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(54) **PRINTING METHOD AND PRINTING DEVICE FOR LONG BAND-SHAPED OBJECTS**

(57) The present invention forms a clear image without distortions or color drift at high speed using a single-pass printer (12). The printing device comprises a single-pass printer (12), which is provided with multiple printing units (18) arranged in the conveyance direction of a long band-shaped body (14) that is the printing object and which performs the desired printing (16) on the surface of the long band-shaped object (14). The device is provided with a constant speed drive roller (40) for conveying the long band-shaped object (14) at a specified speed and a constant speed motor (42) for rotating the constant drive roller (40) at a constant speed. The device is provided with tension change-detecting members (26, 30,

33, 52, 54, 57) for detecting the tension of the long band-shaped object (14) at both the upstream side and the downstream side of the printing units (18) in the conveyance direction. The device is provided with speed control rollers (24, 60) for controlling the conveyance speed of the long band-shaped object (14) on the basis of the speed of the long band-shaped object (14) detected at both the upstream side and the downstream side of the printing units (18) in the conveyance direction. A specified printing (16) is performed on the surface of the long band-shaped object (14), which is conveyed at a specified speed facing the printer (12), by keeping the tension of the long band-shaped object (14) constant.

EP 2 927 007 A1

Description**Technical Field**

[0001] The present invention relates to a printing method and a printing device for a long band-shaped object, which performs printing on the long band-shaped object, such as fastener tapes of a slide fastener, as a printed object using a single-pass printer.

Background Art

[0002] Conventionally, as printers for performing printing on a long band-shaped object, such as a slide fastener or a hook-and-loop fastener, a printing device has been proposed, in which a printer head of an ink-jet printer, which is constituted of a plurality of ink-jet nozzle portions for each color, is arranged in a direction perpendicular to a conveying direction of a plurality of long band-shaped objects arranged side by side, as described in Patent Document 1. The ink-jet printer is referred to as a multi-pass type and is configured so that the printer head is reciprocatingly moved relative to surfaces of the long band-shaped objects in a direction transverse thereto while spraying inks from each ink-jet nozzle onto the surfaces of the long band-shaped objects, and also the long band-shaped objects are intermittently driven in a length direction thereof, thereby performing a desired printing along the length direction.

[0003] This type of the printing device has tension exerting portions provided on upstream and downstream sides in a conveying direction of the long band-shaped objects for exerting a tension on each long band-shaped object intermittently driven, and the tension exerting portions are constituted of dancer rollers for allowing the long band-shaped objects to be smoothly delivered and wound. The dancer rollers are configured to be moved upward or downward depending on an extra length of the long band-shaped objects, and each has a detector attached thereto for detecting a position of the dancer roller to detect the extra length of the long band-shaped objects.

[0004] On the other hand, as disclosed in Patent Document 2, a single-pass ink-jet printer has been proposed, in which a line head having a plurality of discharging ports formed side by side in a direction perpendicular to a conveying direction of a recording medium, which is conveyed while being placed on a belt, discharges ink onto the recording medium, thereby performing an image recording. Particularly, in the field of industrial applications, the single-pass printer which has a higher speed and excellent productivity is attracting attention. When a multi-color printing is performed by the single-pass ink-jet printer, ink-jet nozzle portions for each color are arranged along the conveying direction so that inks can be discharged to predetermined positions along the conveying direction of the recording medium with time intervals, thereby performing the multi-color printing.

Prior Art Document**Patent Document**

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[0005]

Patent Document 1: Japanese Patent Application Publication No. 2000-007199A

Patent Document 2: Japanese Patent Application Publication No. 2009-285854A

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Summary of Invention**Problems to Be Solved by Invention**

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[0006] The multi-pass ink-jet printer as disclosed in Patent Document 1 is configured so that the printer head performs printing on a plurality of stopped long band-shaped objects while reciprocatingly moving in the direction perpendicular to the conveying direction. Accordingly, because the printing has to be performed while intermittently driving the long band-shaped objects, misalignment in position or shift in color due to stretching of the long band-shaped objects as a printed object is hardly occurred, but there is a problem in that a printing speed is slow. Thus, it is conceived to apply the single-pass manner, which can perform printing at a high speed, to the ink-jet printer disclosed in Patent Document 1, but because a tension exerting portion of the ink-jet printer of Patent Document 1 is not a mechanism for adjusting a tension of the long band-shaped object during conveying by dancer rollers so that the tension can be kept constant, the mechanism cannot be used as-is in the single-pass printer.

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[0007] In particular, the single-pass printer as disclosed in Patent Document 2 is intended to form an image on the recording medium stably placed on the belt, and thus cannot be applied to stretchable long band-shaped objects, such as cloth of fastener tapes or ribbons, because it is difficult to stably supply the long band-shaped objects while being placed on the belt. Particularly, in the case of the single-pass manner, when formation of an image onto a stretchable cloth surface or the like is performed by an ink-jet printer, the printed object, which is a long band-shaped object, can be stretched due to changes in tension of the printed object during conveying. Accordingly, because dots of inks discharged from the ink-jet nozzles are not hit at desired positions, the image is distorted or a color shift is occurred.

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[0008] The present invention has been made keeping in mind the background art as described above, and an object thereof is to provide a printing method and a printing device for a long band-shaped object, in which a clean image can be rapidly formed using a single-pass printer without misaligning in position or shifting in color.

Means for Solving Problems

[0009] The present invention is a printing method for a long band-shaped object using a single-pass printer, in which a plurality of printing units are arranged along a conveying direction of the long band-shaped object as a printed object, and the printing units are operated so as to correspond to a conveying speed of the long band-shaped object to perform a desired printing on a surface of the long band-shaped object, the printing method including: conveying the long band-shaped object at a predetermined speed, detecting a change in tension of the long band-shaped object on both upstream and downstream sides of the printing units in the conveying direction, and controlling the conveying speed of the long band-shaped object on both upstream and downstream sides of the printing units in the conveying direction, thereby controlling a tension and a speed of the long band-shaped object, which is conveyed while facing the printer, to be kept constant.

[0010] The long band-shaped object is conveyed at a constant speed by a constant speed driving roller in the vicinity of the upstream side of the printing units, and controlling the conveying speed on the upstream side of the printing units in the conveying direction is controlling the conveying speed of the long band-shaped object on the upstream side of the constant speed driving roller.

[0011] The present invention is a printing device for a long band-shaped object including a single-pass printer provided with a plurality of printing units arranged along a conveying direction of the long band-shaped object as a printed object and configured to perform a desired printing on a surface of the long band-shaped object, a constant speed driving roller configured to convey the long band-shaped object at a predetermined speed, a constant speed motor for rotating the constant speed driving roller at a constant speed, a tension change detecting member configured to detect a change in tension of the long band-shaped object on both upstream and downstream sides of the printing units in the conveying direction, and a speed control roller configured to control the change in tension of the long band-shaped object based on a speed of the long band-shaped object detected on both upstream and downstream sides of the printing units in the conveying direction, wherein the tension of the long band-shaped object which is conveyed at the predetermined speed while facing the printer is controlled to be kept constant, thereby performing the desired printing on the surface of the long band-shaped object.

[0012] The constant speed driving roller is provided in the vicinity of the upstream side of the printing units, and a speed control roller for controlling the conveying speed of the long band-shaped object is provided upstream of the constant speed driving roller.

[0013] The tension change detecting member includes dancer rollers around which the long band-shaped object is wound, the dancer rollers being movable upward and downward due to the tension of the long band-shaped

object. The dancer rollers are journaled on one end portions of arm members provided to be swingable in a vertical direction, weights are fixed on the other end portions of the arm members, and the arm members are provided to be swingable so that the dancer rollers are moved upward and downward substantially in the vertical direction. Also, the tension change detecting members include rotary encoders provided on the swing center of the arm members.

[0014] The speed control roller and the constant speed driving roller are provided with pressing rollers configured to press the long band-shaped object against the speed control roller and the constant speed driving roller.

[0015] The printer is an ink-jet printer and the printing units have ink-jet nozzle portions. Alternatively, the printer may be a laser printer and the printing units may include photo-sensitive drums.

Advantageous Effects of Invention

[0016] According to the printing method and the printing device for the long band-shaped object of the present invention, even a stretchable long band-shaped object, such as cloth, can be rapidly and precisely printed by the single-pass printer without misaligning in position or shifting in color. Thus, printing can be effectively and clearly performed on a long printed object.

Brief Description of Drawings

[0017]

Fig. 1 is a schematic front view showing a printing device for a long band-shaped object according to one embodiment of the present invention.

Fig. 2 is a schematic view showing a single-pass printer for the long band-shaped object according to the embodiment.

Fig. 3 is a flow chart showing a printing method for the long band-shaped object according to the embodiment.

Embodiments of Invention

[0018] Now, embodiments of the present invention will be described based on the accompanying drawings. A printing device 10 for a long band-shaped object according to the present embodiment is intended to perform a desired image printing 16 on a surface of a fastener tape 14 of a slide fastener, which is the long band-shaped object, using a single-pass ink-jet printer 12. The ink-jet printer 12 has a plurality of printing units 18 for each color arranged in a conveying direction of the fastener tape 14, and each printing unit 18 is provided with a plurality of ink portions or ink-jet nozzle portions, not shown, for spraying the same color ink along a width direction of the fastener tape 14. Each printing unit 18 of the ink-jet printer 12 is positioned on a horizontal flat surface, and the fas-

tener tape 14 is conveyed while being parallel to and slightly spaced from the flat surface.

[0019] The fastener tape 14 is conveyed from a supply unit, not shown, to a tape feed device 20 via guide rollers or the like in a state where fastener elements 15 are closed, and then are conveyed to a dancer roller 26, which is a tension change detecting member, via a speed control roller 24. The speed control roller 24 is rotationally driven by a control motor 28 so that a feed speed of the fastener tape 14 is controlled. Control of the control motor 28 is performed by an output of a control inverter, not shown, depending on a position of the dancer roller 26 using a control method as described below. A pressing roller 25 for pressing the fastener tape 14 to prevent a slip thereof and thus to ensure a reliable feed thereof is positioned to face and be pressed against a roller surface of the speed control roller 24.

[0020] The dancer roller 26 is pivotally supported on a distal end of an arm member 30 as a tension change detection member configured to be vertically swingable and is provided to be rotatable about a rotation shaft 32 attached at a location on the arm member 30, which is slightly more remote from the dancer roller 26 than that of the middle portion of the arm member 30. A rotary encoder 33 as a tension change detection member for detecting a swing angle of the arm member 30 is attached to the rotation shaft 32. A weight 34 is attached to the other end of the arm member 30 and adjusted so that the arm member 30 is horizontally balanced and swing of the arm member 30 is facilitated.

[0021] The fastener tape 14, which has passed the dancer roller 26, are conveyed upward and then wound around a constant speed driving roller 40. The constant speed driving roller 40 is driven by a constant speed motor 42 so that the feed speed is kept constant. A pressing roller 41 for pressing the fastener tape 14 to prevent a slip thereof and thus to ensure a reliable feed thereof is positioned to face and be pressed against a roller surface of the constant speed driving roller 40.

[0022] The fastener tape 14, which has passed the constant speed driving roller 40, are diverted to a horizontal direction and then conveyed below the ink-jet printer 12. A running guide surface 46 for guiding the fastener tape 14 in a horizontal position is provided directly below the ink-jet printer 12 with an insertion space for the fastener tape 14 left therebetween. The running guide surface 46 is provided on a top surface of a base portion 50 of the printing device 10 for the long band-shaped object.

[0023] The base portion 50 is provided with the speed control roller 14, the pressing roller 25 and the control motor 28 and also pivotally supports the rotation shaft 32 of the arm member 30 at a predetermined position. In addition, the constant speed driving roller 40 and the constant speed motor 42 are also provided at upper positions on the base portion 50.

[0024] The fastener tape 14, which has passed the running guide surface 46, pass a diverting roller 48 and then are conveyed to a dancer roller 52 as a tension change

detection member positioned at a lower position in a vertical direction. Like the dancer roller 26 on the upstream side, the dancer roller 52 is also pivotally supported on a distal end of an arm member 54 as a tension change detection member configured to be vertically swingable and is provided to be rotatable about a rotation shaft 56 attached at a location on the arm member 54, which is slightly more remote from the dancer roller 52 than that of the middle portion of the arm member 54. A rotary encoder 57 as a tension change detection member for detecting a swing angle of the arm member 54 is attached to the rotation shaft 56. A weight 58 is attached to the other end of the arm member 54 and adjusted so that the arm member 54 is horizontally balanced and swing of the arm member 54 is facilitated.

[0025] The fastener tape 14, which has passed the dancer roller 52, are conveyed upward in the vertical direction and then conveyed to the next process after passing a speed control motor 60. The speed control roller 60 is rotationally driven by an inverter-controlled control motor 64 controlled by an inverter, so that a feed speed of the fastener tape 14 is controlled. Control of the control motor 64 is performed by an output of a control inverter, not shown, depending on a position of the dancer roller 52 using a control method as described below.

[0026] The speed control roller 60 and the control motor 64 are also fixed at upper positions on the base portion 50, and also the arm member 54 of the dancer roller 52 is pivotally supported at a predetermined lower position on the base portion 50.

[0027] Next, operations of the printing device 10 for the long band-shaped object according to the present embodiment will be described based on a flow chart of Fig. 3. First, fastener tapes 14 are placed along a predetermined path as described above to span from a diverting roller 22 on an inlet part of the printing device 10 to a dancer roller 62 on the outlet part thereof. Then, when conveying of the fastener tape 14 is started by a control unit, not shown, the constant speed motor 42 is rotated at a predetermined speed, e.g. a speed corresponding to a fastener tape feed amount of 15 m/min, to rotate the constant speed driving roller 40 at the predetermined speed (s11). Along with this, the control motors 28 and 64 are driven so that the speed control rollers 24 and 60 are rotated at the same speed as that of the constant speed driving roller 40, e.g. at the speed corresponding to the tape feed amount of 15m/min (s12a and s12b).

[0028] In this state, the dancer roller 26 is slightly moved upward or downward in accordance with changes in feed length or stretching of the fastener tape 14 itself due to changes in load on the upstream side. The changes in feed length or stretching of the fastener tape 14 is caused due to changes in tension by a driving force exerted on the fastener tape 14 or occurrences of running resistances, such as any catching on the upstream side, because the fastener tape 14 is a long band-shaped object made of cloth. If such stretching is caused, a length of the tape conveyed by the constant speed driving roller

is substantially changed. Therefore, a design printed by the ink-jet printer 12 is ultimately distorted or misalignment in position in spraying each color ink from ink-jet nozzle portions of different printing units 18, which would otherwise have been sprayed to the same position, is occurred, thereby causing a color shift in a region where a plurality of colors are blended.

[0029] Thus, according to the printing device 10 for the long band-shaped object of the present embodiment, in order to inhibit stretching to eliminate misalignment in position or shift in color of the design, driving of the control motors 28 and 64 is controlled based on position information of the dancer rollers 26 and 52, thereby finely controlling rotation speeds of the speed control rollers 24 and 60. For the purpose of this fine control, position information of the dancer rollers 26 and 52 as swing angles of the arm members 30 and 54 are detected by the rotary encoders 33 and 57. Outputs of the rotary encoders 33 and 57 are configured so that horizontal positions of the arm members 30 and 54 are considered as neutral positions, which are an initial state.

[0030] When the dancer roller 26 on the inlet part of the printing device 10 for the long band-shaped object is moved to a position higher than the horizontal position of the arm member 30 in a constant speed conveying state of the fastener tape 14, for example, a plus value of the swing angle as angle information is outputted from the rotary encoder 33. This state corresponds to a case where a tension exerted on the fastener tape 14 is increased, and is resulted from a slower rotation speed of the speed control roller 24 relative to the constant speed driving roller 40 or catching of the fastener tape 14 on the upstream side. Thus, rotation of the control motor 28 is controlled in an increasing direction, e.g., so that a feed amount of the fastener tape 14 becomes faster than 15 m/min. Contrarily, when the dancer roller 26 is moved to a position lower than the horizontal position of the arm member 30, for example, a minus value of the swing angle as angle information is outputted from the rotary encoder 33. This state corresponds to a case where a tension exerted on the fastener tape 14 is decreased, and is resulted from a faster rotation speed of the speed control roller 24 relative to the constant speed driving roller 40 or rapid return of the fastener tape 14 after catching. Thus, rotation of the control motor 28 is controlled in a deceleration direction, e.g., so that the feed amount of the fastener tape 14 becomes slower than 15 m/min (s13a). In this way, the speed of the control motor 28 is controlled and the dancer roller 26 is returned to a neutral position. Also, the control motor 28 becomes a normal state and rotates at the constant speed in a state where stretching of the fastener tape 14 are inhibited (s14a).

[0031] As for the outlet part, also, when the dancer roller 52 on the outlet part is moved to a position higher than the horizontal position of the arm member 54 in a constant speed conveying state of the fastener tape 14, for example, a plus value of the swing angle as angle information is outputted from the rotary encoder 57. This

state corresponds to a case where a tension exerted on the fastener tape 14 is increased, and is resulted from a faster rotation speed of the speed control roller 60 relative to the constant speed driving roller 40 or catching of the fastener tape 14 on the upstream side. Thus, rotation of the control motor 64 is controlled in a deceleration direction, e.g., so that the feed amount of the fastener tape 14 becomes slower than 15 m/min. Contrarily, when the dancer roller 52 is moved to a position lower than the horizontal position of the arm member 54, for example, a minus value of the swing angle as angle information is outputted from the rotary encoder 57. This state corresponds to a case where a tension exerted on the fastener tape 14 is decreased, and is resulted from a slower rotation speed of the speed control roller 60 relative to the constant speed driving roller 40 or rapid return of the fastener tape 14 after catching. Thus, rotation of the control motor 64 is controlled in an increasing direction, e.g., so that the feed amount of the fastener tape 14 becomes faster than 15 m/min (s13b). In this way, the speed of the control motor 64 is controlled and thus rotates at the constant speed in a state where stretching of the fastener tape 14 are inhibited (s14b).

[0032] Therefore, no change is caused in the tension of the fastener tape 14 between the dancer rollers 26 and 52, which are located between the speed control rollers 24 and 60 driven by the control motors 28 and 64, and also the fastener tape 14 is conveyed with stretching thereof inhibited to a minimum.

[0033] As the fastener tape 14 is conveyed at a predetermined speed without stretching, ink-jet nozzle portions of each of the printing units 18 arranged along the conveying direction of the fastener tape 14 in the single-pass ink-jet printer 12 can precisely spray inks on the fastener tape 14, which are conveyed at the predetermined speed, e.g. at a high speed of 15 m/min, at a predetermined timing and a predetermined position calculated from distances between the printing units 18 and the conveying speed of the fastener tape 14.

[0034] According to the printing device 10 and the printing method for the long band-shaped object of the present embodiment, even a stretchable long band-shaped object, such as cloth, can be rapidly and precisely printed by a single-pass manner using the ink-jet printer 12, and also printing of the long band-shaped object, such as the fastener tape 14, by the ink-jet printer 12 can be clearly and effectively performed. Because the dancer rollers 26 and 52 for detecting a tension of the fastener tape 14 are provided on the swingable arm members 30 and 54 and the weights 34 and 58 are provided on ends of the arm members 30 and 54 opposite to the dancer rollers 26 and 52, self-weights of the dancer rollers 26 and 52 can be partially cancelled, thereby allowing the arm members 30 and 54 to be extremely sensitively swung in response to changes in tension of the fastener tape 14. Thus, a tension exerted on the fastener tape 14 can be precisely detected and fed back, thereby allowing a highly responsive and precise control. Also, by adjusting a load or po-

sition of each of the weights 34 and 58 of the dancer rollers 26 and 52, the tension can be optimally adjusted depending on long band-shaped objects of various materials and widths, which have different stretchable degrees.

[0035] Meanwhile, the printing method and the printing device for the long band-shaped object according to the present invention are not limited to the foregoing embodiments, and accordingly, instead of the ink-jet printer, any other printers employing the single-pass manner, such as a laser printer, may be used. The long band-shaped body may be any long members, such as ribbons or tapes, other than the fastener tapes, and also if long materials have a band shape, the invention can be appropriately applied. The manner of movement of dancer rollers is not limited to swing using arm members, and accordingly the dancer rollers may be moved in an upward and downward direction within a predetermined range. Also, the constant speed driving roller is preferably positioned at the position in the foregoing embodiment in terms of stability of speed, but may be positioned downstream of the printer.

Description of Reference Numerals

[0036]

10	Printing Device for Long Band-Shaped Object
12	Ink-Jet Printer
14	Fastener Tape
16	Printing
18	Printing Unit
20	Tape Conveying Device
24, 60	Speed Control Roller
25, 41	Pressing Roller
26, 52	Dancer Roller
28, 64	Control Roller
30, 54	Arm Member
32, 56	Rotation Shaft
33, 57	Rotary Encoder
34, 58	Weight
40	Constant Speed Driving Roller
42	Constant Speed Motor

Claims

1. A printing method for a long band-shaped object using a single-pass printer (12), in which a plurality of printing units (18) are arranged along a conveying direction of the long band-shaped object (14) as a printed object, and the printing units (18) are operated so as to correspond to a conveying speed of the long band-shaped object (14) to perform a desired printing (16) on a surface of the long band-shaped object (14), the printing method comprising:

conveying the long band-shaped object (14) at

a predetermined speed, detecting a change in tension of the long band-shaped object (14) on both upstream and downstream sides of the printing units (18) in the conveying direction, and controlling the conveying speed of the long band-shaped object (14) on both upstream and downstream sides of the printing units (18) in the conveying direction, thereby controlling a tension and a speed of the long band-shaped object (14) which is conveyed while facing the printer (12), to be kept constant.

2. The printing method for the long band-shaped object according to claim 1, comprising conveying the long band-shaped object (14) at a constant speed by a constant speed driving roller (40) in the vicinity of the upstream side of the printing units (18), wherein controlling the conveying speed on the upstream side of the printing units (18) in the conveying direction is controlling the conveying speed of the long band-shaped object (14) on the upstream side of the constant speed driving roller (40).

3. The printing method for the long band-shaped object according to claim 1 or 2, wherein the printer (12) is an ink-jet printer and the printing units (18) comprise ink-jet nozzle portions.

4. The printing method for the long band-shaped object according to claim 1 or 2, wherein the printer (12) is a laser printer and the printing units (18) comprise photo-sensitive drums.

5. A printing device for a long band-shaped object, comprising:

a single-pass printer (12) provided with a plurality of printing units (18) arranged along a conveying direction of the long band-shaped object (14) as a printed object and configured to perform a desired printing (16) on a surface of the long band-shaped object (14);

a constant speed driving roller (40) configured to convey the long band-shaped object (14) at a predetermined speed;

a constant speed motor (42) for rotating the constant speed driving roller (40) at a constant speed;

a tension change detecting member (26, 30, 33, 52, 54, 57) configured to detect a change in tension of the long band-shaped object (14) on both upstream and downstream sides of the printing units (18) in the conveying direction; and

a speed control roller (24, 60) configured to control the change in tension of the long band-shaped object (14) based on a speed of the long band-shaped object (14) detected on both upstream and downstream sides of the printing

units (18) in the conveying direction;
 wherein the tension of the long band-shaped object (14) which is conveyed at the predetermined speed while facing the printer (12) is controlled to be kept constant, thereby performing the desired printing (16) on the surface of the long band-shaped object.

(18) comprise photo-sensitive drums.

6. The printing device for the long band-shaped object according to claim 5, wherein the constant speed driving roller (40) is provided in the vicinity of the upstream side of the printing units (18) and a speed control roller (24) for controlling the conveying speed of the long band-shaped object (14) is provided on the upstream side of the constant speed driving roller (40). 5
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7. The printing device for the long band-shaped object according to claim 5 or 6, wherein the tension change detecting member comprises dancer rollers (26, 52) around which the long band-shaped object (14) is wound, the dancer rollers being movable upward and downward due to the tension of the long band-shaped object (14). 20
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8. The printing device for the long band-shaped object according to claim 7, wherein the dancer rollers (26, 52) are journaled on one end portions of arm members (30, 54) provided to be swingable in a vertical direction and weights (34, 58) are fixed on the other end portions of the arm members (30, 54), wherein the arm members (30, 54) are provided to be swingable so that the dancer rollers (26, 52) are moved upward and downward substantially in the vertical direction. 30
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9. The printing device for the long band-shaped object according to claim 8, wherein the tension change detecting members comprise rotary encoders (33, 57) provided on the swing center of the arm members (30, 54). 40
10. The printing device for the long band-shaped object according to claim 5, wherein the speed control roller (24) and the constant speed driving roller (40) are provided with pressing rollers (25, 42) configured to press the long band-shaped object (14) against the speed control roller (24) and the constant speed driving roller (40). 45
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11. The printing device for the long band-shaped object according to any one of claims 5 to 10, wherein the printer (12) is an ink-jet printer and the printing units (18) comprise ink-jet nozzle portions. 55
12. The printing device for the long band-shaped object according to any one of claims 5 to 10, wherein the printer (12) is a laser printer and the printing units

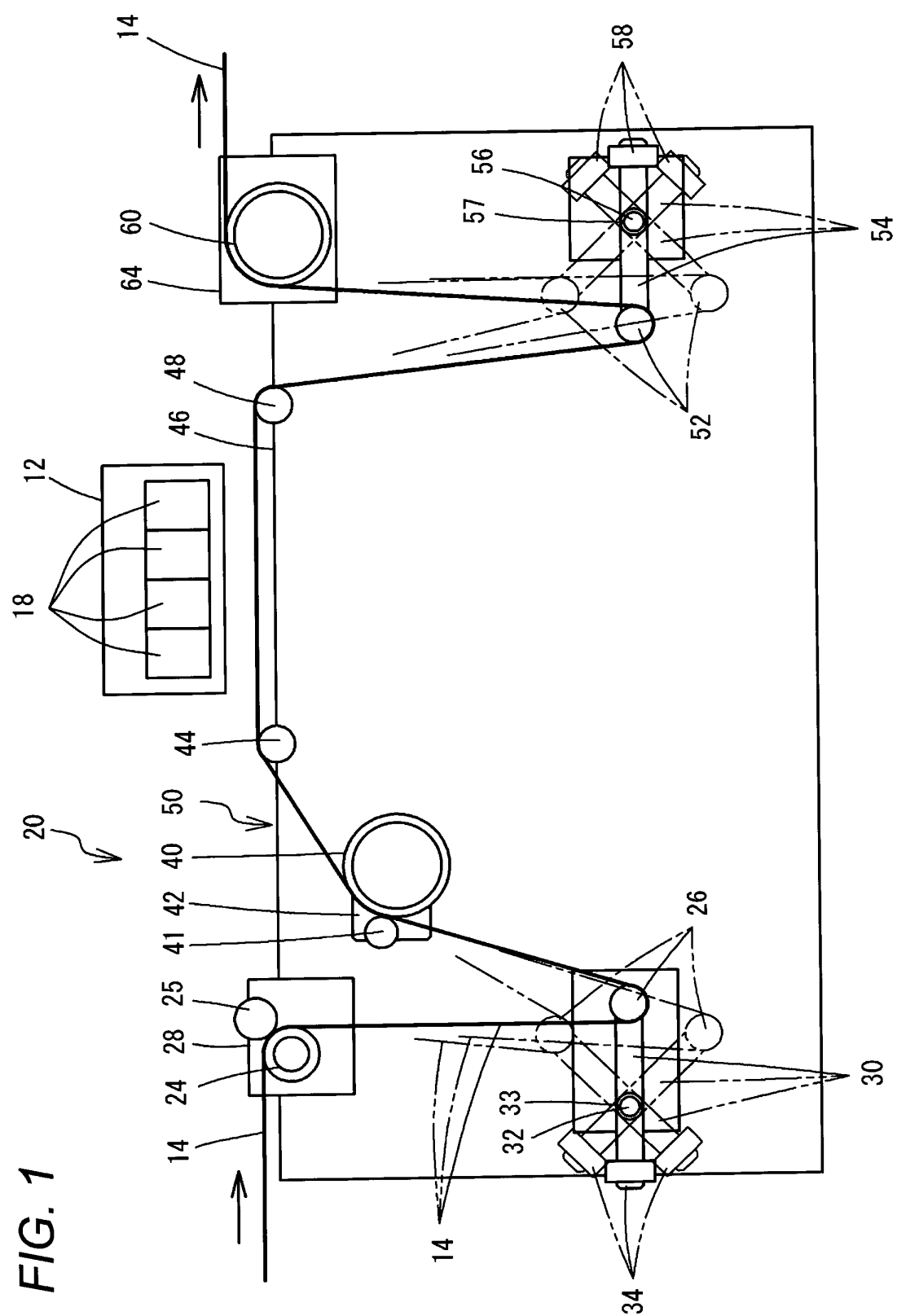


FIG. 2

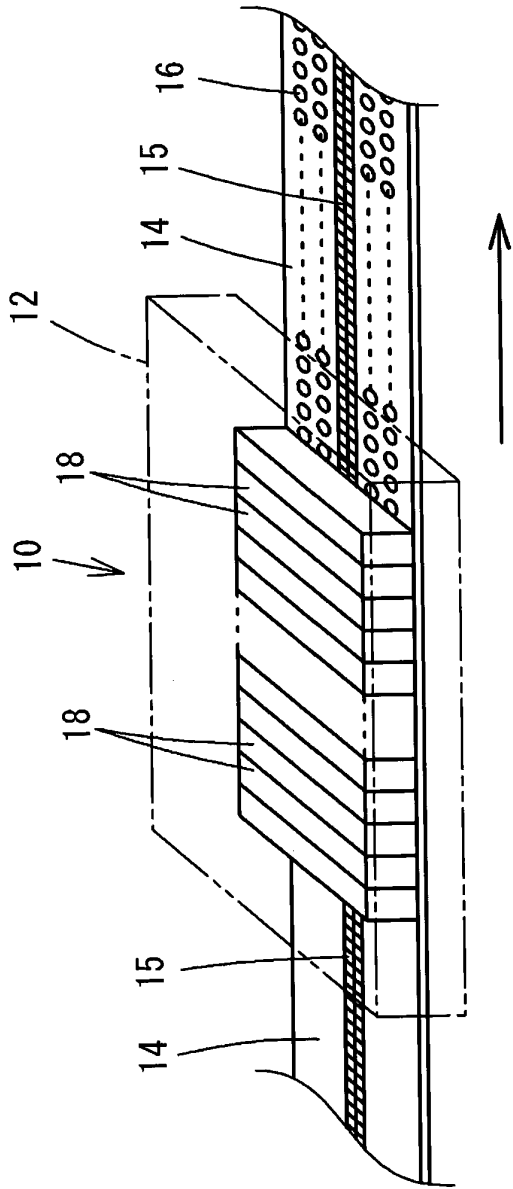
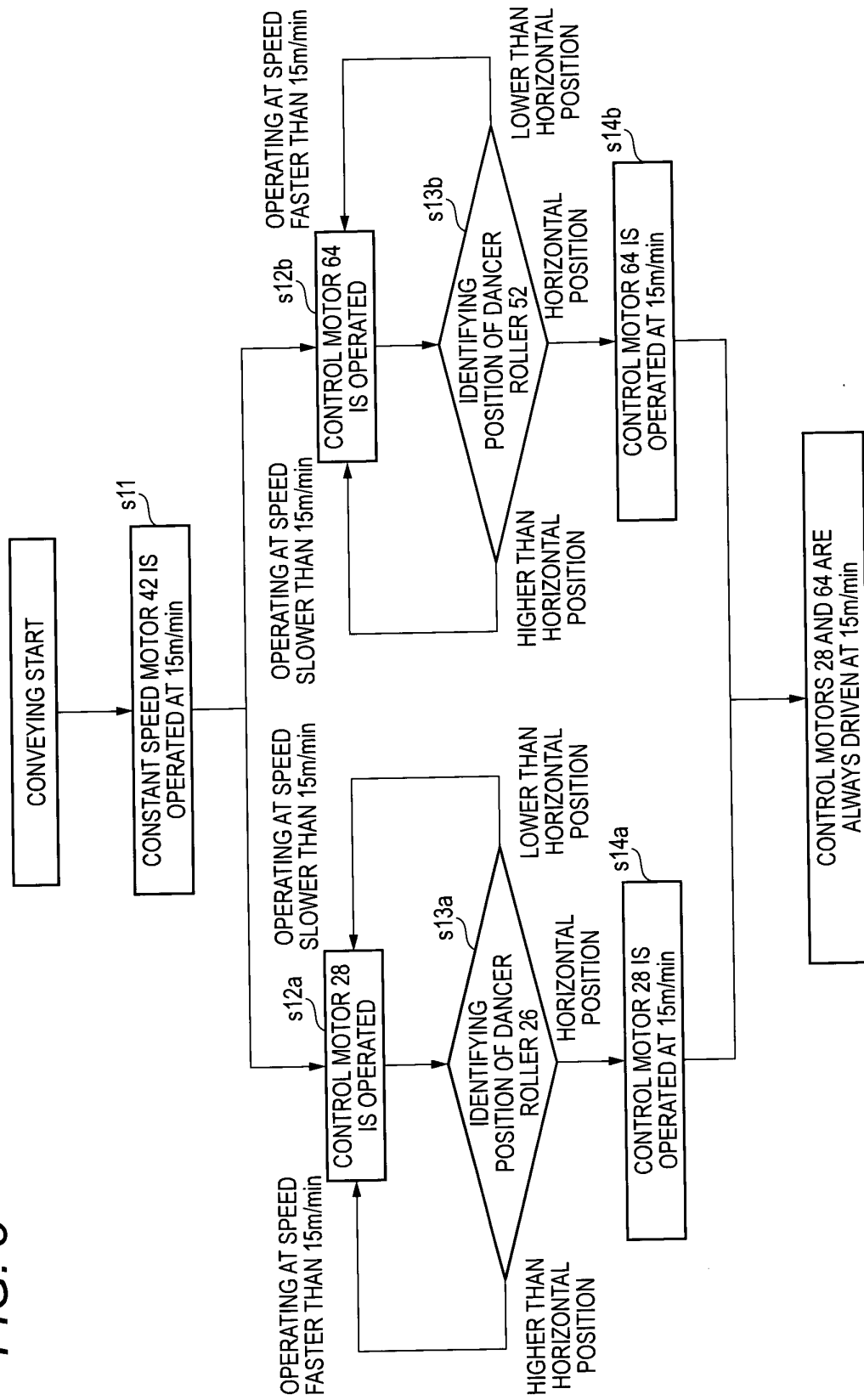


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/081145

A. CLASSIFICATION OF SUBJECT MATTER

B41J15/00 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B41J15/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2013
Kokai Jitsuyo Shinan Koho	1971-2013	Toroku Jitsuyo Shinan Koho	1994-2013

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	JP 2012-201094 A (Dainippon Screen Mfg. Co., Ltd.), 22 October 2012 (22.10.2012), paragraphs [0020] to [0021]; fig. 1 (Family: none)	1, 3 4 1-12
Y	JP 6-64244 A (Xerox Corp.), 08 March 1994 (08.03.1994), paragraph [0001] & US 5274428 A	4
A	JP 2010-208323 A (Dainippon Printing Co., Ltd.), 24 September 2010 (24.09.2010), paragraphs [0027] to [0030]; fig. 1 (Family: none)	7-8

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search
17 January, 2013 (17.01.13)Date of mailing of the international search report
29 January, 2013 (29.01.13)Name and mailing address of the ISA/
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Authorized officer

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/081145

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2000-7199 A (YKK Corp.), 11 January 2000 (11.01.2000), paragraph [0027]; fig. 1 & US 6340215 B1	1
A	JP 63-134455 A (Kuraray Co., Ltd.), 07 June 1988 (07.06.1988), fig. 1 (Family: none)	1

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REFERENCES CITED IN THE DESCRIPTION

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- JP 2000007199 A [0005]
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