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(54) **Method of controlling a knitted fabric guide and lapping take-up device using the same**

Verfahren zur Steuerung einer Gestrickführung und dieses umsetzende Faltvorrichtung

Procédé pour contrôler un guide de tissu tricoté et dispositif l'enroulement de reprise l'utilisant

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US-A- 4 573 958
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Description

BACKGROUND OF THE INVENTION

(Field of the Invention)

[0001] The present invention relates to a knitted fabric guide controlling method and a lapping take-up device using the same, in which a knitted fabric produced by a knitting unit of a knitting machine is folded or lapped due to the reciprocation of a knitted fabric guide.

(Description of the Related Art)

[0002] As one take-up device for a knitted fabric produced by a knitting machine, there is a lapping take-up device. In general, the lapping take-up device pulls down a knitted fabric manufactured by a knitting unit of a knitting machine, by means of take-up rolls forming a take-up unit placed immediately therebelow, and drops the fabric so that the fabric is folded within a receiving unit provided in the lower portion of the take-up device. As the forms of the lapping take-up device, there are a receiving unit moving type in which the receiving unit moves in the direction orthogonal to the axial direction of the take-up rolls, and a knitted fabric guide moving type in which the knitted fabric guide above the receiving unit moves in such orthogonal direction.

[0003] In the latter knitted fabric guide moving type, the knitted fabric guide which guides a knitted fabric to be produced receives the transmission of a power exerted by a servo motor, and reciprocates from end to end of the receiving unit in the direction orthogonal to the axial direction of the take-up rolls in a space region above the receiving unit and below the take-up rolls. Thereby, the knitted fabric guide guides the knitted fabric which is lowered from the take-up rolls so that it is folded or lapped. As an example thereof, there has been known a knitted fabric folding and accommodating method in a knitting machine in which a swing arm which holds two guide rolls forming the knitted fabric guide is provided below the take-up rolls, and reciprocates in the direction orthogonal to the axial direction of the take-up rolls so that the guide rolls at the ends of the swing arm move in an upward convex circumference, and the guide rolls guide the knitted fabric so that it is accommodated into the receiving unit, and a mechanism therefor (for instance, Japanese Patent Application Laid-Open No. 2001-279563).

[0004] In the knitted fabric guide moving type take-up device of Japanese Patent Application Laid-Open No. 2001-279563, a spaced gap to the extent that no creases and wrinkles tend to be caused in the passing knitted fabric is provided between two guide rolls forming the knitted fabric guide, and the guide rolls are rotated so as not to slacken the knitted fabric between the take-up rolls and the guide rolls, and therefore, the knitted fabric to be accommodated is hardly subject to pressure or tension from the units other than the take-up rolls. Therefore, there is an advantage that the knitted fabric can be collected in a state of not being affected by such external force, e.g., in a state that no deep wrinkles or creases are caused.

SUMMARY OF THE INVENTION

[0005] In this connection, the conventional take-up device of the type of knitted fabric guide moving has the following problems with the accommodated knitted fabric. Figs. 9A and 9B are explanatory views showing an example of the operation of the conventional knitted fabric guide moving type take-up device. As understood from the comparison of Figs. 9A and 9B, in the take-up device, guide rolls 8 and 8 forming a knitted fabric guide 6 arranged below a knitting unit of a knitting machine, such as a circular knitting machine, moves while being held parallel with a take-up rolls 3 and 3, so that the distance between the knitted fabric guide 6 and the take-up rolls 3 and 3 is changed gradually. Therefore, when the knitted fabric guide 6 moves at a constant speed, stretch and slack are caused in a knitted fabric F to be accommodated into a receiving unit 5 according to the position of the moving knitted fabric guide 6.

[0006] When the knitted fabric guide 6 moves at a constant speed, in the case where as shown in Fig. 9A, the knitted fabric guide 6 moves from immediately below the take-up unit consisting of the take-up rolls 3 and 3 toward one side of the knitting unit of the knitting machine in the direction orthogonal to the axial direction of the guide rolls 8 and 8 of the knitted fabric guide 6 and horizontally, the distance between a take-up unit and the knitted fabric guide 6 becomes longer while the amount of the knitted fabric rolled out from a knitted fabric feeding point P of the take-up unit is constant, so that the knitted fabric to be accommodated into the receiving unit 5 becomes shorter, and therefore, a knitted fabric grounding point G moves backwards from the point immediately below the guide rolls 8 and 8 (by a distance Ld), with the result that the knitted fabric F is pulled by its portion which has been already grounded, and cannot be expanded to the opposite ends of the receiving unit 5 when it is folded. On the contrary, in the case where as shown in Fig. 9B, the knitted fabric guide 6 moves in the center direction from the outer circumference side of the knitting machine, the distance between the take-up unit and the knitted fabric guide 6 becomes shorter, so that the knitted fabric F accommodated into the receiving unit 5 becomes longer and is slackly accommodated, whereby wrinkles and creases tend to be caused in the fabric.

[0007] In Japanese Patent Application Laid-Open No. 2001-279563, when the guide rolls of the knitted fabric guide are swung in an upward convex circumference by the swing arm, the distance between the knitted fabric feeding point and the knitted fabric guide is larger on the outer circumference side of the knitting machine than in the conventional knitted fabric guide moving type take-up device shown in Figs. 9A and 9B, and therefore, ex-

cessive wrinkles and creases tend to be caused in the knitted fabric in the receiving unit.

[0008] GB 2 014 960 A discloses a zigzag folder for a continuously advancing web of textile material. The speed of a guide roll assembly is progressively increased and reduced at each stroke of reciprocation.

[0009] US 4,573,958 describes a machine for folding continuously supplied textile web in a stack. The machine comprises a carriage movably mounted on a frame for reciprocating movement with respect to the frame.

[0010] US 4,708,331 discloses a device for layer-stacking web-like materials. The device comprises guiding elements which are connected to a carriage mounted for a sliding motion. The carriage is driven by a speed-controllable driving motor.

[0011] EP 1 842 949 A1 discloses a method of controlling knitted fabric guide in accordance with the preamble of claim 1.

[0012] In view of the foregoing, the present invention has been devised to substantially eliminate the above discussed problems and is intended to provide a knitted fabric guide controlling method and a lapping take-up device using the same, which can increase the amount of the accommodated fabric without causing any wrinkles or creases when a knitted fabric is folded or lapped by the movement of a knitted fabric guide.

[0013] In the present invention, there is provided a method of controlling a knitted fabric guide and a lapping take-up device in accordance with the features of claim 1 and claim 5, respectively.

[0014] There is provided a receiving unit and a knitted fabric guide positioned above the receiving unit in a take-up device of a knitting machine. The knitted fabric guide guides and drops a knitted fabric produced by a kitting unit of the knitting machine while reciprocating in a horizontal direction so as to fold the knitted fabric within the receiving unit. The moving speed of the knitted fabric guide is adjusted according to a length between a knitted fabric feeding point in a position upward of the knitted fabric guide and the knitted fabric guide (hereinafter, called a knitted fabric feeding length). The knitted fabric feeding length is changed gradually or varied due to the reciprocation of the knitted fabric guide.

[0015] According to the present invention, since the moving speed of the knitted fabric guide is adjusted according to the knitted fabric feeding length which is changed gradually by the reciprocation of the knitted fabric guide, the knitted fabric accommodated into the receiving unit can be brought into a state that any stretch or slack are substantially eliminated, and therefore, the knitted fabric can be accommodated into the receiving unit without causing any wrinkles or creases, and can be fully expanded to the opposite ends of the receiving unit when it is folded therewithin, so that the amount of the accommodated fabric can be increased.

[0016] In the present invention, the method further includes providing a take-up unit positioned upward of the knitted fabric guide to feed the knitted fabric to the knitted fabric guide. The knitted fabric feeding point is formed by the take-up unit. Therefore, the knitted fabric can be easily fed to the knitted fabric guide by the take-up unit.

[0017] Preferably, the moving speed of the knitted fabric guide may be so controlled as to be decreased when the knitted fabric guide moves in the direction in which the knitted fabric feeding length becomes longer gradually, and the moving speed of the knitted fabric guide is so controlled as to be increased when the knitted fabric guide moves in the direction in which the knitted fabric feeding length becomes shorter gradually. Therefore, when the knitted fabric feeding length becomes longer, the moving speed of the knitted fabric guide is controlled to be decreased to feed the knitted fabric into the receiving unit so that stretch in the knitted fabric can be substantially eliminated, and when the knitted fabric feeding length becomes shorter, the moving speed of the knitted fabric guide is controlled to be increased to feed the knitted fabric into the receiving unit so that slack in the knitted fabric can be substantially eliminated. As a result, the knitted fabric can be accommodated so that the distance from the knitted fabric feeding point to the knitted fabric guide and the length of the knitted fabric fed from the knitted fabric guide into the receiving unit are substantially the same.

[0018] The rotation of the take-up unit is detected by a sensor to move the knitted fabric guide in synchronization with a rotation detection signal of the detected rotation. Therefore, since the length of the knitted fabric produced from a knitting unit of the knitting machine is equal to the amount of movement in the outer circumference of the take-up roll in the take-up unit, the movement of the knitted fabric guide can be controlled so as to accurately correspond with the length of the knitted fabric to be produced, in synchronization with the rotation of the take-up roll.

[0019] Preferably, the moving speed of the knitted fabric guide with respect to the rotation detection signal may be adjusted to compensate for stretch properties of the knitted fabric. In addition, the compensation value of the moving speed of the knitted fabric guide, which is adjusted according to the stretch properties of the knitted fabric, is inputted, e.g., manually. Therefore, the moving speed of the knitted fabric guide can be easily compensated according to the stretch properties of the knitted fabric, so that the knitted fabric can be fully expanded to the opposite ends of the receiving unit when it is folded therewithin without causing any wrinkles or creases.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] In any event, the present invention will become more clearly understood from the following description of preferred embodiments thereof, when taken in conjunction with the accompanying drawings. However, the embodiments and the drawings are given only for the purpose of illustration and explanation, and not to be taken as limiting the scope of the present invention in any

way whatsoever, which scope is to be determined by the appended claims. In the accompanying drawings, like reference numerals are used to denote like parts throughout the several views, and:

Fig. 1 is a schematic perspective view showing a lapping take-up device according to an embodiment of the present invention;
Fig. 2 is a side view of the lapping take-up device of Fig. 1;
Fig. 3 is a partial enlarged perspective view of Fig. 1;
Fig. 4 is a block diagram showing a knitted fabric guide controlling method according to the present invention;
Figs. 5A and 5B are explanatory views showing the operation of the controlling method of the present invention;
Fig. 6 is a diagram showing controlled moving distances (speed changes) relative to pulse in the moving positions of the knitted fabric guide;
Fig. 7 is an explanatory view showing the operation of the controlling method according to a modification example;
Fig. 8 is a diagram showing controlled moving distances (speed changes) relative to pulse in the moving positions of the knitted fabric guide according to the modification example; and
Figs. 9A and 9B are explanatory views showing an example of the operation of a conventional knitted fabric guide moving type take-up device.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0021] A preferred embodiment of the present invention will be described with reference to the drawings. Further, needless to say, the present invention is not limited to the embodiments and modification examples described below. Fig. 1 is a schematic perspective view of a lapping take-up device according to an embodiment of the present invention. Fig. 2 is a side view of Fig. 1, and Fig. 3 is a partial enlarged perspective view of Fig. 1.

[0022] A lapping take-up device 1 of Fig. 1 is arranged below a knitting unit of a knitting machine (see Figs. 9A and 9B), and includes a pair of upright support plates 2 and 2 spaced from each other, the support plates 2 and 2 being coupled and fixed by upper and lower horizontal members 13 and 14. Inner walls 2a and 2a in the upper portions of the respective support plates 2 and 2 rotatably support therebetween, for instance, a take-up unit having two take-up rolls 3 and 3 which extend in an axial direction X. The take-up unit pulls down a knitted fabric produced by the knitting unit of the knitting machine. The positions of the take-up rolls 3 and 3 are not changed. Such two take-up rolls 3 and 3 are typically used for a single-knit fabric. One of the take-up rolls 3 and 3 is provided with a rotation detection sensor 4 such as a rotary encoder which detects the rotation of the take-up roll 3.

[0023] The knitting machine is a circular knitting machine which includes the knitting unit, in which a cylinder having a plurality of needle grooves for needles is revolved by a drive, exerted by a motor, with yarns supplied to the knitting needles, to thereby form a tubular knitted fabric, and the take-up device 1 receives the tubular knitted fabric formed by the knitting unit. It is to be noted that the circular knitting machine is given as an example, and the knitting machine is not limited to the circular knitting machine.

[0024] The take-up device 1 includes a receiving unit 5 provided in the lower portion thereof, and a knitted fabric guide 6 which is arranged below the take-up rolls 3 and 3 and above the receiving unit 5 and reciprocates in a direction Y (in the drawing, in the right-left direction) orthogonal to the axial direction X (in the drawing, in the front-rear direction). The knitted fabric formed by the knitting unit passes through between the take-up rolls 3 and 3, and is dropped downwardly by the knitted fabric guide 6 so as to be guided and lapped or folded within the receiving unit 5.

[0025] The knitted fabric guide assembly (Fig. 1) has a pair of seats 7 and 7 spaced from each other, a knitted fabric guide 6 having guide rollers 8 and 8 rotatably attached to inner walls 7a and 7a of the seats 7 and 7, respectively, and extending in the axial direction X, a pair of operating members 9 and 9, such as pinions, rotatably attached to outer walls 7b and 7b of the seats 7 and 7, respectively, a pair of transmitting members 10 and 10, such as racks, extending in the Y direction, attached to the inner walls 2a and 2a of the support plates 2 and 2, respectively, and engaging with the pair of pinions 9 and 9, respectively, and a driving device 11 (shown in Fig. 4), such as a servo motor, driving the pinions 9 and 9. The partial enlarged view of Fig. 3 shows a rack-and-pinion mechanism in which the pinion 9 engages with the rack 10. It is to be noted that although in this embodiment, the rack-and-pinion mechanism is used as the operating and transmitting members, the present invention is not limited to this mechanism and other mechanisms corresponding to this may be used.

[0026] It is to be noted that although in this example, the guide rolls 8 and 8 shares, as the rotation driving source, the driving device 11 with the pinions 9 and 9, an additional driving device may be provided without sharing the driving device 11. In addition, the rotation speed of the guide rolls 8 and 8 may be synchronized with the moving speed of the knitted fabric guide 6. Alternatively, the rotation speed of the guide rolls 8 and 8 may be independently changed according to the position of the knitted fabric guide 6 without being synchronized with the moving speed of the knitted fabric guide 6.

[0027] As shown in Fig. 2, each pinion 9 is rotated by a power, exerted by the servo motor 11 (shown in Fig. 4), to move on each rack 10, so that while the guide rolls 8 and 8 are parallel with the take-up rolls 3 and 3 and with the bottom of the receiving unit 5, the knitted fabric guide 6 moves in the Y direction orthogonal to the axial direction X of the guide roll 8 and horizontally. When the

knitted fabric guide 6 moves to a predetermined position at either end, a controlling unit 15 typically reverses the rotation direction of the pinions 9 and 9 to change the moving direction of the knitted fabric guide 6. The pinions 9 and are rotated reversely by the servo motor 11 in order to prevent the pinions 9 and 9 from disengaging from the rack 10, thereby changing the moving direction of the knitted fabric guide 6 toward the opposite end. By repeating such operation, the knitted fabric guide 6 reciprocates in a horizontal direction above the receiving unit 5.

[0028] The knitted fabric formed by the knitting unit passes through between the take-up rolls 3 and 3, passes through between the guide rolls 8 and 8 reciprocating with the movement of the knitted fabric guide 6, and is dropped so as to be guided and folded within the receiving unit 5.

[0029] Fig. 4 is a block diagram showing the method of controlling the knitted fabric guide 6 according to this embodiment. The controlling unit 15 for controlling the entire take-up device, has an activating means 17 and a speed adjusting means 18. The controlling unit 15 controls the servo motor (driving device) 11 based on a detection pulse signal (rotation detection signal) from the rotation detection sensor 4 which has detected the rotation of one of the take-up rolls 3 and 3, and adjusts the moving distance (moving speed) per pulse of the knitted fabric guide 6 (guide rolls 8 and 8).

[0030] The activating means 17 of Fig. 4 obtains the length of a knitted fabric F pulled down by the take-up rolls 3 and 3 from the rotation detection sensor 4 which detects the detection pulse signal. Based on this detection, the activating means 17 activates the servo motor 11 and rotates it forwardly or reversely, using the current position and the moving direction of the knitted fabric guide 6 stored in the controlling unit 15 and starts to move the knitted fabric guide 6 in the right or left direction. The speed adjusting means 18 adjusts the moving distance per pulse of the knitted fabric guide 6 as a knitted fabric feeding length which is the longitudinal distance of the knitted fabric F between a knitted fabric feeding point P in which the take-up rolls 3 and 3 are engaged with each other and the position of the knitted fabric guide 6 is changed gradually due to the reciprocation of the knitted fabric guide 6. In other words, the knitted fabric feeding point P is the intermediate point of the respective rotation centers of the take-up rolls 3 and 3. The position of the knitted fabric guide 6 is also the point in which the guide rolls 8 and 8 are engaged with each other, that is, the intermediate point of the respective rotation centers of the guide rolls 8 and 8.

[0031] The speed adjusting means 18 changes the moving speed, that is, the moving distance of the knitted fabric guide 6 per pulse of the detection pulse signal from the rotation detection sensor 4 provided in one of the take-up rolls 3 and 3 by a drive, exerted by the servo motor 11, according to the displacement of the knitted fabric feeding length and the moving direction of the knitted fabric guide 6. In the moving direction of the knitted fabric guide 6 in which the knitted fabric feeding length becomes longer gradually, its moving distance is made shorter (or the moving speed is decreased) while in the moving direction of the knitted fabric guide 6 in which the knitted fabric feeding length becomes shorter gradually, its moving distance made longer (or the moving speed is increased).

[0032] The activating means 17 and the speed adjusting means 18 of the controlling unit 15 perform a series of operations of controlling the servo motor 11 to automatically adjust the moving speed of the knitted fabric guide 6 based on the detection pulse signal from the rotation detection sensor 4 which has detected the rotation of the take-up roll 3 by software processing based on, e.g., a control program previously stored in the controlling unit 15. It is to be noted that the activating means 17 and the speed adjusting means 18 may be realized by a hardware circuit in place of the software processing.

[0033] As shown in Fig. 5A, as the guide rolls 8 and 8 moves in the left direction away from an origin O which is a point lowered vertically from the knitted fabric feeding point P (P is the position in which the knitted fabric F is rolled out) of the take-up rolls 3 and 3 to the intermediate point of the guide rolls 8 and 8, the knitted fabric feeding length between the take-up rolls 3 and 3 and the guide rolls 8 and 8 (or the length of an oblique side of a rectangular triangle formed by the points P, O, and O') becomes longer gradually from L1 in which the guide rolls 8 and 8 is located at the origin position O to L2 in which the guide rolls 8 and 8 are located at the moving end O (L2 > L1). For this reason, in the case where the knitted fabric guide 6 conventionally has a constant speed, as the knitted fabric feeding length approaches L2, the boundary of the fabric F, in which one side of the boundary is folded within the receiving unit 5 while the other side does not reach the receiving unit 5, is behind in horizontal direction due to the increased path from the take-up rolls 3 and 3 through the knitted fabric guide 6 to the receiving unit 5, and therefore, the knitted fabric F is not sufficient only with the length of the knitted fabric F rolled out from the take-up rolls 3 and 3, resulting in pulling the knitted fabric F accommodated into the receiving unit 5. Accordingly, when the knitted fabric feeding length becomes longer, the moving speed of the knitted fabric guide 6 is decreased (or the moving distance per pulse is made shorter). As a result, the knitted fabric F can be fed slowly into the receiving unit 5 so as to prevent the knitted fabric F from being insufficient with only the length of the knitted fabric F rolled out from the take-up rolls 3 and 3, and therefore, stretch in the knitted fabric F accommodated into the receiving unit 5 can be substantially eliminated, so that the moving distance of the knitted fabric guide 6 and the length of the knitted fabric F fed into the receiving unit 5 are substantially the same to enable the knitted fabric F to be properly accommodated. This is ditto for the case where the guide rolls 8 and 8 move away from the origin O in the right direction.

[0034] As shown in Fig. 5B, as the guide rolls 8 and 8

approach the origin O from the left end in the right direction, the knitted fabric feeding length (the length of an oblique side of a rectangular triangle) becomes shorter gradually from L2 to L1. For this reason, in the case where the knitted fabric guide 6 has a constant speed, as the knitted fabric feeding length approaches L1, the knitted fabric F rolled out from the take-up rolls 3 and 3 is excessive, with the result that the knitted fabric F accommodated into the receiving unit 5 is slacked. Accordingly, when the knitted fabric feeding length becomes shorter, the moving speed of the knitted fabric guide 6 is increased (or the moving distance per pulse is made longer). As a result, since the knitted fabric F rolled out from the take-up rolls 3 and 3 can be fed immediately into the receiving unit 5 so as not to be excessive, slack in the knitted fabric F accommodated into the receiving unit 5 can be substantially eliminated, and therefore, the moving distance of the knitted fabric guide 6 and the length of the knitted fabric fed into the receiving unit 5 are substantially the same to enable the knitted fabric to be properly accommodated. This is ditto for the case where the guide rolls 8 and 8 approach the origin O from the right end in the left direction.

[0035] According to this embodiment, the speed adjusting means 18 adjusts the speed of the knitted fabric guide 6 so as to be substantially inversely proportional to the knitted fabric feeding length, whereby the knitted fabric F is fed into the receiving unit 5 so that stretch or slack in the knitted fabric F can be substantially eliminated. As a result, the knitted fabric F can be accommodated into the receiving unit 5 without causing any wrinkles or creases, and can be fully expanded to the opposite ends of the receiving unit 5 when it is folded therewithin, thereby enabling the amount of the accommodated fabric to be increased.

[0036] Fig. 6 is a diagram showing controlled moving distances (speed changes) relative to pulse in the moving positions of the knitted fabric guide 6. The horizontal axis shows the number of pulses of the detection pulse signal corresponding to the rotation of one of the take-up rolls 3 and 3, and the vertical axis shows the moving distances on the left and right sides of the knitted fabric guide 6, as seen from the origin O. When the knitted fabric guide 6 returns from the left end to the origin O in the right direction, as indicated by a, the knitted fabric feeding length becomes shorter gradually, so that the moving distance, that is, the moving speed, of the knitted fabric guide 6 per pulse is controlled to be increased. When the knitted fabric guide 6 moves away from the origin O in the right direction, as indicated by b, the knitted fabric feeding length becomes longer gradually, so that the moving speed of the knitted fabric guide 6 is controlled to be decreased. Thereafter, when the knitted fabric guide 6 returns from the right end to the origin O in the left direction, as indicated by c, the knitted fabric feeding length becomes shorter gradually, so that the moving speed of the knitted fabric guide 6 is controlled to be increased. When the knitted fabric guide 6 moves away from the origin O in the left direction, as indicated by d, the knitted fabric feeding length becomes longer gradually, so that the moving speed of the knitted fabric guide 6 is controlled to be decreased. The series of operations are repeated, so that the knitted fabric F is folded within the receiving unit 5.

[0037] In addition, when the knitted fabric F has stretch properties, the knitted fabric F is extended by being tensioned by the take-up roll 3, and thereafter, the knitted fabric F is rolled out from the take-up roll 3 so as to be shrunk to a natural length, and therefore, the amount of production of the knitted fabric F per pulse becomes smaller than that of the knitted fabric F without stretch properties, with the result that the moving distance of the knitted fabric guide 6 per pulse exceeds the amount of production of the knitted fabric F. As a result, the knitted fabric F accommodated into the receiving unit 5 is pulled to cause a gap on either end side, and cannot be fully expanded to the opposite ends of the receiving unit 5 when it is folded therewithin. In such case, the correction value or compensation value of the shrinkage factor of the knitted fabric F is input to the computer implementing the control program, e.g., manually, to adjust the moving distance (moving speed) of the knitted fabric guide 6 per pulse so that it is made shorter (decreased) according to the inputted numerical value, whereby the knitted fabric F can be expanded to the opposite ends of the receiving unit 5 when it is folded therewithin without causing any wrinkles or creases.

[0038] In this way, in the present invention, since the moving speed of the knitted fabric guide is adjusted as the knitted fabric feeding length between the knitted fabric feeding point or the take-up unit and the knitted fabric guide is changed gradually during the reciprocation of the knitted fabric guide, the knitted fabric accommodated into the receiving unit can be brought into a state that stretch and slack can be substantially eliminated, so that the knitted fabric can be accommodated into the receiving unit without causing any wrinkles or creases, and can be fully expanded to the opposite ends of the receiving unit when it is folded therewithin, thereby enabling the amount of the accommodated fabric to be increased.

[0039] Fig. 7 shows a modification example. Although in the above embodiment, the take-up unit is formed of two typical rolls 3 and 3 for single knit, in this modification example, as shown in Fig. 7, the take-up unit is formed of three typical rolls 3, 3 and 3 for double knit. In this case, the origin O is a point which is lowered vertically from the knitted fabric feeding point P at the rightmost roll 3 of the take-up unit to the intermediate point of the guide rolls 8 and 8. Since the left region is larger than the right region, as seen from the origin O, the moving distance on the left side of the knitted fabric guide 6 is longer than that on the right side thereof, as shown in Fig. 8.

[0040] It is to be noted that although in these embodiments, the take-up rolls 3 and 3 is used as the knitted fabric feeding point P positioned upward of the knitted

fabric guide 6, the take-up rolls constituting or forming the take-up unit may be omitted. In this case, as the knitted fabric feeding point P, a support point of an element such as a bar, provided in the middle position in the up-down direction between the knitting unit and the knitted fabric guide 6 and in the substantially center position in the Y direction of the knitted fabric guide 6 is used.

[0041] It is also to be noted that although in these embodiments, the servo motor 11 is controlled by the software processing to automatically adjust the moving speed of the knitted fabric guide 6, the moving speed of the knitted fabric guide 6 may be adjusted only by mechanism control which performs substantially the same operation as the software processing and the servo motor 11 without using them.

[0042] Although the present invention has been fully described in connection with the preferred embodiments thereof with reference to the accompanying drawings which are used only for the purpose of illustration, those skilled in the art will readily conceive numerous changes and modifications within the scope of the specification herein presented of the present invention. Accordingly, such changes and modifications are, unless they depart from the scope of the present invention as delivered from the claims annexed hereto, to be construed as included therein.

[Reference Numerals]

[0043]

1	Lapping take-up device
3	take-up roll
4	rotation detection sensor
5	accommodating unit
6	knitted fabric guide
8	guide roll
15	controlling unit
F	knitted fabric
P	knitted fabric feeding point

Claims

1. A method of controlling a knitted fabric guide (6), the method comprising:

providing a receiving unit (5) and the knitted fabric guide (6) positioned above the receiving unit (5) in a lapping take-up device (1) of a knitting machine, the knitted fabric guide (6) guiding and dropping a knitted fabric (F) produced by a knitting unit of the knitting machine while reciprocating in a horizontal direction so as to fold the knitted fabric (F) within the receiving unit (5);
providing a take-up unit, having take-up rolls (3), in a position upward of the knitted fabric guide (6) to feed the knitted fabric (F) to the knitted fabric guide (6), a knitted fabric feeding point (P) being formed by the take-up unit,

characterized in

adjusting the moving speed of the knitted fabric guide (6) according to a knitted fabric feeding length between the knitted fabric feeding point (P) and the knitted fabric guide (6), the knitted fabric feeding length varying due to the reciprocation of the knitted fabric guide (6),
wherein the rotation of one of the take-up rolls (3) of the take-up unit is detected by a sensor (4) based on a detection pulse signal, the moving speed of the knitted fabric guide (6) is adjusted by changing a moving distance of the knitted fabric guide (6) per pulse of the detection pulse signal from the sensor (4).

2. The method according to claim 1,
wherein the moving speed of the knitted fabric guide (6) is so controlled as to be decreased when the knitted fabric guide (6) moves in the direction in which the knitted fabric feeding length becomes longer gradually, and the moving speed of the knitted fabric guide (6) is so controlled as to be increased when the knitted fabric guide (6) moves in the direction in which the knitted fabric feeding length becomes shorter gradually.

3. The method according to claim 1,
wherein, when the knitted fabric (F) has stretch properties, the moving speed of the knitted fabric guide (6) with respect to the rotation detection signal is adjusted so as to be decreased compared to that of the knitted fabric (F) without stretch properties.

4. The method according to claim 3, wherein a compensation value of the shrinkage factor of the knitted fabric (F) to adjust the moving speed is inputted manually.

5. A lapping take-up device (1) for a knitting machine comprising:

a receiving unit (5);
a knitted fabric guide (6) positioned above the receiving unit (5), suitable for guiding and dropping a knitted fabric (F) produced by a kitting unit of the knitting machine while reciprocating in a horizontal direction so as to fold the knitted fabric (F) within the receiving unit (5);
a take-up unit having take-up rolls (3) and being positioned upward of the knitted fabric guide (6) for feeding the knitted fabric (F) to the knitted fabric guide (6), the knitted fabric feeding point (P) being formed by the take-up unit;
the lapping take-up device being **characterized**

by a sensor (4) suitable for detecting the rotation of one of the take-up-rolls (3) of the take-up unit; a controlling unit (15) suitable for adjusting the moving speed of the knitted fabric guide (6) according to a knitted fabric feeding length between the knitted fabric feeding point (P) and the knitted fabric guide (6), the knitted fabric feeding length varying due to the reciprocation of the knitted fabric guide (6),
wherein, based on a detection pulse signal from the sensor (4) which has detected the rotation of one of the take-up rolls (3), the controlling unit (15) adjusts the moving speed of the knitted fabric guide (6) by changing a moving distance of the knitted fabric guide (6) per pulse of the detection pulse signal from the sensor (4).

6. The lapping take-up device (1) according to claim 5, wherein the controlling unit (15) performs control so that the moving speed of the knitted fabric guide (6) is decreased when the knitted fabric guide (6) moves in the direction in which the knitted fabric feeding length becomes longer gradually, and that the moving speed of the knitted fabric guide (6) is increased when the knitted fabric guide (6) moves in the direction in which the knitted fabric feeding length becomes shorter gradually.

Patentansprüche

1. Verfahren zur Steuerung einer Gestrickführung (6), wobei das Verfahren umfasst:

Bereitstellen einer Empfangseinheit (5) und der Gestrickführung (6), welche oberhalb der Empfangseinheit (5) in einer Faltvorrichtung (1) einer Strickmaschine angeordnet ist, wobei die Gestrickführung (6) ein Gestrick (F), welches durch eine Strickeinheit der Strickmaschine hergestellt worden ist, führt und fallen lässt, während es sich in einer horizontalen Richtung hin- und herbewegt, um das Gestrick (F) in der Empfangseinheit (5) zu falten;
Bereitstellen einer Aufnahmeeinheit mit Aufnahmewalzen (3) in einer Position oberhalb der Gestrickführung (6), um die Gestrickführung (6) mit dem Gestrick (F) zu beschicken, wobei ein Gestrickbeschickungspunkt (P) durch die Aufnahmeeinheit gebildet wird,

dadurch gekennzeichnet,

dass die Bewegungsgeschwindigkeit der Gestrickführung (6) gemäß einer Gestrickbeschickungslänge zwischen dem Gestrickbeschickungspunkt (P) und der Gestrickführung (6) angepasst wird, wobei die Gestrickbeschickungslänge wegen der Hin- und Herbewegung der Gestrickführung (6) variiert,
wobei die Drehung der Aufnahmewalzen (3) der Aufnahmeeinheit auf der Grundlage eines Erfassungspulssignals durch einen Sensor (4) erfasst wird, wobei die Bewegungsgeschwindigkeit der Gestrickführung (6) durch Ändern des Bewegungsabstands der Gestrickführung (6) pro Puls des Erfassungspulssignals vom Sensor (4) angepasst wird.

2. Verfahren nach Anspruch 1,
wobei die Bewegungsgeschwindigkeit der Gestrickführung (6) so gesteuert wird, dass sie verringert wird, wenn die Gestrickführung (6) sich in die Richtung bewegt, in welche die Gestrickbeschickungslänge allmählich länger wird, und die Bewegungsgeschwindigkeit der Gestrickführung (6) so gesteuert wird, dass sie zunimmt, wenn die Gestrickführung (6) sich in die Richtung bewegt, in welche die Gestrickbeschickungslänge allmählich kürzer wird.

3. Verfahren nach Anspruch 1,
wobei, wenn das Gestrick (F) Dehnungseigenschaften aufweist, die Bewegungsgeschwindigkeit der Gestrickführung (6) in Bezug auf das Drehungserfassungssignal angepasst wird, so dass sie im Vergleich zu einem Gestrick (F) ohne Dehnungseigenschaften verringert wird.

4. Verfahren nach Anspruch 3, wobei ein Kompensationswert des Schrumpffaktors des Gestricks (F) zum Anpassen der Bewegungsgeschwindigkeit manuell eingegeben wird.

5. Faltvorrichtung (1) für eine Strickmaschine, umfassend:

eine Empfangseinheit (5);
eine oberhalb der Empfangseinheit (5) angeordnete Gestrickführung (6), geeignet zum Führen und Fallenlassen eines Gestricks (F), welches durch die Strickeinheit der Strickmaschine hergestellt worden ist, während sie sich in einer horizontalen Richtung hin- und herbewegt, um das Gestrick (F) in der Empfangseinheit (5) zu falten;
eine oberhalb der Gestrickführung (6) angeordnete Aufnahmeeinheit mit Aufnahmewalzen (3) zum Beschicken der Gestrickführung (6) mit dem Gestrick (F), wobei der Gestrickbeschickungspunkt (P) durch die Aufnahmeeinheit gebildet ist;

wobei die Faltvorrichtung **gekennzeichnet ist durch**

einen Sensor (4), welcher zum Erfassen der Drehung einer der Aufnahmewalzen (3) der Auf-

nahmeeinheit geeignet ist;
eine Steuereinheit (15), welche zum Anpassen einer Bewegungsgeschwindigkeit der Gestrickführung (6) gemäß einer Gestrickbeschickungslänge zwischen dem Gestrickbeschickungspunkt (P) und der Gestrickführung (6) geeignet ist, wobei die Gestrickbeschickungslänge wegen der Hin- und Herbewegung der Gestrickführung (6) variiert,
wobei auf der Grundlage eines Erfassungspulssignals des Sensors (4), welcher eine Drehung einer der Aufnahmewalzen (3) erfasst hat, die Steuereinheit (15) die Bewegungsgeschwindigkeit der Gestrickführung (6) **durch** Ändern einer Bewegungsstrecke der Gestrickführung (6) pro Puls des Erfassungspulssignals vom Sensor (4) anpasst.

6. Faltvorrichtung (1) nach Anspruch 5,
wobei die Steuereinheit (15) die Steuerung so ausführt, dass die Bewegungsgeschwindigkeit der Gestrickführung (6) verringert wird, wenn die Gestrickführung (6) sich in die Richtung bewegt, in welcher die Gestrickbeschickungslänge allmählich länger wird, und dass die Bewegungsgeschwindigkeit der Gestrickführung (6) erhöht wird, wenn die Gestrickführung (6) sich in die Richtung bewegt, in welcher die Gestrickbeschickungslänge allmählich kürzer wird.

Revendications

1. Procédé de commande d'un guide de tricot (6), le procédé comprenant:

la fourniture d'une unité de réception (5) et le guide de tricot (6) positionné au-dessus de l'unité de réception (5) dans un dispositif d'enroulement plieur (1) d'une machine à tricoter, le guide de tricot (6) guidant et déposant un tricot (F) produit par une unité à tricoter de la machine à tricoter en un mouvement alternatif dans un sens horizontal de manière à plier le tricot (F) dans l'unité de réception (5);
la fourniture d'une unité d'enroulement, comportant des enrouleurs (3), dans une position vers le haut du guide de tricot (6) pour alimenter le tricot (F) vers le guide de tricot (6), un point d'alimentation de tricot (P) étant formé par l'unité d'enroulement,

caractérisé

par le réglage de la vitesse de déplacement du guide de tricot (6) en fonction d'une longueur d'alimentation de tricot entre le point d'alimentation de tricot (P) et le guide de tricot (6), la longueur d'alimentation de tricot variant en raison du mouvement alternatif du guide de tricot (6),
en ce que la rotation de l'un des enrouleurs (3) de l'unité d'enroulement est détectée par un capteur (4) sur la base d'un signal d'impulsion de détection, la vitesse de déplacement du guide de tricot (6) est réglée en modifiant une distance de déplacement du guide de tricot (6) par impulsion du signal d'impulsion de détection du capteur (4).

2. Procédé selon la revendication 1,
en ce que la vitesse de déplacement du guide de tricot (6) est commandée de manière à être réduite lorsque le guide de tricot (6) se déplace dans le sens dans lequel la longueur d'alimentation de tricot augmente progressivement, et la vitesse de déplacement du guide de tricot (6) est commandée de manière à être augmentée lorsque le guide de tricot (6) se déplace dans le sens dans lequel la longueur d'alimentation de tricot diminue progressivement.

3. Procédé selon la revendication 1,
en ce que, lorsque le tricot (F) présente des propriétés en termes d'extensibilité, la vitesse de déplacement du guide de tricot (6) par rapport au signal de détection de rotation est réglée de manière à être réduite par rapport à celle du tricot (F) ne présentant pas de propriétés en termes d'extensibilité.

4. Procédé selon la revendication 3, en ce qu'une valeur de compensation du facteur de retrait du tricot (F) pour régler la vitesse de déplacement est saisie manuellement.

5. Dispositif d'enroulement plieur (1) pour une machine à tricoter comprenant:

une unité de réception (5);
un guide de tricot (6) positionné au-dessus de l'unité de réception (5), approprié pour guider et déposer un tricot (F) produit par une unité à tricoter de la machine à tricoter en un mouvement alternatif dans un sens horizontal de manière à plier le tricot (F) dans l'unité de réception (5);
une unité d'enroulement comportant des enrouleurs (3) et étant positionnée vers le haut du guide de tricot (6) pour alimenter le tricot (F) vers le guide de tricot (6), le point d'alimentation de tricot (P) étant formé par l'unité d'enroulement;
le dispositif d'enroulement plieur étant **caractérisé par**
un capteur (4) approprié pour détecter la rotation de l'un des enrouleurs (3) de l'unité d'enroulement;
une unité de contrôle-commande (15) appropriée pour régler la vitesse de déplacement du

guide de tricot (6) en fonction d'une longueur d'alimentation de tricot entre le point d'alimentation de tricot (P) et le guide de tricot (6), la longueur d'alimentation de tricot variant en raison du mouvement alternatif du guide de tricot (6),
en ce que, sur la base d'un signal d'impulsion de détection du capteur (4) qui a détecté la rotation de l'un des enrouleurs (3), l'unité de contrôle-commande (15) règle la vitesse de déplacement du guide de tricot (6) en modifiant une distance de déplacement du guide de tricot (6) par impulsion du signal d'impulsion de détection du capteur (4).

6. Dispositif d'enroulement plieur (1) selon la revendication 5,
en ce que l'unité de contrôle-commande (15) effectue la commande de sorte que la vitesse de déplacement du guide de tricot (6) soit réduite lorsque le guide de tricot (6) se déplace dans le sens dans lequel la longueur d'alimentation de tricot augmente progressivement, et de sorte que la vitesse de déplacement du guide de tricot (6) soit augmentée lorsque le guide de tricot (6) se déplace dans le sens dans lequel la longueur d'alimentation de tricot diminue progressivement.

Fig. 1

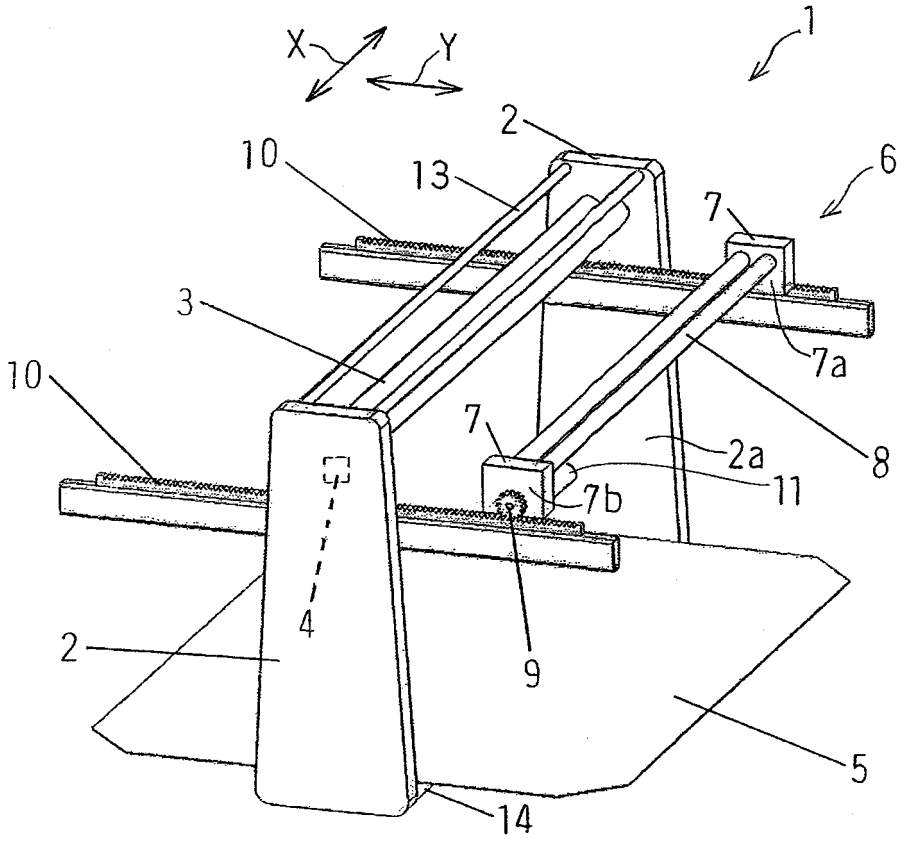


Fig. 2

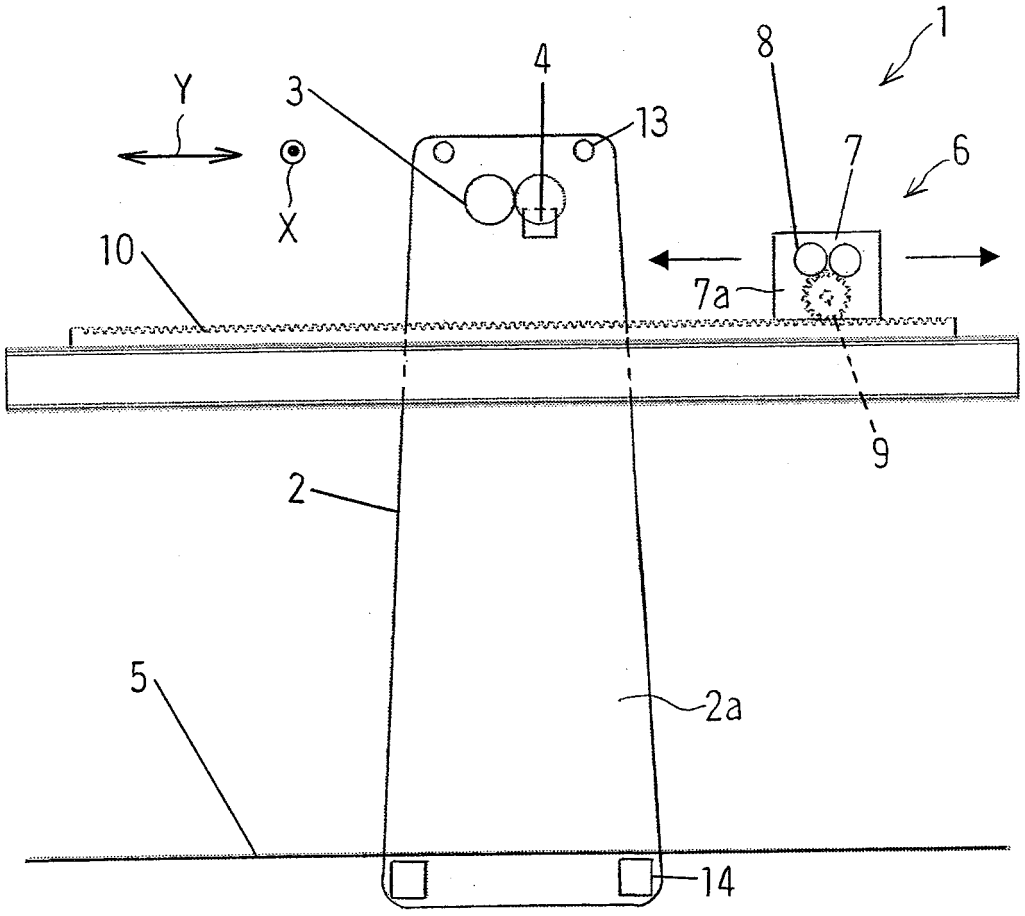


Fig. 3

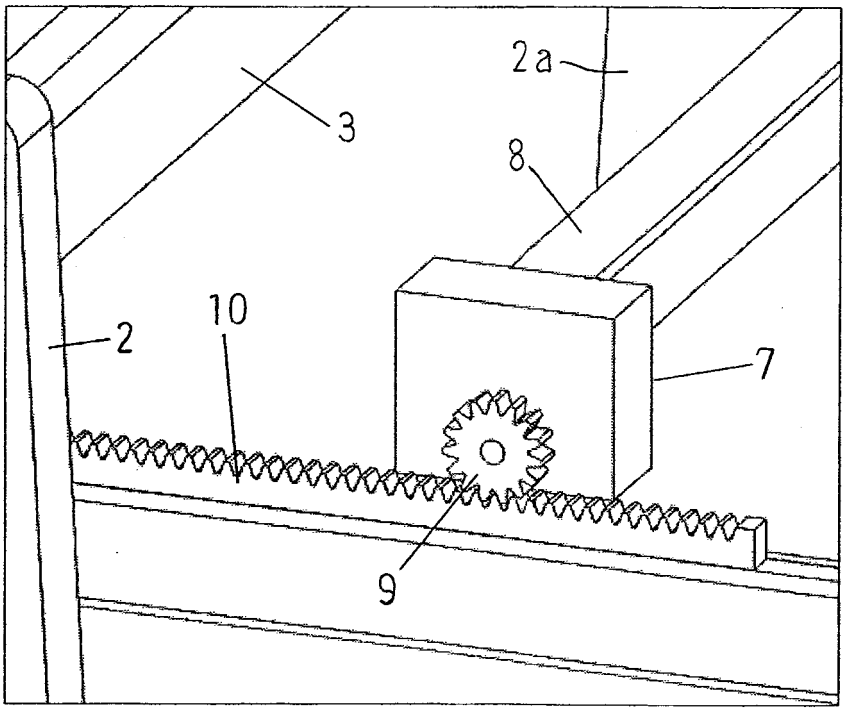


Fig. 4

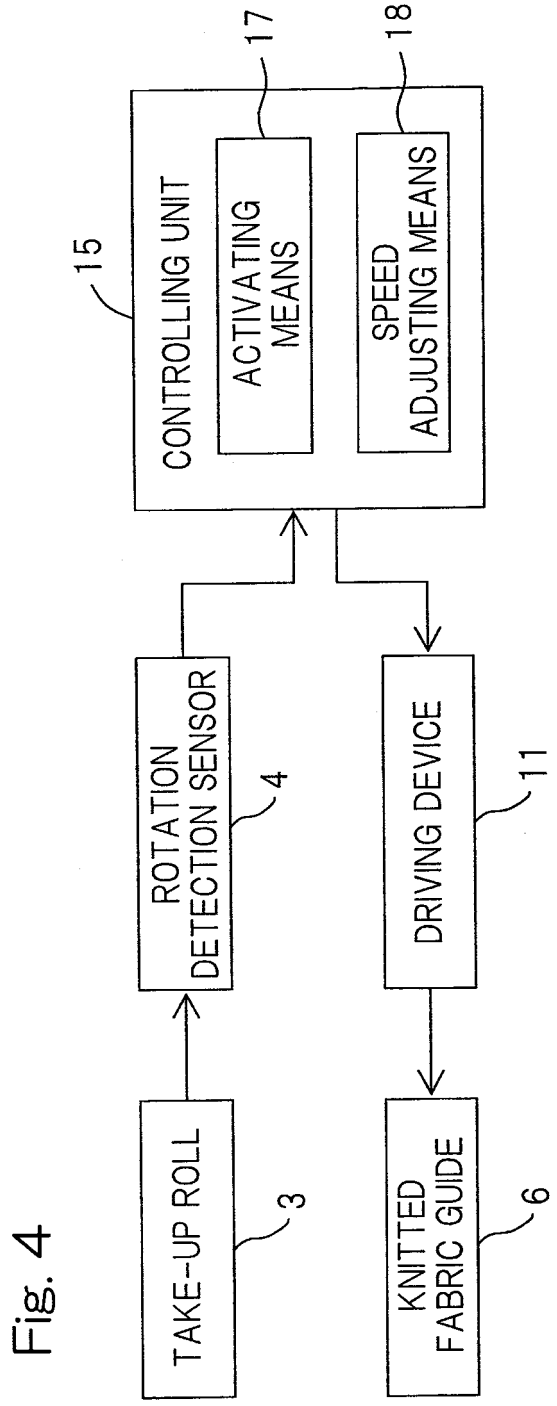

15
CONTROLLING UNIT
17
ACTIVATING MEANS
18
SPEED ADJUSTING MEANS
ROTATION DETECTION SENSOR
4
DRIVING DEVICE
11
TAKE-UP ROLL
3
KNITTED FABRIC GUIDE
6

Fig. 5B

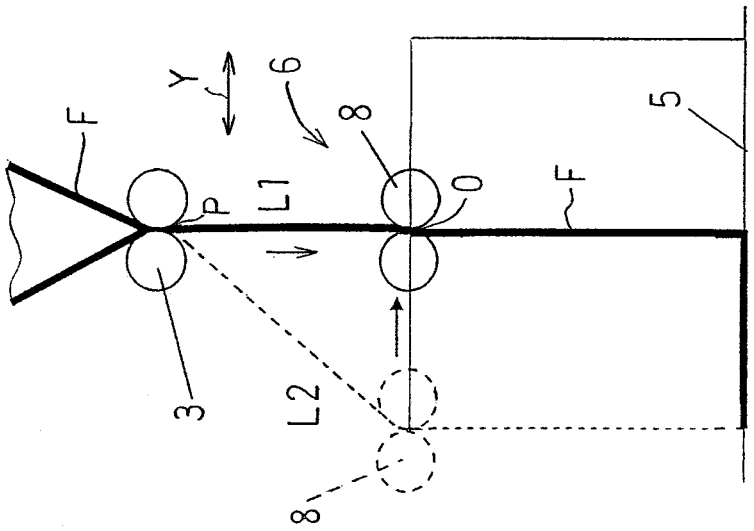


Fig. 5A

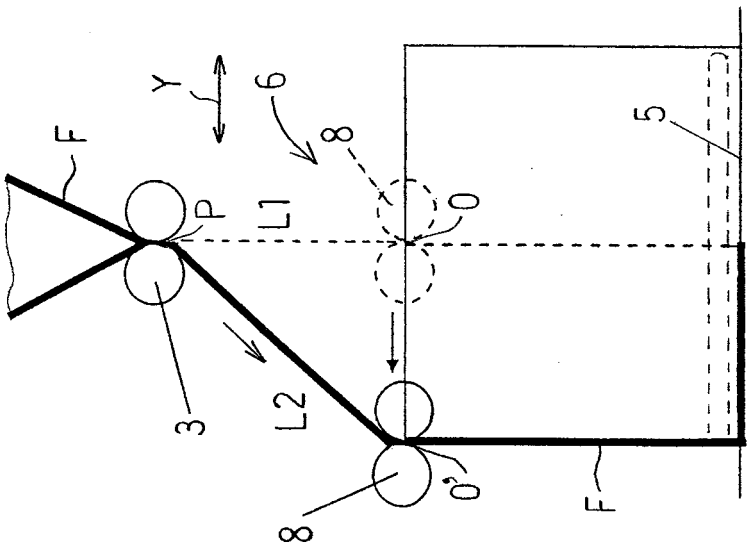


Fig. 6

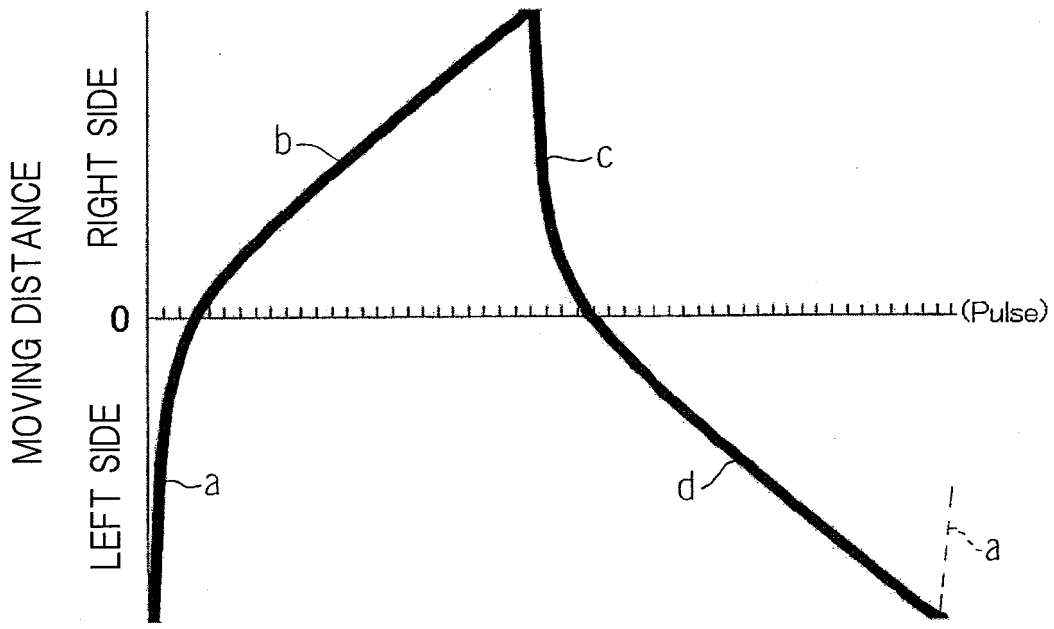


Fig. 7

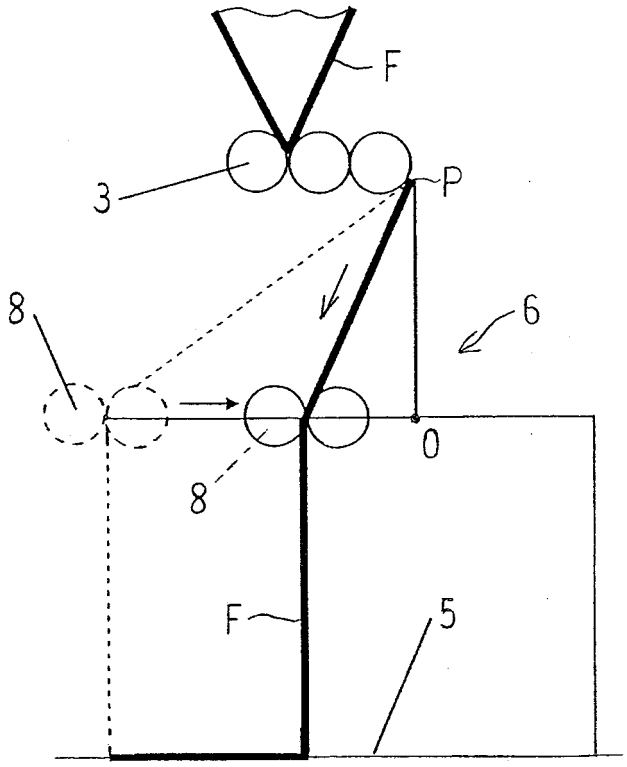

F
3
P
8
6
0
8
F
5

Fig. 8

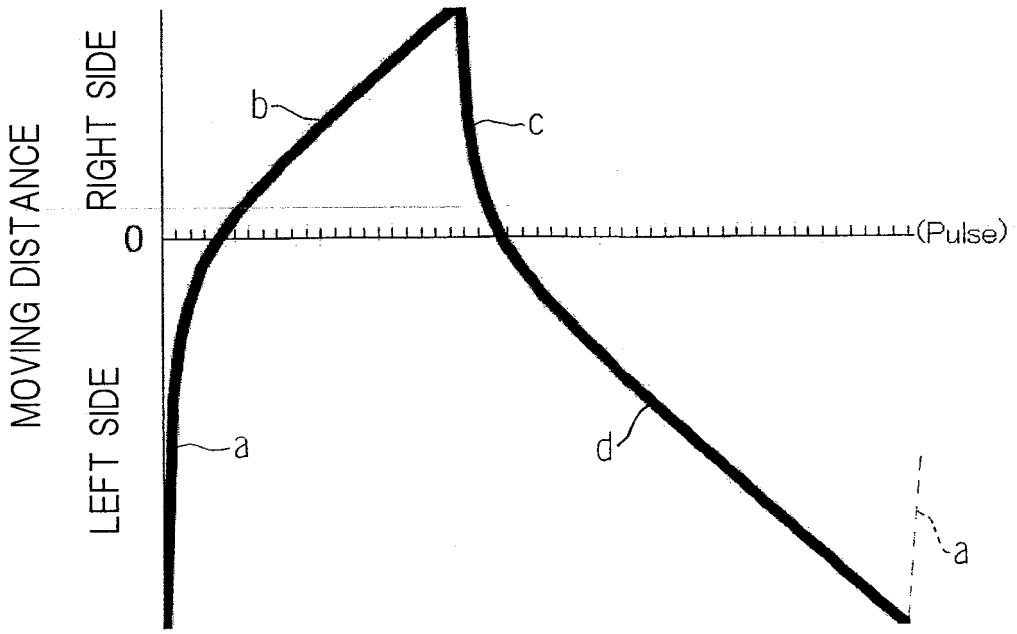

MOVING DISTANCE
RIGHT SIDE
LEFT SIDE
0
b
c
(Pulse)
a
d
a

Fig. 9B

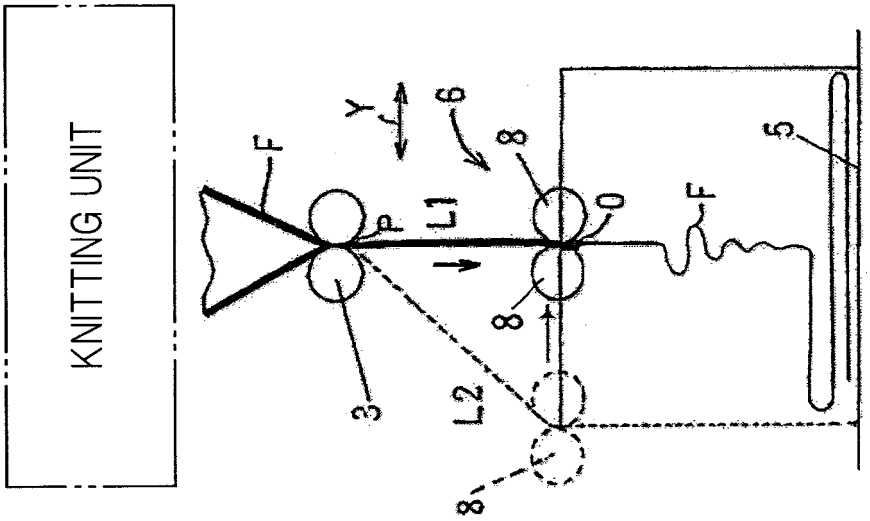
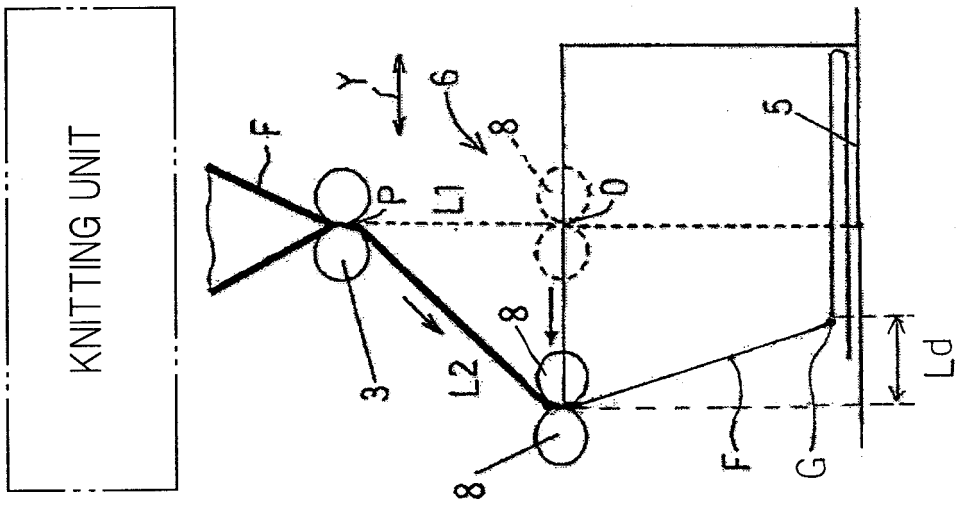

KNITTING UNIT
F
Y
6
8
P
L1
0
F
5
3
L2
8
8

Fig. 9A


KNITTING UNIT
F
Y
6
8
P
L1
0
5
3
L2
8
8
F
G
Ld

REFERENCES CITED IN THE DESCRIPTION

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