that the recording is completed. When it is determined that the recording is completed, the recording method according to the embodiment is completed.

[0071] If in step S120, the rotation angle θ of the feeding motor 28 and the movement distance d of the adhesive belt 10 are input, the control unit 20 calculates the roll diameter r of the recording medium in step S140.

[0072] Next, in step S150, based on the load detected by the load sensor 36, the control of the control unit 20 determines that the acceleration speed during the intermittent movement of the adhesive belt 10 should be set. At this time, the control unit 20 adjusts and sets the acceleration speed based on the roll diameter r calculated in step S140.

[0073] Next, in step S160, a flag for performing the load

reduction mode in the intermittent movement of the adhesive belt 10 from the second movement is raised. Specifically, in the load reduction mode, during the intermittent movement of the adhesive belt 10, the control unit 20 controls the drive of the belt motor 27 so as to cause the adhesive belt 10 to intermittently move at the acceleration speed set in step S150.

[0074] If the flag for performing the load reduction mode is raised in step S160, in step S170, it is determined whether or not the recording is completed. Then, the recording is performed in the load reduction mode until it is determined that the recording is completed. When it is determined that the recording is completed, the recording method according to the embodiment is completed.

[0075] Although not shown in Fig. 5, the value of the load may be repeatedly measured and/or the roll diameter may be repeatedly calculated (or measured) during recording to reset the acceleration speed. In addition, it is possible to vary the acceleration with the value of the detected load in addition to the value of the roll diameter.

[0076] 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:

a transport mechanism (3) that can intermittently move a movable belt (10) capable of supporting a recording medium (P);

a feeding unit (2) for feeding the recording medium left in a stretched state to the movable belt by receiving tension from the recording medium in response to the intermittent movement of the movable belt; and

a recording mechanism (4) for performing recording by causing a recording head (7) to reciprocate in a direction (B) which intersects a transport direction (A) of the recording medium, wherein the feeding unit has a feeding motor (28) serving as a drive source and a load sensor (36) of the feeding motor which can detect a load based on the tension, and

wherein, when the load sensor detects the load which is equal to or greater than a predetermined threshold value (T1), the recording apparatus is adapted to perform a load reduction mode for reducing an acceleration during the intermittent movement of the movable belt.

2. The recording apparatus according to claim 1, wherein the recording medium has a roll shape, wherein the feeding unit is adapted to feed the roll-shaped recording medium in response to a rotation drive of the feeding motor, and

wherein in the load reduction mode, during the intermittent movement of the movable belt, for the recording medium having the largest roll diameter which is supposed to be used and the recording medium having the smallest roll diameter which is supposed to be used, the acceleration when the movable belt is moved is arranged to be reduced so that the recording medium maintains the stretched state and the load is smaller than the threshold value.

3. The recording apparatus according to claim 2, further comprising:

a reception unit (30) for receiving information of the roll diameter, wherein based on the information of the roll diameter which is received by the reception unit, the acceleration in the load reduction mode is arranged to be adjusted.

4. The recording apparatus according to claim 3, further comprising:

a calculation unit for calculating the roll diameter by using a rotation angle (θ) of the feeding motor and a movement distance (d) of the movable belt, wherein the reception unit is arranged to receive a calculation result of the calculation unit.

5. The recording apparatus according to any one of the preceding claims, wherein based on a detection result of the load sensor, the acceleration in the load reduction mode can be set.

6. The recording apparatus according to any one of the preceding claims, wherein the movable belt is an adhesive belt.

7. A recording method using a recording apparatus (1) which includes a transport mechanism (3) that can intermittently move a movable belt (10) capable of supporting a recording medium (P); a feeding unit (2) that feeds the recording medium left in a stretched state to the movable belt by receiving tension from the recording medium in response to the intermittent movement of the movable belt; and a recording mechanism (4) that performs recording by causing a recording head (7) to reciprocate in a direction (B) which intersects a transport direction (A) of the recording medium, in which the feeding unit has a feeding motor (28) serving as a drive source and a load sensor (36) of the feeding motor which can detect a load based on the tension, the method comprising:

reducing an acceleration during the intermittent movement of the movable belt, when the load sensor detects the load which is equal to or

greater than a predetermined threshold value.

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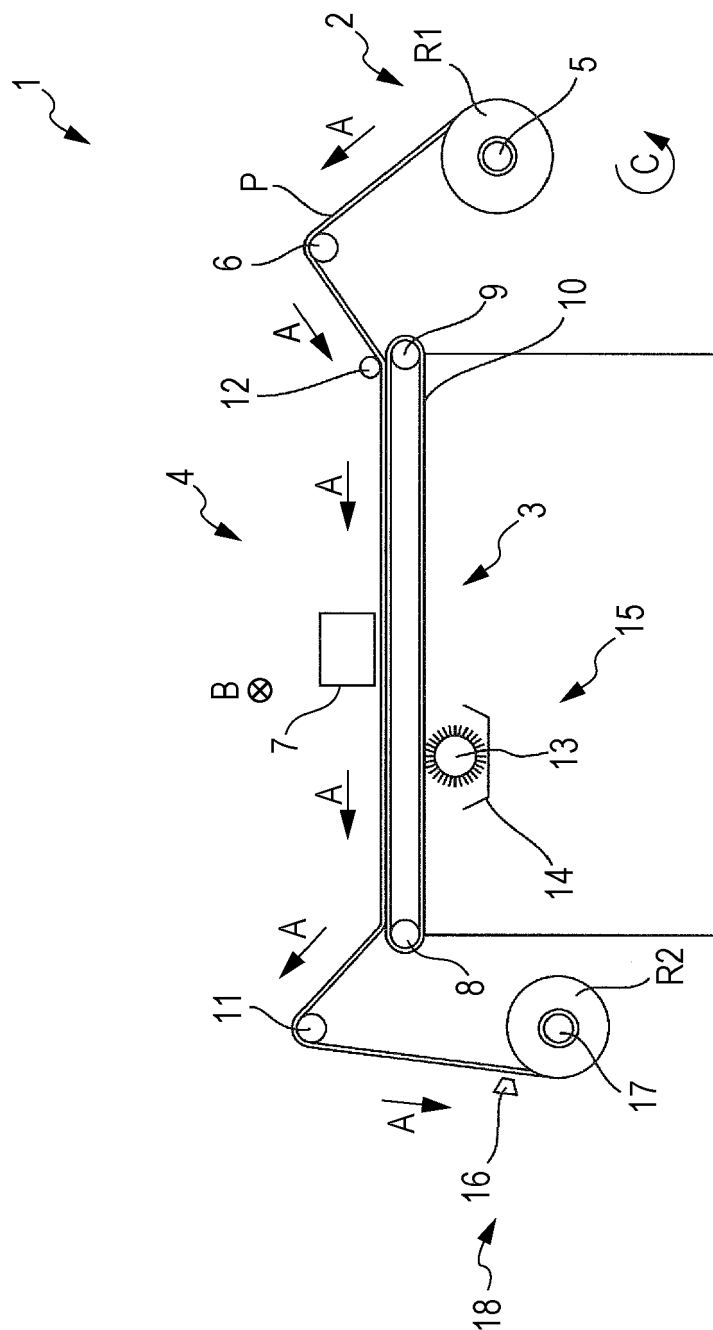


FIG. 1

FIG. 2

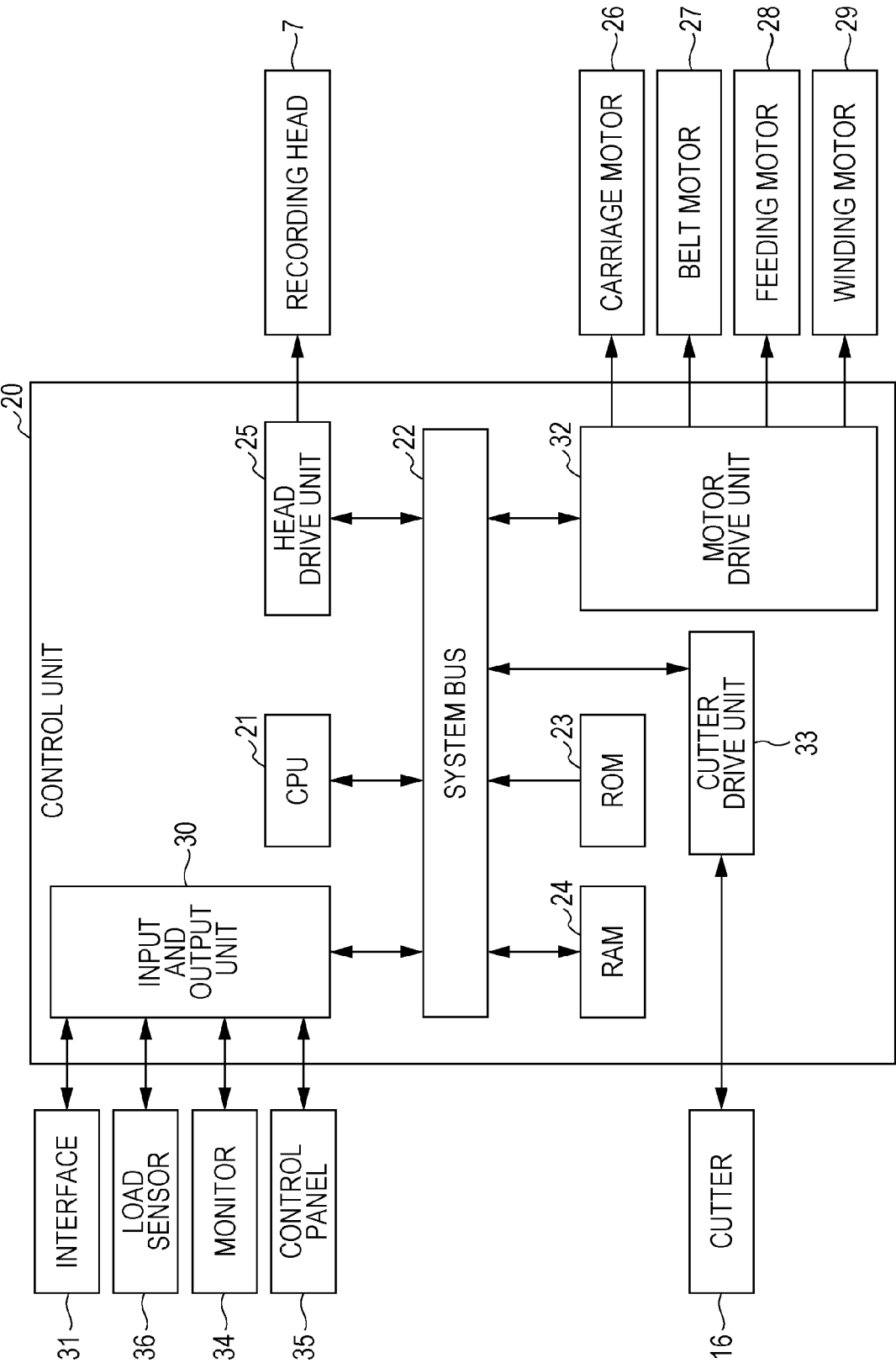


FIG. 3

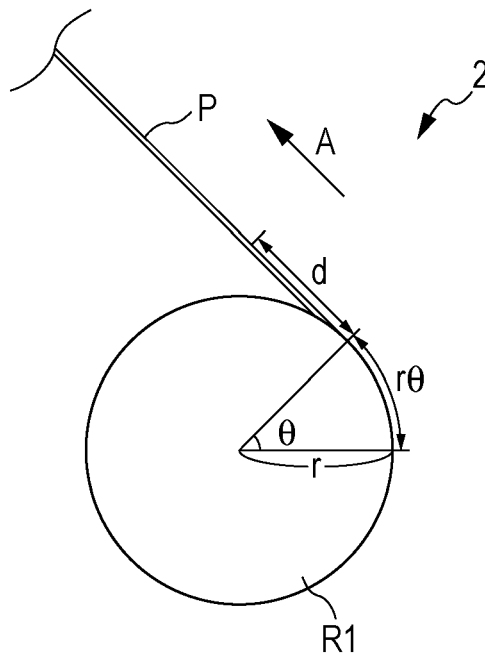


FIG. 4A

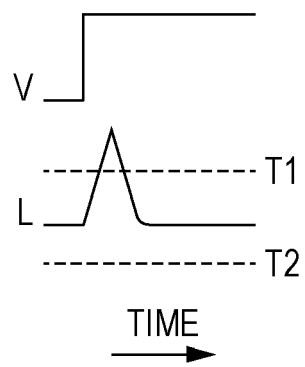


FIG. 4B

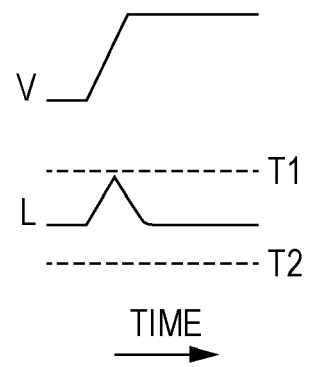
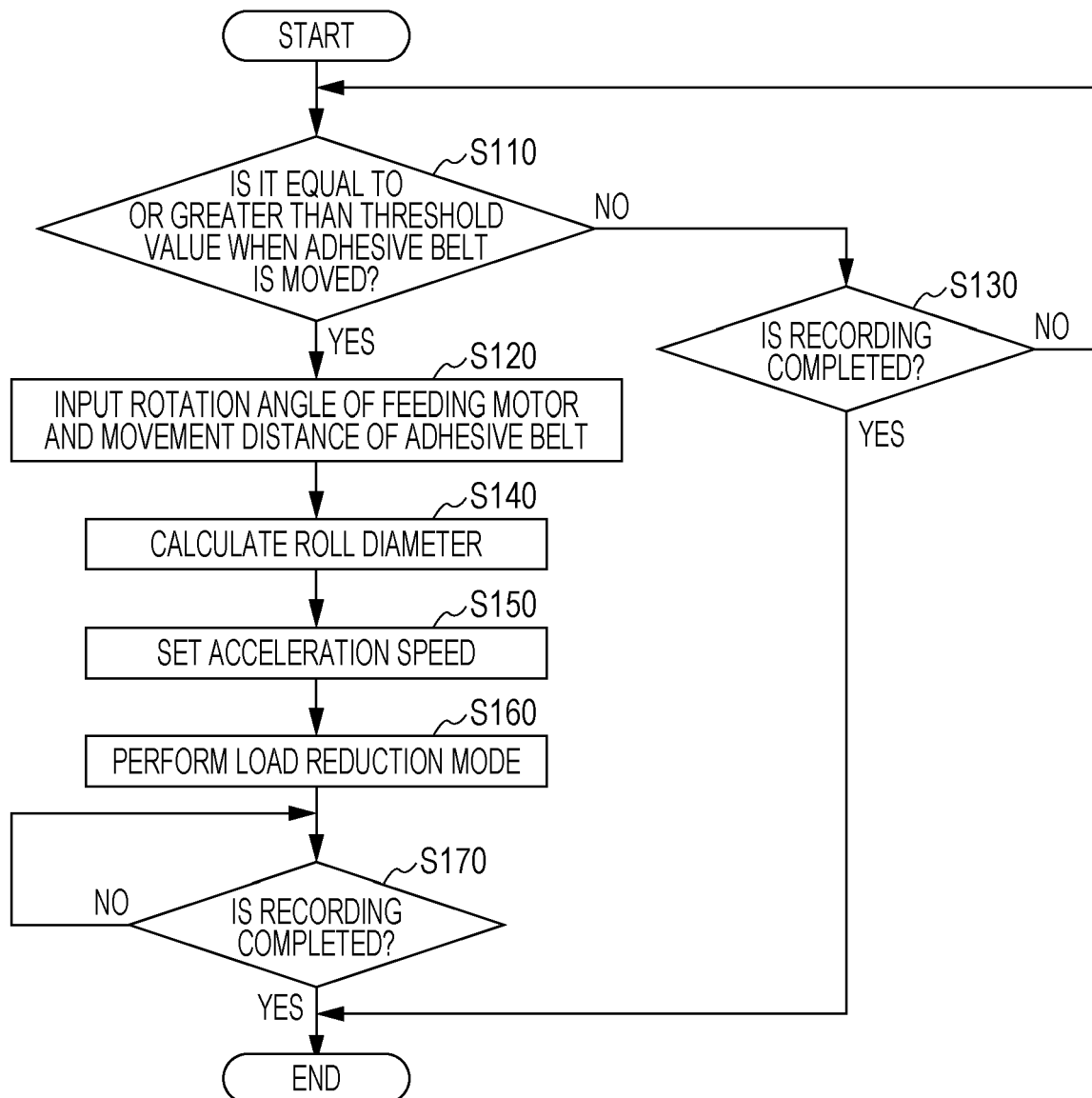


FIG. 5





EUROPEAN SEARCH REPORT

 Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2006/115313 A1 (SHAW JAMES E III [US] SHAW III JAMES E [US]) 1 June 2006 (2006-06-01) * paragraphs [0042], [0043] *	1-7	INV. B65H23/185 B41J15/04
A	US 2009/290927 A1 (YODA SEIICHIRO [JP]) 26 November 2009 (2009-11-26) * paragraph [0029] *	1-7	
A,D	JP 2005 219845 A (KONICA MINOLTA HOLDINGS INC) 18 August 2005 (2005-08-18) * paragraph [0041] *	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65H B41J
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 June 2014	Examiner Diaz-Maroto, V
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			

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EPO FORM 1503 03.82 (P04C01)

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

EP 14 15 7049

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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12-06-2014

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006115313 A1	01-06-2006	US 2006115313 A1 WO 2006057651 A2	01-06-2006 01-06-2006
US 2009290927 A1	26-11-2009	JP 5459694 B2 JP 2009279861 A US 2009290927 A1	02-04-2014 03-12-2009 26-11-2009
JP 2005219845 A	18-08-2005	NONE	

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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

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Patent documents cited in the description

- JP 2005219845 A [0002]