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(54) **Let-off control method and let-off control device for loom including temple device having automatic temple position switching mechanism**

Ablastssteuerungsverfahren und Ablastssteuerungsvorrichtung für Webmaschine, die eine Breithaltervorrichtung mit einem automatischen Breithalterpostionsschaltmechanismus beinhaltet

Procédé de contrôle de relâchement et dispositif de contrôle de relâchement pour métier à tisser incluant un dispositif de templet doté d'un mécanisme de commutation de la position du templet

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a method and device for controlling let-off of warp in a loom including a temple device having a mechanism that automatically switches the position of a temple. In particular, the present invention relates to a loom for weaving a fabric including two or more weave sections having different densities (for example, a tire cord fabric whose weave section includes a tire fabric section and a tabby section). The loom includes a let-off device, a temple (for example, a ring temple), and a temple device. The let-off device controls the let-off amount (let-off speed) of warp by controlling driving of a let-off motor in accordance with a basic speed that is calculated on the basis of the number of revolutions of the loom and the like. The temple device includes a mechanism (for example, an automatic elevator mechanism) that displaces the temple between two positions, i.e., an operating position and a standby position by using an actuator as a drive source. The temple device automatically switches the position of the temple between the two positions in accordance with the density of a fabric to be woven. Regarding such a loom, the present invention relates to let-off control that is performed by the let-off device to displace the temple when the weave section changes (between the fabric section and the tabby section, in the case of tire cord fabric).

[0002] The term "standby position" refers to a position to which the temple finally reaches according to the configuration of the device. The term "non-operating position", which will be mentioned below, refers to a position at which the temple is separated from the fabric. It is possible that the standby position is the same as the non-operating position.

2. Description of the Related Art

[0003] In a general loom, temple devices are disposed at both ends in the weaving-width direction of a fabric to prevent a portion of the fabric near the cloth fell from being crimped when the fabric is woven. A ring temple is a known example of a temple used in such a temple device. The ring temple includes a plurality of temple rings that are arranged parallel to one another along the weaving-width direction, and each of the temple rings has multiple pins on the outer peripheral surface thereof.

[0004] Such a temple device is used not only when weaving a general fabric but also when weaving a rubber-reinforcing fabric such as a tire cord fabric. When weaving a tire cord fabric, a body portion having a very low weft density (so-called "tire fabric section") and a tab portion having a high weft density (so-called "tabby section") are alternately woven. The temple is made to act on the fabric when weaving the tabby section and the temple is sep-

arated from the fabric when weaving the tire fabric section.

[0005] There is a temple device, which is used in a loom for weaving a tire cord fabric, including a mechanism (automatic temple position switching mechanism) that automatically switches the position of a temple (Japanese Unexamined Patent Application Publication No. 4-281041). The automatic temple position switching mechanism includes a pneumatic cylinder to which the temple is attached. The pneumatic cylinder moves the temple between a first position (standby position) and a second position (operating position).

[0006] As described in Japanese Unexamined Patent Application Publication No. 4-281041 (and the corresponding publication US 5 065 796 A), when weaving a fabric (tire cord fabric) including two or more weave sections having different weft densities, i.e., a first weave section having a very low weft density such as a tire fabric section and a second weave section having a high weft density such as a tabby section, the first weave section is woven when the temple has been moved to a first position (standby position) at which the temple is separated (retracted) from the fabric. The reason for this operation will be described in detail.

[0007] As with the case of a general fabric, when weaving the second weave section having a high weft density, the fabric tends to be crimped when the fabric is woven. Therefore, it is necessary to locate the temple at the second position (operating position, i.e., a position at which the fabric engages with the temple and is pressed against the temple) so that the temple can exert a crimp prevention effect to the fabric.

[0008] In contrast, when weaving the first weave section having a very low density, such as the tire fabric section, it is not necessary to prevent crimping by using a temple, because the fabric is only negligibly crimped when the fabric is woven. Moreover, in the first weave section having a very low weft density, warp applies only a weak binding force to weft, so that the positions of warp and weft are easily displaced from each other. Therefore, if the first weave section is continuously pressed by a temple, the weft and the warp may be disarranged and the quality of the fabric may be reduced. Therefore, when weaving the first weave section, it is preferable that the temple be retracted to a first position (standby position) at which the temple is separated from the fabric.

[0009] For such a reason, in the loom described in Japanese Unexamined Patent Application Publication No. 4-281041, the operation of the pneumatic cylinder is controlled so that the position of the temple is automatically moved (displaced) from the operating position to the standby position or from the standby position to the operating position depending on which of the first and second weave sections having different weft densities is to be woven.

SUMMARY OF THE INVENTION

[0010] However, if the position of the temple is switched between the two positions, i.e., the operating position and the standby position, when the weave section is switched between the first weave section (low density) and the second weave section (high density), the warp tension is changed due to the switching, so that problems such as reduction in the quality of fabric and a warp insertion fault occur. These problems will be described below in detail.

[0011] When the temple is at the operating position, the fabric is guided by guides (temple base, temple guide), which are disposed in front of and behind the temple, and the peripheral surface of the temple, so that the fabric moves along a path along the peripheral surface of the temple. When the temple is at the non-operating position at which the temple is separated from the fabric, the fabric linearly moves between the front and back guides. That is, the length of the path along which the fabric moves differs depending on whether the temple is located at the operating position or at the non-operating position. The length of the path is larger when the temple is at the operating position.

[0012] When the temple is retracted from the operating position to the non-operating position, the length of the path along which the fabric moves sharply changes in a decreasing direction. Accordingly, the tension of the fabric and the warp tension sharply decrease in a short time. As a result, a warp shedding fault may occur due to the decrease in the warp tension, which may cause a warp insertion fault.

[0013] On the contrary, when the temple is displaced from the non-operating position to the operating position, the length of the path along which the fabric moves sharply changes in an increasing direction. Accordingly, the tension of the fabric and the warp tension sharply increase in a short time. As a result, the sharp increase in the warp tension may cause reduction in the quality of fabric.

[0014] Moreover, because the warp tension sharply changes, the amount of warp let-off is controlled excessively, whereby the control may become unstable (hunting may occur) and a weaving bar may be generated.

[0015] An object of the present invention, which has been achieved with consideration of the above-described problems, is to reduce an influence that is exerted on weaving when the position of a temple is changed between an operating position and a standby position in a loom including a temple device having an automatic position switching mechanism that automatically changes the position of the temple between the operating position and the standby position.

[0016] A first aspect of the present invention is a warp let-off control method performed by a let-off device of a loom, the loom used for weaving a fabric having two or more weave sections with different densities, the loom including the let-off device that controls an amount of

warp let-off by performing let-off control in which a let-off motor is driven in accordance with a speed that is obtained by applying a tension correction to a basic speed on the basis of a deviation of a detected tension from a target tension, and a temple device including a temple that is displaceable between two positions and an automatic temple position switching mechanism that automatically switches a position of the temple between the two positions in accordance with a weft density of one of the weave sections to be woven, the two positions being an operating position and a standby position.

[0017] The method includes controlling driving of a let-off motor with a control mode during a control period including a period during which the temple is displaced, the control mode adjusting an amount of warp let-off in a direction such that a change in a warp tension due to the displacement of the temple is cancelled out, the control mode being different from a control mode for performing let-off control in a normal operation of the loom after the control period.

[0018] The term "a control period including a period during which the temple is displaced (hereinafter referred to as a "control period") means that the displacement of the temple is performed during at least a part of (or all of) the control period. It does not necessarily mean that the control period includes all of the period during which the temple is displaced between the operating position and the non-operating position (hereinafter referred to as a "displacement period") and the control period is equal to or longer than the displacement period. Therefore, the "control period" may be shorter than the entirety of the displacement period. For example, if the displacement period is four loom cycles, the control period may be three loom cycles, and there may be a period during which the temple is moved and the adjustment is not performed.

[0019] It is preferable that the control period be the same as the displacement period and the let-off amount be adjusted during the control period so that a change in the warp tension due to the displacement of the temple is cancelled out. However, the control period is not limited thereto. Alternatively, the adjustment amount for one loom cycle may be reduced and the control period may be longer than the displacement period, or the adjustment amount for one loom cycle may be increased and the control period may be shorter than the displacement period.

[0020] The control period is not literally limited to a specific period from a certain time to another certain time as in the case of the weaving cycle and the displacement period of the temple. Alternatively, for example, the control period may be a conditional period having a start time that is fixed and an end time that is the time at which a certain condition is satisfied.

[0021] The "control mode being different from a control mode" includes the following first to third modes.

[0022] A first mode is a control mode in which a correction speed that corresponds to a set correction

amount is added to a command speed obtained from the basic speed and the let-off control performed on the basis of the tension deviation. To be specific, because the warp tension decreases when the weave section is switched from the tabby section to the tire fabric section, a control mode for adding a negative correction to the command speed is performed. On the contrary, because the warp tension increases when the weave section is switched from the tire fabric section to the tabby section, a control mode for adding a positive correction to the command speed is performed.

[0023] A second mode is a control mode in which the command speed, which is obtained in the let-off control performed on the basis of the basic speed and the tension deviation, is multiplied by a preset coefficient. To be specific, when the weave section is switched from the tabby section to the tire fabric section, in order to compensate for a decrease in the warp tension, the command speed is multiplied by a coefficient smaller than 1, and the result of the multiplication is determined as the command speed. On the contrary, when the weave section is switched from the tire fabric section to the tabby section, in order to compensate for an increase in the warp tension, the command speed is multiplied by a coefficient larger than 1, and the result of the multiplication is determined as the command speed.

[0024] A third mode is a control mode in which, instead of performing the let-off control, warp is let off with a predetermined speed (set speed). In this case, the set speed is calculated by adding to or subtracting from the basic speed a correction speed obtained with consideration of a change in the warp tension due to the displacement of the temple. To be specific, when the weave section is switched from the tabby section to the tire fabric section, the set speed is controlled to be higher than the basic speed. On the contrary, when the weave section is switched from the tire fabric section to the tabby section, the set speed is controlled to be lower than the basic speed.

[0025] The term "let-off amount" refers to the length of warp that is let off per unit time (= let-off speed).

[0026] In the method according to the first aspect of the invention, a correction amount of warp let-off in accordance with a change in a warp tension due to the displacement of the temple and a correction period may be set beforehand, the correction period being the control period including the period during which the temple is displaced, and the control mode may apply correction to the control of the amount of warp let-off in accordance with the correction amount, the control being performed by the let-off device during the correction period.

[0027] The "change in the warp tension" corresponds to (is proportional to) a change in the path length of a fabric due to the displacement of the temple. The "correction amount" is set as a let-off amount that compensates for the change in the warp tension (change in the path length of the fabric).

[0028] In the method according to a first aspect of the

invention, the correction period may include a plurality of weaving cycles, and driving of the let-off device may be controlled so that correction of the amount of warp let-off in accordance with the correction amount is evenly performed in each weaving cycle during the correction period and so that correction of the amount of warp let-off corresponding to the correction period is performed during the entirety of the correction period.

[0029] The "weaving cycle" is one weaving cycle in which a series of operations with which inserted weft is woven in the fabric (weft insertion, beating, etc.) is performed, which corresponds to the rotation angle of the main shaft of the loom in the range of 0° to 360°.

[0030] In the method according to the first aspect of the invention, the correction period is set in accordance with a weaving condition. When correction is evenly performed during the correction period, the correction period is adjusted and thereby the correction for each weaving cycle is adjusted.

[0031] A second aspect of the invention is a let-off control device for a loom, the loom weaving a fabric having two or more weave sections with different densities in accordance with a weaving length that has been set beforehand for each weave section while monitoring the weaving length of each weave section, the loom including a let-off device including the let-off control device that controls a let-off motor for rotating a warp let-off member in accordance with a command speed obtained by applying a tension correction to a basic speed on the basis of a deviation of a detected tension from a target tension, and a temple device including a temple that is displaceable between two positions and an automatic temple position switching mechanism that automatically switches a position of the temple between the two positions in accordance with a weft density of one of the weave sections to be woven, the two positions being an operating position and a standby position.

[0032] The let-off control device includes setting means that sets a correction amount in accordance with a change in a warp tension due to displacement of the temple and a correction period during which correction control is performed on the basis of the correction amount; and correction control means that adds, in correspondence with switching of the position of the temple, a speed correction value to the command speed for the let-off motor in accordance with the correction amount during the correction period set in the setting means.

[0033] In the let-off control device according to the second aspect of the invention, the correction period may include a plurality of weaving cycles, and the correction control means may calculate the average correction amount for each weaving cycle during the correction period from the correction amount and the correction period, and calculates the speed correction value on the basis of the average correction amount.

[0034] With the present invention, the let-off amount of the let-off device is corrected when the weave section is switched. Therefore, a change in the warp tension

change due to displacement of the temple between the operating position and the standby position is cancelled out by the correction of the let-off amount, whereby a warp insertion fault and a reduction in the quality of fabric due to a change in the tension is prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035]

Fig. 1 illustrates a tire cord fabric loom according to the present invention;
 Fig. 2 illustrates an overview of control of the fabric weaving device illustrated in Fig. 1;
 Fig. 3 is a side view of a temple device when the loom is weaving a tabby section;
 Fig. 4 illustrates the temple device when the loom is weaving a tire fabric section;
 Fig. 5 is a plan view of the temple device;
 Fig. 6 is a block diagram of a system for driving a cylinder of the temple device; and
 Fig. 7 is a block diagram of a system for controlling driving of a let-off motor.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0036] Fig. 1 illustrates a tire cord fabric loom to which the present invention is applied. A general tire cord fabric loom includes a yarn supply unit 1, a fabric weaving device 2, and a take-up device 3, which are independently provided. The yarn supply unit 1 supplies a large number of warp yarns 1a as a warp row 1b (hereinafter also referred to as a "warp sheet"). The fabric weaving device 2 makes a fabric 2a by inserting weft (not shown) into the warp sheet 1b. The take-up device 3 takes up the fabric 2a. A tire cord fabric, which is the fabric 2a, and the parts of the tire cord fabric loom will be described below in detail.

[0037] A tire cord fabric is a rubber-reinforcing fabric that is used for making a carcass layer of a rubber tire. The tire cord fabric includes two weave sections (not shown) having significantly different weft densities: a tire fabric section having a very low weft density, and a tabby section having a weft density higher than that of the tire fabric section. The carcass layer is manufactured by coating the tire fabric section of the tire cord fabric with a rubber material.

[0038] The yarn supply unit 1 includes a creel device (not shown) and a tension device 4. The creel device includes a large number of pegs that protrude from a strut or the like. The number of the pegs is the same as the number of the warp yarns 1a, and each of the pegs supports a yarn supply package. A yarn is supplied toward the tension device 4 from each of the yarn supply packages, and thereby a warp row is formed.

[0039] The tension device 4 aligns a large number of yarns, which have been pulled out of the creel device, in the lateral direction so that the yarns extend parallel to

each other, and the yarns are guided to a dancer roller 4b along a path in which a plurality of guide rollers 4a are disposed. The dancer roller 4b applies a tension to the yarns so that a substantially equal tension is applied to each of the yarns that have been pulled out of the yarn supply package. Subsequently, the fabric weaving device 2 makes the large number of yarns into the warp sheet 1b, and the warp sheet 1b is output toward the take-up device 3.

[0040] In the example illustrated in Fig. 1, the take-up device 3 is a so-called off-loom take-up device that performs contact take-up. The take-up device 3 includes a drive roller 3a, which is rotated, and a driven roller 3b, which is rotatable. A take-up roller 3c is disposed above the drive roller 3a and the driven roller 3b, and one end of the fabric 2a is wound around the take-up roller 3c. In addition to the drive roller 3a and the driven roller 3b, a guide roller 3d is provided in the take-up device 3. When the take-up roller 3c rotates in contact with the drive roller 3a, the fabric 2a, which has been woven, is guided the guide roller 3d and the driven roller 3b, and is wound around the take-up roller 3c.

[0041] Fig. 2 illustrates an enlarged view of the fabric weaving device 2 of Fig. 1. The structure of the fabric weaving device 2 is the same as that of an ordinary loom, except for the following. An ordinary loom supplies a warp sheet, which is wound around a let-off beam, to a fabric weaving unit by rotating the let-off beam. In contrast, the tire cord fabric loom illustrated in Fig. 2 supplies the warp sheet 1b, which has passed through the tension device 4, to a fabric weaving unit 7 by letting off the warp sheet 1b by a desired let-off amount using a let-off mechanism 5 of the weaving device.

[0042] The let-off mechanism 5 includes a nip roller 5a, a let-off roller 5b, and a let-off motor 5c for rotating the let-off roller 5b. The warp sheet 1b is wound around and nipped between the nip roller 5a and the let-off roller 5b, and is let off due to rotation of the let-off roller 5b. The let-off roller 5b corresponds to a "warp let-off member" in the present invention, and corresponds to a warp beam in the case of a general loom.

[0043] The warp sheet 1b, which has been let off from the let-off mechanism 5, passes a guide roller 6a, and is wound around and guided by a tension roller 6b. A tension detector 6c is connected to the tension roller 6b, and the tension detector 6c detects the warp tension by detecting a load applied to the tension roller 6b due to the warp tension.

[0044] The fabric weaving unit 7 makes the fabric 2a by inserting weft into the warp sheet 1b. Subsequently, the fabric 2a is let off toward the take-up device 3 (off-loom take-up device) by a take-up mechanism 8. In Fig. 2, a heald frame 7a is illustrated.

[0045] The take-up mechanism 8 includes a pair of press rollers 8a, a take-up roller 8b that is in pressed contact with the press rollers 8a, and a take-up motor 8c for rotating the take-up roller 8b. The fabric 2a, which has been woven by the fabric weaving unit 7, is guided by a

guide roller 7b toward the take-up mechanism 8; is wound around the press roller 8a, the take-up roller 8b, and the press roller 8a in this order; and is nipped between the press roller 8a and the take-up roller 8b. Thus, when the take-up roller 8b is rotated, the fabric 2a is let off toward the take-up device 3 with a let-off amount (speed) in accordance with a preset weft density.

[0046] A take-up control device 20 controls driving of the take-up motor 8c of the take-up mechanism 8. A let-off control device 10 controls driving of the let-off motor 5c of the let-off mechanism 5. The let-off mechanism 5, the let-off control device 10, and the like correspond to a "let-off device" in the present invention.

[0047] The basic function of the let-off control device 10 is as follows. The let-off control device 10 calculates the basic speed from the number of revolutions of the loom and the weft density that have been set in a loom control device 30, calculates a speed correction value from the deviation of the warp tension detected by the tension detector 6c from the target warp tension that has been set, and calculates a command speed by correcting the basic speed using the speed correction value. The let-off control device 10 calculates the actual number of revolutions of the let-off motor 5c from a signal sent from an encoder 5d that detects the rotation angle of the drive shaft of the let-off motor 5c, and performs let-off control by driving the let-off motor 5c so that the actual number of revolutions of the let-off motor 5c becomes the same as the command speed. As a result, the amount of warp let-off is controlled, and the warp tension is adjust. The structure for realizing the basic function of the let-off control device 10, other functions of the let-off control device 10, and the structure for realizing the other functions will be described below in detail.

[0048] The take-up control device 20 calculates the number of revolutions and the like of a main shaft 9a of the loom on the basis of a signal from an encoder 9b that detects the rotation angle of the main shaft 9a. The take-up control device 20 controls driving of the take-up motor 8c in sync with the rotation of the main shaft 9a of the loom with a rotation speed in accordance with the weft density that has been set in the loom control device 30. That is, because the weft density and the number of revolutions of the main shaft 9a of the loom differs between the tire fabric section and the tabby section, driving of the take-up motor 8c is controlled so that the rotation speed of the take-up motor 8c matches that for either of these sections. To do so, as with the let-off control device 10, the take-up control device 20 calculates the actual number of revolutions of the take-up motor 8c on the basis of a signal from an encoder 8d of the drive shaft of the take-up motor 8c, and the take-up control device 20 controls driving of the take-up motor 8c so that the actual rotation speed of the take-up motor 8c matches the rotation speed for the weave section.

[0049] The above-described tire cord fabric loom includes a pair temple devices each disposed at an end portion thereof in the weaving-width direction and near

the cloth fell in a downstream part thereof in the direction in which warp moves. The pair of temple devices are laterally symmetric with each other. Therefore, in the following description, as illustrated in Figs. 3 to 5, only a temple device 40 that is disposed on one of the sides in the weaving-width direction will be described.

[0050] Fig. 3 is a side view of the temple device 40, which is disposed on a side of the weaving-width direction, in a state in which a fabric (not shown) is in pressed contact with a ring temple 41. Fig. 4 illustrates a state in which a fabric (not shown) is separated from the ring temple 41. Fig. 5 is a top view of the temple device 40.

[0051] As with the temple device described in "Description of the Related Art", the temple device 40 includes the ring temple 41 that is engageable with the fabric 2a, and an automatic temple elevating device (hereinafter referred to as an "elevating device") 42 for automatically elevating and lowering the ring temple 41. The elevating device 42 corresponds to an automatic temple position switching mechanism.

[0052] The elevating device 42 includes an air cylinder 50 that serves as an actuator, a temple holder 60 to which the ring temple 41 is attached, and a link mechanism 70 that connects the air cylinder 50 and the ring temple 41 to each other. In the elevating device 42, the members 50, 60, and 70 are swingably supported by a pair of support plates 43 that are fixed to a frame of the loom (not shown) or the like. The pair of support plates 43 are disposed so as to face each other in the weaving-width direction with a distance therebetween, and the members 50, 60, and 70 are supported between the pair of support plates 43. Each of the members 50, 60, and 70 will be described below in detail.

[0053] A bracket 51 is rotatably supported by a first support shaft 50A, which extends between the pair of support plates 43, with a bearing 50a (plain bearing or the like). One side of the air cylinder 50 (to be specific, the head cover side of a cylinder body 52) is fixed to the bracket 51. Thus, the air cylinder 50 is rotatably supported by the pair of support plates 43 through the bracket 51. As with the first support shaft 50A, various shafts that will be described below extend in the weaving-width direction.

[0054] A connection member 54 is attached to one end of the cylinder body 52 (an end of a piston rod 53, which protrudes on the rod cover side) of the air cylinder 50. The connection member 54 has a two-forked shape (angular U-shape in plan view) that is open in a direction away from the rod cover. Opposite members 54a, which form the two-forked shape, are separated from each other in the weaving-width direction. A first connection shaft 54B extends between the opposite members 54a.

[0055] The temple holder 60 is a unit (integrally formed member) including a base portion 61, an arm portion 62, and a support portion 63 that are integrated with each other. The base portion 61 extends in the weaving-width direction. The arm portion 62 extends in a direction (lateral direction in Fig. 3) that is perpendicular to the longi-

tudinal direction of the base portion 61. The support portion 63 is a block-shaped member formed at an end of the arm portion 62. The ring temple 41 is attached to the base portion 61. A through-hole 63b is formed in the support portion 63 so as to extend in the longitudinal direction of the base portion 61. A second support shaft 63A is inserted through the through-hole 63b with a bearing 63a (plain bearing or the like) therebetween, and the second support shaft 63A extends between the pair of support plates 43. Thus, the temple holder 60 is rotatably supported by the pair of support plates 43 at the support portion 63 thereof.

[0056] The link mechanism 70 includes a first link lever 71 and a second link lever 72. One end of the first link lever 71 (the upper end in Fig. 3) is rotatably supported by a third support shaft 71A that extends between the pair of support plates 43 with a bearing 71a (plain bearing or the like). The other end of the first link lever 71 (the lower end in Fig. 3) is rotatably connected to the first connection shaft 54B of the connection member 54 with a bearing 54b (plain bearing or the like).

[0057] One end of the second link lever 72 (the upper end in Fig. 3) is rotatably connected to the first connection shaft 54B of the connection member 54 with the bearing 54b (plain bearing or the like). The other end of the second link lever 72 (the lower end in Fig. 3) has a two-forked shape as with the connection member 54, and a second connection shaft 72B extends between a pair of opposite members 72a. The other end of the second link lever 72 is connected to a connection piece 73 that is attached to the upper surface of the temple holder 60 through the second connection shaft 72B. A bearing 72b (plain bearing or the like) is disposed between the second connection shaft 72B and the connection piece 73, so that the second connection shaft 72B (second link lever 72) and the connection piece 73 are rotatably connected to each other.

[0058] As described above, the first connection shaft 54B, which connects the first link lever 71 to the second link lever 72, extends across the two-forked connection member 54. A stopper 74, which defines the protruding limit of the piston rod 53 to which the connection member 54 is attached, is disposed between the pair of support plates 43. The stopper 74 is disposed at a position such that, when the piston rod 53 protrudes and the connection member 54 contacts the stopper 74, the third support shaft 71A, the first connection shaft 54B, and the second connection shaft 72B are positioned on the same line in a side view.

[0059] The temple devices 40, each having the above-described structure, are disposed on both ends of the loom in the weaving-width direction. A temple bar 81, which extends in the weaving-width direction, is disposed below the temple devices 40 and fixed to the frame (not shown) of the loom. A temple guide 83 and a temple base 84 are attached to the temple bar 81 at positions corresponding to the selvage in lateral directions using a temple bracket 82 that is fixed to the temple bar 81 with a

holder 80. The temple guide 83 and the temple base 84 are disposed below the ring temple 41 at positions in front of and behind the ring temple 41, respectively. The temple guide 83 and the temple base 84, which form a U-shape in side view, guide ends of a fabric.

[0060] In the temple device 40 having the above-described structure, the positions of the first to third support shafts 50A, 63A, and 71A are fixed relative to the support plates 43. The positions of the first and second connection shafts 54B and 72B are movable. In the temple device 40, when the piston rod 53 of the air cylinder 50 has protruded to the limit as illustrated in Fig. 3, the first link lever 71 and the second link lever 72 extend along substantially the same line, and the distance between the third support shaft 71A, which is fixed, and the second connection shaft 72B, which is movable, is the maximum. In this state, the ring temple 41 is positioned at the lower limit of the elevation range, the lower end of the ring temple 41 is positioned below the upper ends of the temple guide 83 and the temple base 84, and the ring temple 41 is in pressed contact with the fabric.

[0061] When the piston rod 53 moves backward from the state illustrated in Fig. 3, as illustrated in Fig. 4, the first link lever 71 rotates around the third support shaft 71A, which is fixed, whereby the first link lever 71 and the second link lever 72 form an angle therebetween. Thus, the distance between the third support shaft 71A, which is fixed, and the second connection shaft 72B, which is movable, decreases and the connection piece 73 is raised, whereby the temple holder 60 rotates upward around the second support shaft 63A, which is fixed. As a result, the ring temple 41 is displaced upward. When the piston rod 53 is at the most retracted position, the ring temple 41 is positioned at the highest position in the elevation range, and the ring temple 41 is separated from the fabric. As the piston rod 53 of the air cylinder 50 reciprocates in such a manner, the ring temple 41 is positioned at one of the lowest position and the highest position in the elevation range.

[0062] Fig. 6 illustrates a control mechanism of the air cylinder 50. The air cylinder 50 causes the piston rod 53 to reciprocate by using compressed air supplied from an air supply source (not shown). The movement direction of the piston rod 53 is switched by supplying compressed air to one of the pressure chambers on the forward movement side (protruding side) and the backward movement side (retracting side) in the cylinder body 52 and discharging compressed air from the other of the pressure chambers. Supply of compressed air to one pressure chamber and discharge of compressed air from the other pressure chamber can be switched by using a four-directional switching valve 90.

[0063] The four-directional switching valve 90 is a solenoid valve. The loom control device 30 includes switching drive means 93 for controlling the operation of the solenoid valve. The loom control device 30 further includes weaving length monitoring means 31 for monitoring the weaving length of a fabric to be woven, a main

controller 33 for controlling driving of the devices of the loom, and a weaving condition setting unit 32 for setting the weaving condition and the like.

[0064] Movement start timing for the ring temple 41 (hereinafter referred to as the "temple 41") is set (stored) in the weaving condition setting unit 32 by using an input setting unit 96. The movement start timing for the ring temple 41 is used when switching between the tabby section and the tire fabric section (= the timing at which the four-directional switching valve 90 is activated for moving the piston rod 53 of the air cylinder 50 forward or backward). The input setting unit 96 includes a display (not shown), an input unit, and the like.

[0065] In the present embodiment, the set value of the movement start timing is set with respect to a reference timing at which the weave sections are switched. The set value is set in terms of the weaving length (in cm) to be woven from the reference timing. To be specific, movement of the temple 41 is started at a start timing at which the boundary between the weave sections reaches a position of the temple 41 (to be specific, a position of the temple 41 at a lateral end of the cloth fell in the warp direction), and the start timing is set by the weaving length from the time at which the weave sections are switched. Therefore, when weaving is performed by the amount of the set length from the reference timing, the boundary between the weave sections reaches the position of the temple 41, and the movement of the temple 41 is started at this timing. The set value is set for each of the case in which the weave section is switched from the tabby section to the tire fabric section and the case in which the weave section is switched from the tire fabric section to the tabby section. Such a set value S1 is output from the weaving condition setting unit 32 to the main controller 33.

[0066] The weaving length monitoring means 31 is known means including, for example, a counter that increments the count by one for each rotation of the main shaft 9a of the loom on the basis of a signal S7 supplied from the encoder 9b for detecting the rotation angle of the main shaft 9a (every time the rotation angle 0° (360°) is detected). The weaving length is calculated in accordance with the count, the weft density set in the weaving condition setting unit 32, and the weaving crimp ratio of the fabric that is being woven, which is obtained beforehand. The calculated weaving length S8 is output to the main controller 33.

[0067] A weaving condition is set in the weaving condition setting unit 32 by using the input setting unit 96. The weaving condition includes the following: the set value S1, the weft density, the number of revolutions of the loom, and a weaving pattern such as the order in which the weave sections (tire fabric section, tabby section) are to be woven and the weaving length.

[0068] The main controller 33 obtains the switching timing of the weave sections from a weaving pattern S2 that has been set in the weaving condition setting unit 32 and the weaving length S8 that has been calculated by

the weaving length monitoring means 31. When the switching timing of the weave sections arrives, the main controller 33 determines whether the weave section to be woven next is the tire fabric section or the tabby section from the weaving pattern S2. Then, the main controller 33 outputs a start command signal S3 to the switching drive means 93 when the movement start timing arrives, on the basis of the set value S1 of the movement start timing for the determined weave section and the weaving length S8 calculated by the weaving length monitoring means 31.

[0069] When receiving the signal S3, the switching drive means 93 outputs an operation signal S11 for operating the four-directional switching valve 90 to the four-directional switching valve 90 in order to change the connection state of the compressed air supply side and the discharge side of the four-directional switching valve 90.

[0070] When the switching timing between the weave sections arrives, the main controller 33 outputs a signal S9, which indicates switching between the weave sections, to the weaving length monitoring means 31. When the signal S9 is input, the weaving length monitoring means 31 resets the weaving length that has been calculated, and starts calculating a new weaving length.

[0071] When the four-directional switching valve 90, which is controlled by the switching drive means 93, is in the state illustrated in Fig. 6, the channel for supplying compressed air is connected to the pressure chamber on the forward movement side and the channel for discharging compressed air is connected to the pressure chamber on the backward movement side, so that the piston rod 53 receives a pressure from the compressed air in a protruding direction. When the four-directional switching valve 90 is operated in this state and the connections of the channels are switched, the piston rod 53 receives a pressure in the backward direction and is retracted, so that the compressed air is discharged from the pressure chamber on the forward movement side. As a result, the piston rod 53 moves backward, the link mechanism 70 rotates the temple holder 60 upward, the temple 41 moves upward from the operating position to the non-operating position, and finally the temple 41 reaches the standby position.

[0072] Fig. 7 illustrates a system for realizing the basic function of the let-off control device 10 and a system for realizing the other function of the let-off control device 10. The basic function is a function of controlling the amount of warp let-off during a normal operation period excluding a control period including a period during which the temple is displaced. The other function is a function of controlling the amount of warp let-off in a control period including a period during which the temple is displaced (that is, a function of controlling the let-off amount of warp in a direction in which a change in the warp tension due to the displacement of the temple is cancelled out). The configuration for realizing the basic function (a target tension setting unit 11, a tension addition point 12, an average tension calculator 13, a correction speed calculator

14, a basic speed calculator 15, a command speed calculator 16, a speed addition point 17, a drive controller 18) and the configuration for realizing the other function (a correction controller 19) will be described below in detail.

[0073] The average tension calculator 13 receives a signal representing the warp tension Y detected by the tension detector 6c and a signal from the encoder 9b for detecting the rotation angle of the main shaft 9a. The average tension calculator 13 samples the warp tension Y with a predetermined sampling period corresponding to a certain rotation angle of the main shaft 9a, and calculates the average tension Ya for a plurality of warp tensions Y obtained in the period (sampling period). Then, the average tension calculator 13 outputs the signal representing the calculated average tension Ya to a subtraction terminal of the tension addition point 12.

[0074] A signal representing the target tension Yo, which is supplied from the target tension setting unit 11, is input to the addition terminal of the tension addition point 12. The tension addition point 12 calculates the deviation $\Delta Ya = Yo - Ya$ from the target tension Yo, which is supplied from the target tension setting unit 11, and the average tension Ya, which is supplied by the average tension calculator 13, and outputs a signal representing the deviation ΔYa to the correction speed calculator 14.

[0075] The correction speed calculator 14 includes control elements for performing, for example, proportional operation, integration, and differentiation, and periodically operates in accordance with a clock signal (not shown), thereby calculating a speed correction value on the basis of the deviation ΔYa , and outputs a signal V1 for the speed correction to the command speed calculator 16. The basic speed calculator 15 also outputs a signal V0 to the command speed calculator 16.

[0076] The weaving condition setting unit 32 of the loom control device 30 outputs a signal S21 representing the number of revolutions of the loom, the weft density, and the like to the basic speed calculator 15. The basic speed calculator 15 calculates the basic speed from the number of revolutions of the loom and the weft density, and outputs a signal V0 representing the basic speed to the command speed calculator 16.

[0077] The command speed calculator 16 calculates a command speed by correcting the basic speed supplied from the basic speed calculator 15 by using a speed correction value supplied from the correction speed calculator 14, and outputs a signal V2 representing the command speed to the addition terminal of the speed addition point 17.

[0078] A signal supplied from the encoder 5d for detecting the rotation angle of the let-off motor 5c is output to the subtraction terminal of the speed addition point 17. The speed addition point 17 calculates the rotation speed of the let-off motor 5c on the basis of the signal supplied from the encoder 5d. In the case of the basic function, for which the correction controller 19 described below is not used, the speed addition point 17 outputs to the drive

controller 18 the deviation ΔV of the calculated rotation speed of the let-off motor 5c from the command speed supplied from the command speed calculator 16.

[0079] The drive controller 18 outputs a signal for cancelling out the deviation ΔV to the let-off motor 5c. In the case of the basic function, for which the correction controller 19 described below is not used, the drive controller 18 outputs a signal that makes the rotation speed of the let-off motor 5c the same as the command speed to the let-off motor 5c, and controls driving of the let-off motor 5c. As a result, the amount of warp let-off is controlled, and the warp tension is controlled. The basic let-off control is performed during a normal operation period of the loom excluding a control period including a period during which the temple 41 is displaced.

[0080] In the let-off control device having the function of the above-described basic let-off control, according to the present invention, the amount of warp let-off is controlled in the control period with a control mode that is different from that of the basic let-off control. To be specific, the let-off control device according to the present invention performs drive control of the let-off motor 5c with a control mode such that the amount of warp let-off during the control period is adjusted in a direction in which a change in the warp tension due to the displacement of the temple 41 is cancelled out as compared with the let-off amount during the basic let-off control. The let-off control device 10 of the present embodiment controls the amount of warp let-off by adding the speed correction value, which corresponds to the preset correction amount, to the command speed, which is obtained by correcting the basic speed for the basic let-off control in accordance with the tension deviation. The correction controller 19 serves as correction control means for performing the different control modes.

[0081] In the example illustrated in Fig. 7, a correction period, which is a control period including a period during which the temple 41 is displaced, is set in the correction controller 19. Moreover, a correction amount, which is used for further correcting the command speed that has been calculated by performing the tension correction on the basic speed, is set in the correction controller 19. Such setting is performed by using the input setting unit 96. Correction of the let-off amount is performed over the set correction period in accordance with the correction period, which has been set over the set correction period, and the correction amount.

[0082] The correction is evenly performed in each weaving cycle in the correction period. That is, if the correction period is X weaving cycles and the correction amount is Y (cm), correction is performed so as to make the let-off amount be Y/X for each weaving cycle.

[0083] In the present embodiment, the starting time of the correction period is the time at which displacement of the temple 41 is started. The starting time of the displacement of the temple 41 is the time at which the boundary between the weave sections reaches the position corresponding to the temple 41 (to be specific, the position

at a lateral end of the temple 41 near the cloth fell in the warp direction).

[0084] An operator can appropriately change the setting of the correction period. The correction period may be set in accordance with waving conditions, such as the number of revolutions of the loom, the weft density, the set warp tension (target tension), and the displacement period during which the temple 41 is displaced between the operating position and the non-operating position (a position separated from the fabric). In particular, when determining the correction period, the displacement period is the most important factor among the weaving conditions. When determining the correction period, it is necessary to consider the movement speed of the temple 41 and the number of revolutions of the loom, because the displacement period is determined by these factors. However, if the movement speed of the temple 41 is uniform, the number of weaving cycles that occur while the temple 41 moves between the operating position and the non-operating position differs depending on the number of revolutions of the loom, so that it is necessary to carefully consider the number of revolutions of the loom.

[0085] The degree of change in the tension due to the displacement of the temple 41 differs in accordance with the target warp tension. Therefore, when determining the correction period, it may be necessary to consider the set warp tension. For example, under the condition in which the tension changes in a direction in which the warp tension decreases (from the tabby section to the tire fabric section), if the set tension is low, the effect of correction on weaving is large. Therefore, it is preferable that the correction let-off amount be performed such that the change in the path length due to the displacement of the temple 41 be cancelled out rapidly. On the contrary, if the set tension is high under the same condition, the effect on weaving is small. Therefore, the correction of let-off amount may be performed such that the change in the path length due to the displacement of the temple 41 be cancelled out slowly. Under the condition in which the tension changes in a direction in which the warp tension increases (from the tire fabric section to the tabby section), the opposite holds true. It is necessary that the operator set the correction period with consideration of these factors.

[0086] Regarding the correction period, the number of revolutions and the weft density differs considerably depending on whether the weave section to be switched is the tabby section or the tire fabric section, so that the weave speed (the speed with which the fabric moves) from the time of the switching differs considerably. Therefore, it is preferable that the correction period be set for each weave section.

[0087] The correction amount is set as a warp let-off length (for example, in cm) in accordance with, for example, a change in the path length of fabric caused due to the displacement of the temple 41. The correction amount has been calculated and set beforehand.

[0088] The correction controller 19 calculates the cor-

rection amount for each weaving cycle on the basis of the correction period and the correction amount, which have been set so that correction is performed for each weaving cycle. Moreover, the correction controller 19 calculates the rotation speed of the let-off motor 5c for letting off the warp by the correction amount in each waving cycle on the basis of the calculated correction amount (the amount of warp let-off), the number of revolutions of the loom (which is supplied from the encoder 9b for detecting the number of revolutions of the main shaft 9a of the loom), and the like. Then, the correction controller 19 outputs a speed correction signal V3 to the addition terminal of the speed addition point 17.

[0089] When the weave section is switched from the tabby section to the tire fabric section, the temple 41 is moved from the operating position to the non-operating position, so that the warp tension decreases. Therefore, during the correction period, it is necessary to reduce the let-off amount from a normal level, so that the speed correction value is negative. On the contrary, when the weave section is switched from the tire fabric section to the tabby section, the warp tension increases, so that the speed correction value is positive.

[0090] Because such a speed correction value is output, at the speed addition point 17, the command speed, which has been calculated by applying a tension correction to the basic speed, is further corrected by using the speed correction value. The deviation ΔV of the calculated rotation speed of the let-off motor 5c from the corrected command speed is output to the drive controller 18. The drive controller 18 outputs a signal for cancelling out the deviation ΔV to the let-off motor 5c. As a result, the amount of warp let-off is controlled in a control mode that is different from that for a normal operation period excluding the control period.

[0091] At the switching timing between the weave sections, the main controller 33 of the loom control device 30 outputs a signal S4 representing an information indicating that the weave section has been switched from the tabby section to the tire fabric and the weave section to be woven next is the tire fabric section is output to the correction controller 19 of the let-off control device 10. The correction controller 19 determines whether the weave section to be woven next is the tire fabric section or the tabby section, and outputs a signal V3 representing the command speed (a negative value that reduces the let-off amount), which is an average correction amount corresponding to the correction amount that is set over a correction period that has been set for the weave section, to the speed addition point 17. Thus, the amount of warp let-off is adjusted in a direction in which the reduction in the warp tension due to the displacement of the temple 41 is cancelled out.

[0092] The present invention is not limited to the embodiment. In the above-described embodiment, correction is performed by adding the set speed correction value to the command speed that has been calculated by the basic let-off control performed in the correction period.

However, the present invention is not limited thereto. For example, correction may be performed by multiplying a predetermined coefficient to the command speed. Instead of correcting the command speed calculated by the basic let-off control, the let-off motor 5c may be driven over the correction period with a specific speed that has been set. In this case, the specific speed is calculated beforehand with consideration of the basic speed and the speed of the let-off motor 5c for letting off warp by the amount that complements a change in the path length of warp due to the displacement of the temple 41, and the let-off motor 5c may be driven with the speed.

[0093] The period during which correction is performed is preset in the above-described embodiment. Instead, only the start timing of performing the correction may be set. Regarding the end timing at which the correction is finished, for example, by monitoring the warp tension detected by the tension detector 6c by using independent monitoring means, and the control may be changed to the original let-off control when the detected tension enters a predetermined range. In this case, it is preferable that the correction amount be a little smaller than that of the embodiment.

[0094] In the above-described embodiment, the correction period is set in the unit of the number of weaving cycles (pick number). However, the correction period may be set in the unit of time or the weaving length.

[0095] In the description above, the loom to which the present invention is applied is a tire cord loom. However, the loom to which the present invention is applied is not limited thereto. The present invention is applicable to any loom for weaving a fabric including two or more weave sections having different densities, the loom including a temple device having an automatic temple position switching mechanism that automatically switches the position of a temple between an operating position and a standby position in accordance with the weft density of the weave section to be woven. Therefore, the warp take-up member of the loom may be a let-off beam.

Claims

1. A warp let-off control method performed by a let-off device of a loom, the loom used for weaving a fabric (2a) having two or more weave sections with different densities, the loom including the let-off device that controls an amount of warp let-off by performing let-off control in which a let-off motor (5c) is driven in accordance with a speed that is obtained by applying a tension correction to a basic speed on the basis of a deviation of a detected tension from a target tension, and a temple device (40) including a temple (41) that is displaceable between two positions and an automatic temple position switching mechanism (42) that automatically switches a position of the temple between the two positions in accordance with a weft density of one of the weave sections to be wo-

ven, the two positions being an operating position and a standby position, the method being **characterised by** controlling driving of a let-off motor with a control mode during a control period including a period during which the temple is displaced, the control mode adjusting an amount of warp let-off in a direction such that a change in a warp tension due to the displacement of the temple is cancelled out, the control mode being different from a control mode for performing let-off control in a normal operation of the loom after the control period.

2. The method according to Claim 1, wherein a correction amount of warp let-off in accordance with a change in a warp tension due to the displacement of the temple and a correction period are set beforehand, the correction period being the control period including the period during which the temple is displaced, and wherein the control mode applies correction to the control of the amount of warp let-off in accordance with the correction amount, the control being performed by the let-off device during the correction period.
3. The method according to Claim 2, wherein the correction period includes a plurality of weaving cycles, and wherein driving of the let-off device is controlled so that correction of the amount of warp let-off in accordance with the correction amount is evenly performed in each weaving cycle during the correction period and so that correction of the amount of warp let-off corresponding to the correction period is performed during the entirety of the correction period.
4. The method according to Claim 3, wherein the correction period is set in accordance with a weaving condition.
5. A let-off control device (10) for a loom, the loom weaving a fabric (2a) having two or more weave sections with different densities in accordance with a weaving length that has been set beforehand for each weave section while monitoring the weaving length of each weave section, the loom including a let-off device including the let-off control device (10) that controls a let-off motor (5c) for rotating a warp let-off member (5b) in accordance with a command speed obtained by applying a tension correction to a basic speed on the basis of a deviation of a detected tension from a target tension, and a temple device including a temple (41) that is displaceable between two positions and an automatic temple position switching mechanism (42) that automatically switches a position of the temple between the two positions in accordance with a weft density of one of the weave sections to be woven, the two

positions being an operating position and a standby position,
characterised by the let-off control device comprising:

setting means that sets a correction amount of let-off of warp in accordance with a change in a warp tension due to displacement of the temple and sets a correction period during which correction control is performed on the basis of the correction amount; and
 correction control means (19) that adds, in correspondance with switching of the position of the temple, a speed correction value to the command speed for the let-off motor in accordance with the correction amount during the correction period that is set in the setting means.

6. The device according to Claim 5,
 wherein the correction period includes a plurality of weaving cycles, and
 wherein the correction control means calculates the average correction amount for each weaving cycle during the correction period from the correction amount and the correction period, and calculates the speed correction value on the basis of the average correction amount.

Patentansprüche

1. Kettablasssteuerungsverfahren, das durch eine Kettablassvorrichtung einer Webmaschine durchgeführt wird, wobei die Webmaschine zum Weben eines Gewebes (2a) verwendet wird, das zwei oder mehr Webabschnitte mit unterschiedlichen Dichten aufweist, wobei die Webmaschine die Ablassvorrichtung enthält, die eine Menge an Kettfaden, der mittels Durchführen von Ablasssteuerung abgelassen ist, und in der ein Ablassmotor (5c) in Übereinstimmung mit einer Geschwindigkeit angetrieben wird, die durch Anwenden einer Spannungskorrektur auf eine Basisgeschwindigkeit auf der Basis einer Abweichung einer erfassten Spannung von einer Zielspannung, erhalten wird,
 und eine Breithaltervorrichtung (40), die einen Breithalter (41) enthält, der verschiebbar ist zwischen den zwei Positionen und einem automatischen Breithalterpositionsschaltmechanismus (42), der automatisch eine Position des Breithalters zwischen den zwei Positionen in Übereinstimmung mit einer Webdichte von einem der zu webenden Webabschnitte schaltet,
 wobei die zwei Positionen eine Betriebsposition und eine Ruheposition sind,
 wobei das Verfahren **gekennzeichnet ist durch** Steuern des Antreibens eines Ablassmotors mit einem Steuermodus während einer Steuerperiode, die

eine Periode enthält, während der der Breithalter verschoben ist, wobei der Steuermodus eine Menge an Kettfaden anpasst, der in eine Richtung abgelassen ist, so dass eine Änderung einer Kettspannung aufgrund der Verschiebung des Breithalters aufgehoben wird, wobei sich der Steuermodus von einem Steuermodus zum Durchführen von Ablasssteuerung in einem normalen Betrieb der Webmaschine nach der Steuerperiode unterscheidet.

2. Verfahren nach Anspruch 1,
 bei dem eine Korrekturmenge von Kettfaden, der in Übereinstimmung mit einer Änderung einer Kettspannung aufgrund der Verschiebung des Breithalters abgelassen ist, und eine Korrekturperiode vorher eingestellt wird, wobei die Korrekturperiode die Steuerperiode ist, die die Periode enthält, während der der Breithalter verschoben wird, und
 bei dem der Steuermodus eine Korrektur der Steuerung der Menge von Kettfaden anwendet, der in Übereinstimmung mit der Korrekturmenge abgelassen ist, wobei die Steuerung durch die Ablassvorrichtung während der Korrekturperiode durchgeführt wird.
3. Verfahren nach Anspruch 2,
 bei dem die Korrekturperiode eine Vielzahl an Webzyklen enthält, und
 bei dem ein Antreiben der Ablassvorrichtung gesteuert ist, so dass eine Korrektur der Menge von Kettfaden, der in Übereinstimmung mit der Korrekturmenge abgelassen ist, gleichmäßig in jedem Webzyklus während der Korrekturperiode durchgeführt wird und so dass eine Korrektur der Menge von abgelassenem Kettfaden, entsprechend der Korrekturperiode, während der Gesamtheit der Korrekturperiode durchgeführt wird.
4. Verfahren nach Anspruch 3,
 bei dem die Korrekturperiode in Übereinstimmung mit einem Webzustand eingestellt wird.
5. Ablasssteuerungsvorrichtung (10) für eine Webmaschine, wobei die Webmaschine ein Gewebe (2a) webt, das zwei oder mehr Webabschnitte mit unterschiedlichen Dichten aufweist, in Übereinstimmung mit einer Weblänge, die vorher für jeden Webabschnitt eingestellt worden ist, indem die Weblänge von jedem Webabschnitt überwacht wird, die Webmaschine enthaltend
 eine Ablassvorrichtung, die die Ablasssteuerungsvorrichtung (10) enthält, die einen Ablassmotor (5c) zum Rotieren eines Kettablasseelements (5b) in Übereinstimmung mit einer Anweisungsgeschwindigkeit steuert, die durch Anwenden einer Spannungskorrektur an einer Basisgeschwindigkeit auf der Basis einer Abweichung einer erfassten Span-

nung von einer Zielspannung erhalten wird, und eine Breithaltervorrichtung, die einen Breithalter (41) umfasst, der verschiebbar zwischen zwei Positionen ist und ein automatischer Breithalterpositionsschaltmechanismus (42), der automatisch eine Position des Breithalters zwischen den zwei Positionen in Übereinstimmung mit einer Webdichte von einem der zu webenden Webabschnitte schaltet, wobei die zwei Positionen eine Betriebsposition und eine Ruheposition sind,

dadurch gekennzeichnet, dass

die Ablasssteuerungsvorrichtung umfasst:

Einstellmittel, das eine Korrekturmenge von abgelassenem Kettfaden in Übereinstimmung mit einer Änderung einer Kettspannung aufgrund von einer Verschiebung des Breithalters einstellt, und eine Korrekturperiode, während der eine Korrektursteuerung auf der Basis der Korrekturmenge durchgeführt wird, einstellt; und Korrektursteuerungsmittel (19), das in Übereinstimmung mit einem Schalten der Position des Breithalters einen Geschwindigkeitskorrekturwert zu der Anweisungsgeschwindigkeit für den Ablassmotor addiert, in Übereinstimmung mit der Korrekturmenge während der Korrekturperiode, die in dem Einstellmittel eingestellt ist.

6. Vorrichtung nach Anspruch 5, bei der die Korrekturperiode eine Vielzahl von Webzyklen enthält, und bei der das Korrektursteuerungsmittel die Durchschnittskorrekturmenge für jeden Webzyklus während der Korrekturperiode von der Korrekturmenge und der Korrekturperiode berechnet, und den Geschwindigkeitskorrekturwert auf der Basis der Durchschnittskorrekturmenge berechnet.

Revendications

1. Procédé de contrôle de déroulement de chaîne effectué par un dispositif de déroulement d'un métier à tisser, le métier à tisser permettant de tisser un tissu (2a) présentant au moins deux sections de tissage de densités différentes, le métier à tisser comportant ledit dispositif de déroulement qui contrôle la quantité de déroulement de chaîne en effectuant le contrôle du déroulement au cours duquel un moteur de déroulement (5c) est entraîné conformément à une vitesse découlant de l'application d'une correction de tension sur une vitesse de base en fonction d'un écart entre la tension détectée et une tension visée, et un dispositif à temple (40) comportant un temple (41) pouvant basculer entre deux positions et un mécanisme de permutation automatique de position du temple (42) qui permute automatiquement la position du temple entre les deux posi-

tions conformément à la densité de trame de l'une des sections de tissage à tisser, les deux positions consistant en une position de service et une position d'attente, le procédé étant **caractérisé par**:

le contrôle de l'entraînement d'un moteur de déroulement selon un mode de contrôle pendant une période de contrôle comportant une période au cours de laquelle le temple subit le basculement, le mode de contrôle ajustant la quantité de déroulement de chaîne dans une direction de manière que la modification de la tension de la chaîne du fait du basculement du temple soit compensée, le mode de contrôle étant différent d'un mode de contrôle permettant de réaliser un contrôle du déroulement lors du fonctionnement normal du métier à tisser après la période de contrôle.

2. Procédé selon la revendication 1, dans lequel la quantité de correction de déroulement de chaîne conformément à la modification de la tension de la chaîne du fait du basculement du temple et la période de correction sont préétablies, la période de correction consistant en la période de contrôle comportant la période au cours de laquelle le temple subit le basculement, et dans lequel le mode de contrôle applique une correction sur le contrôle de la quantité de déroulement de chaîne conformément à la quantité de correction, le contrôle étant effectué par le dispositif de déroulement au cours de la période de correction.
3. Procédé selon la revendication 2, dans lequel la période de correction comporte une pluralité de cycles de tissage, et dans lequel l'entraînement du dispositif de déroulement est contrôlé de manière que la quantité de déroulement de chaîne conformément à la quantité de correction soit effectuée de manière égale dans chaque cycle de tissage au cours de la période de correction et de manière que la correction de la quantité de déroulement de chaîne correspondant à la période de correction soit effectuée pendant l'intégralité de la période de correction.
4. Procédé selon la revendication 3, dans lequel la période de correction est établie conformément à une condition de tissage.
5. Dispositif de contrôle du déroulement (10) pour un métier à tisser, le métier à tisser tissant un tissu (2a) présentant au moins deux sections de tissage de densités différentes conformément à une longueur de tissage préétablie pour chaque section de tissage tout en surveillant la longueur de tissage de chaque section de tissage, le métier à tisser comportant:

un dispositif de déroulement comportant le dispositif de contrôle du déroulement (10) qui contrôle un moteur de déroulement (5c) faisant tourner un élément de déroulement de chaîne (5b) conformément à une vitesse de commande dé- 5
coulant de l'application d'une correction de la tension sur une vitesse de base en fonction de l'écart entre la tension détectée et une tension visée, et
un dispositif à templett comportant un templett 10
(41) pouvant basculer entre deux positions et un mécanisme de permutation automatique de position du templett (42) qui permute automatiquement la position du templett entre les deux 15
positions conformément à la densité de trame de l'une des sections de tissage à tisser, les deux positions consistant en une position de service et une position d'attente,

caractérisé en ce que le dispositif de contrôle du déroulement comprend: 20

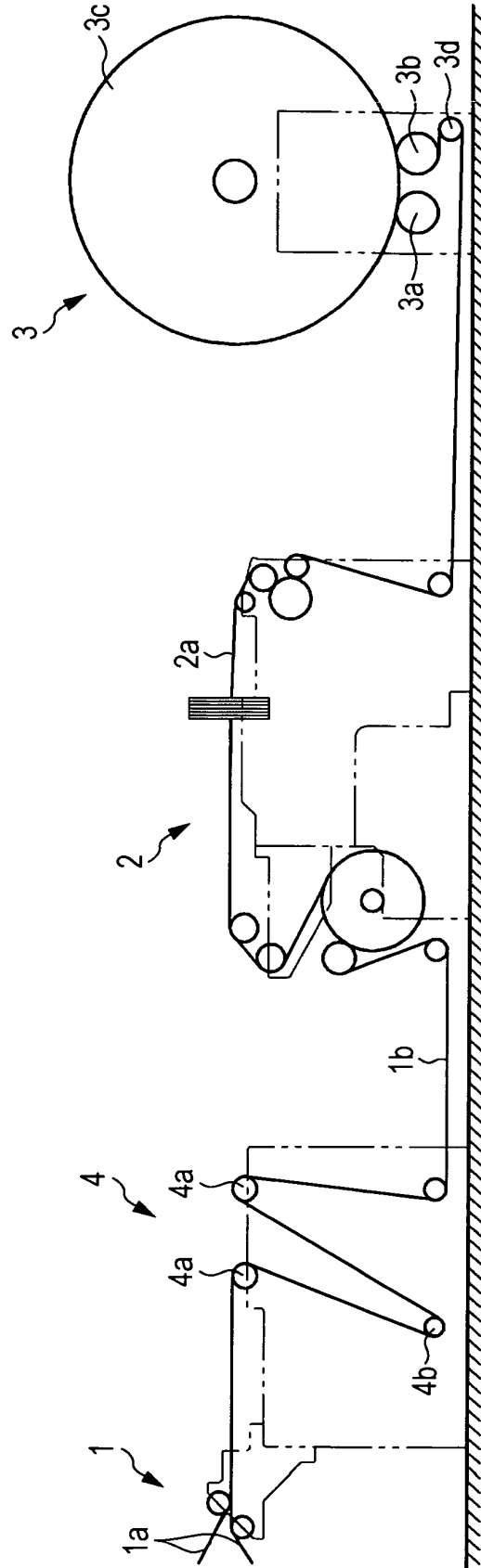
un moyen de réglage qui règle la quantité de correction de déroulement de chaîne conformément à la modification de la tension de la chaîne 25
du fait du basculement du templett et qui règle la période de correction au cours de laquelle s'effectue le contrôle de correction en fonction de la quantité de correction; et
un moyen de contrôle de correction (19) qui 30
ajoute, en correspondance avec la permutation de la position du templett, une valeur de correction de vitesse à la vitesse de command relative au moteur de déroulement conformément à la 35
quantité de correction au cours de la période de correction réglée dans le moyen de réglage.

6. Dispositif selon la revendication 5, dans lequel la période de correction comporte une pluralité de cycles de tissage, et 40
dans lequel le moyen de contrôle de correction calcule la quantité moyenne de correction pour chaque cycle de tissage au cours de la période de correction à partir de la quantité de correction et de la période de correction, et calcule la valeur de correction de 45
vitesse en fonction de la quantité moyenne de correction.

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FIG. 1



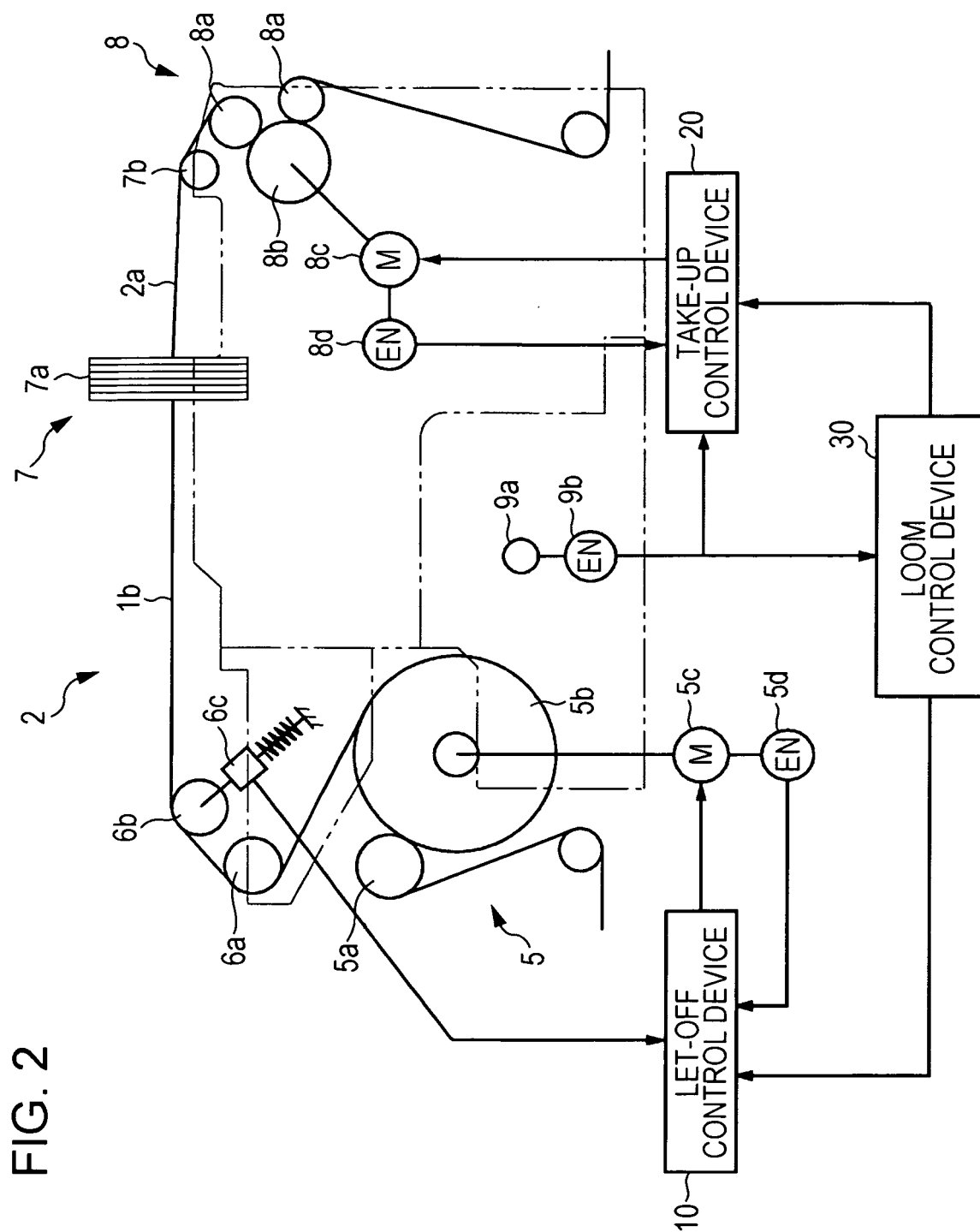
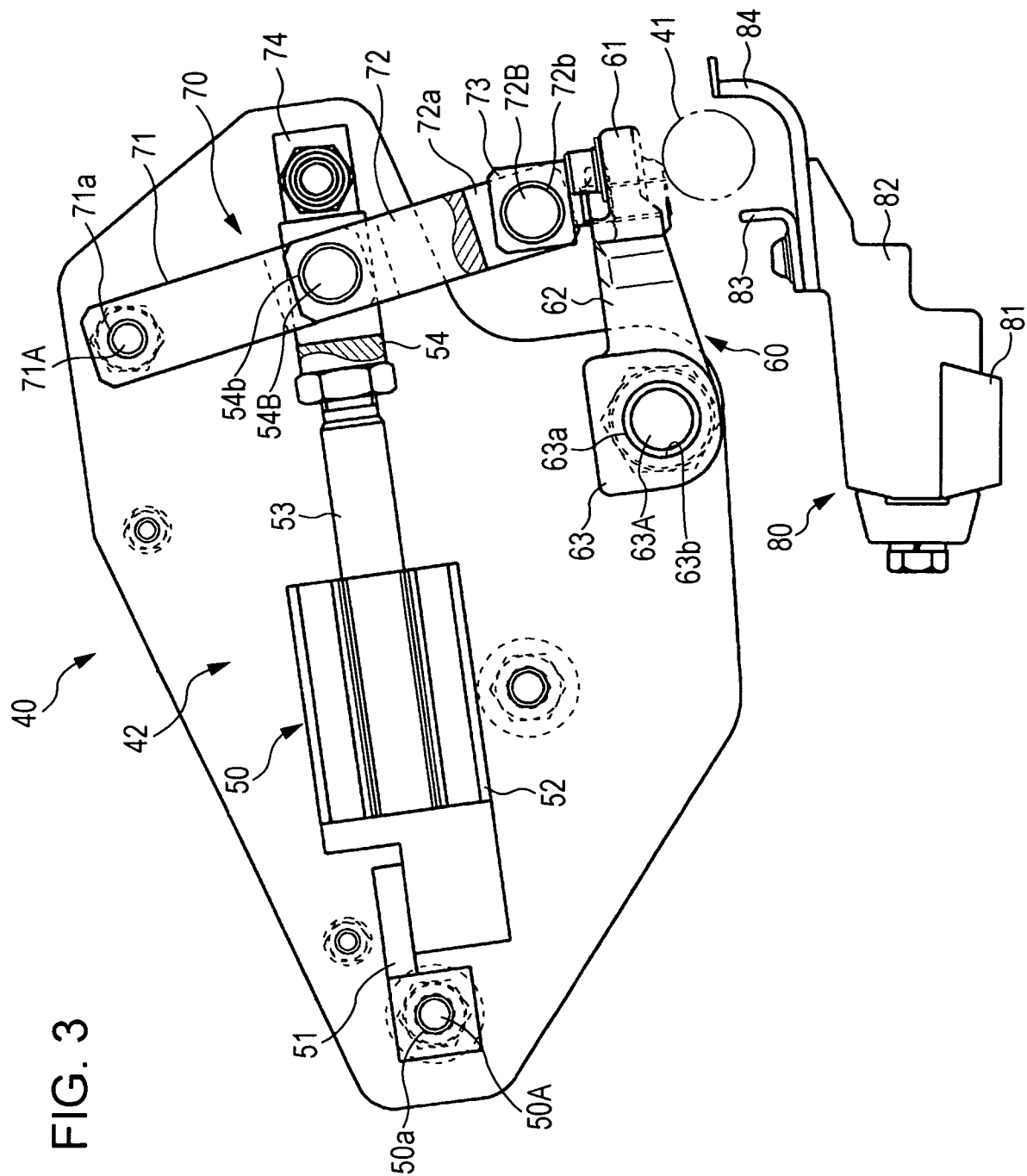


FIG. 2



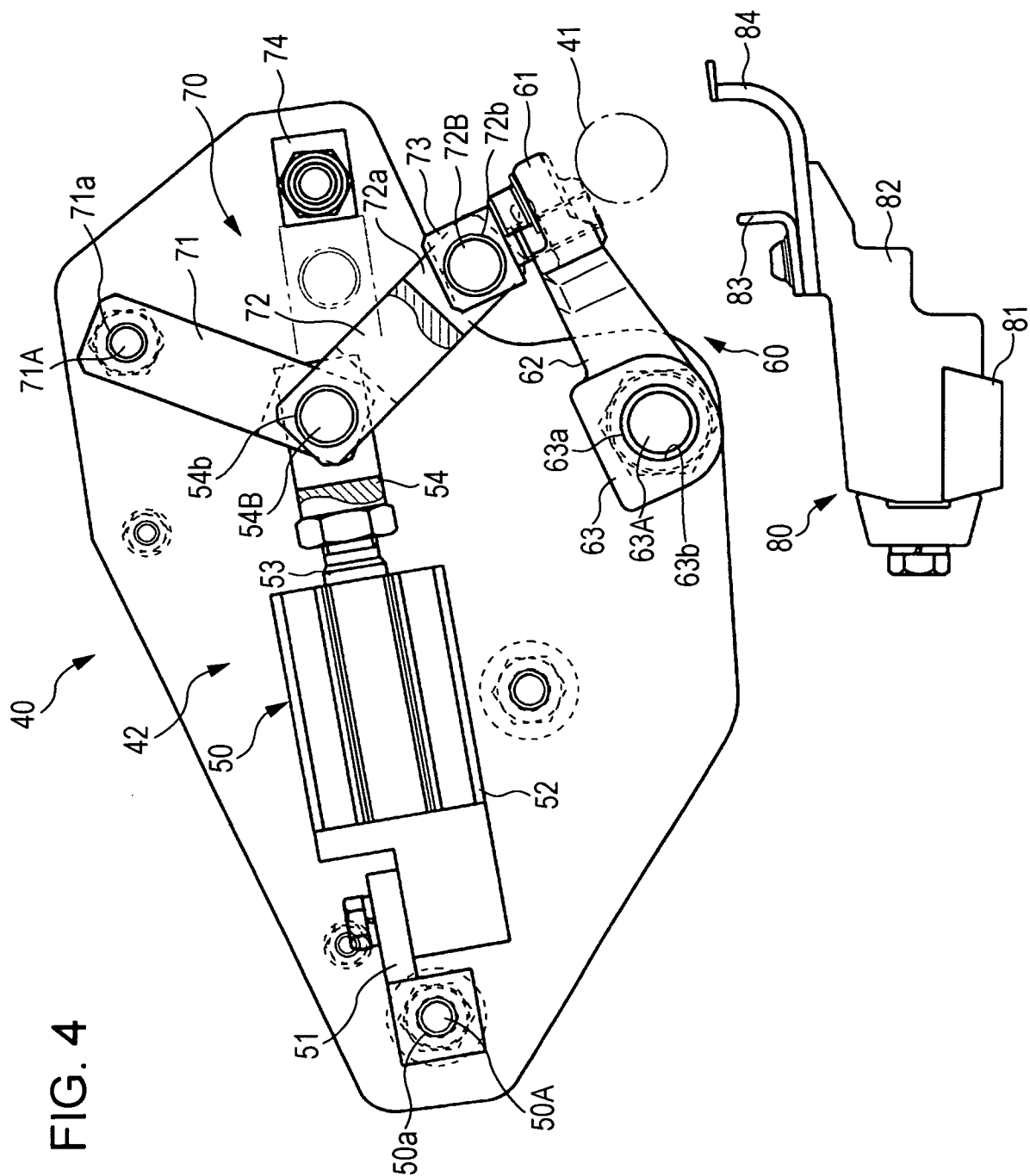


FIG. 5

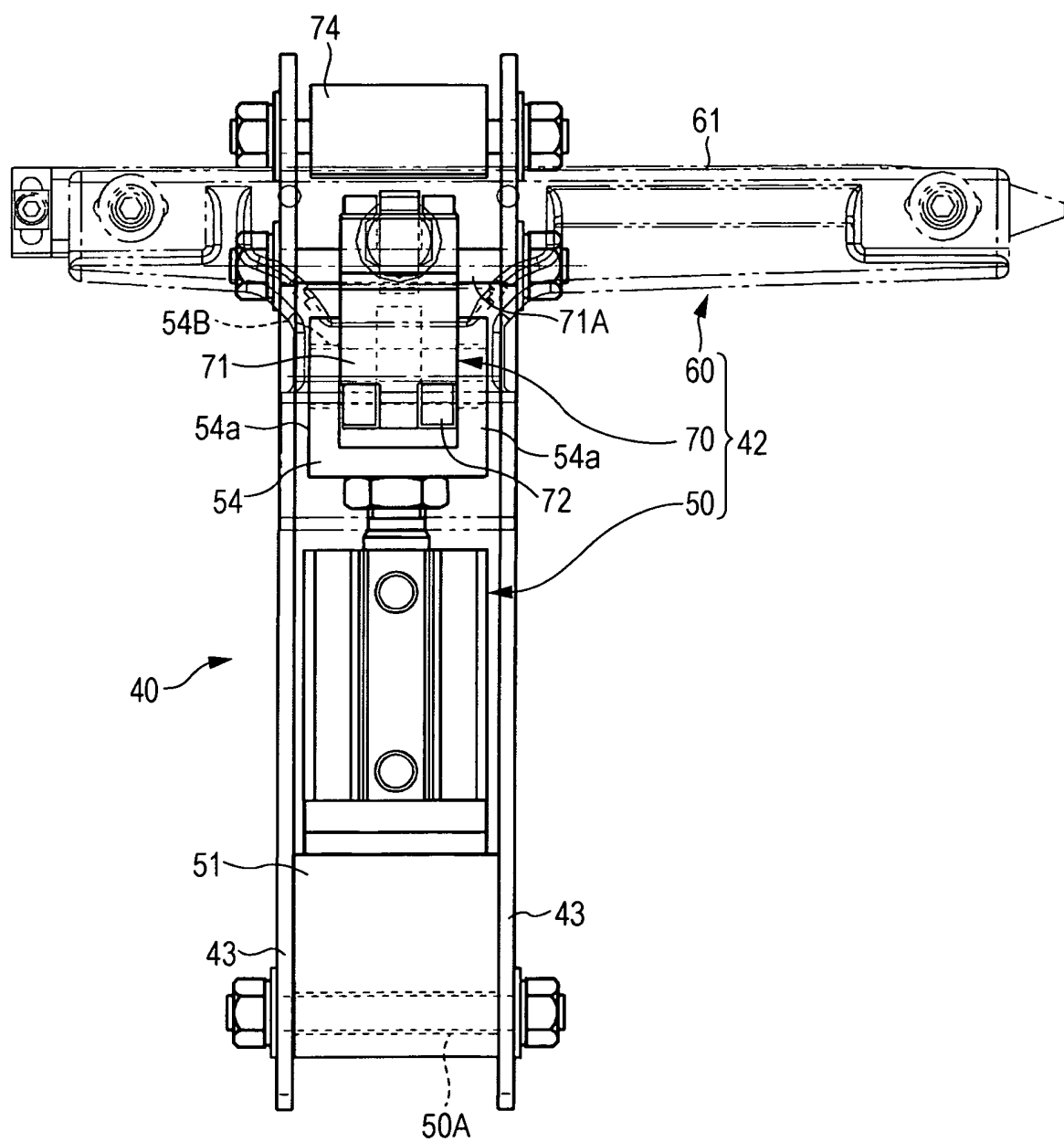


FIG. 6

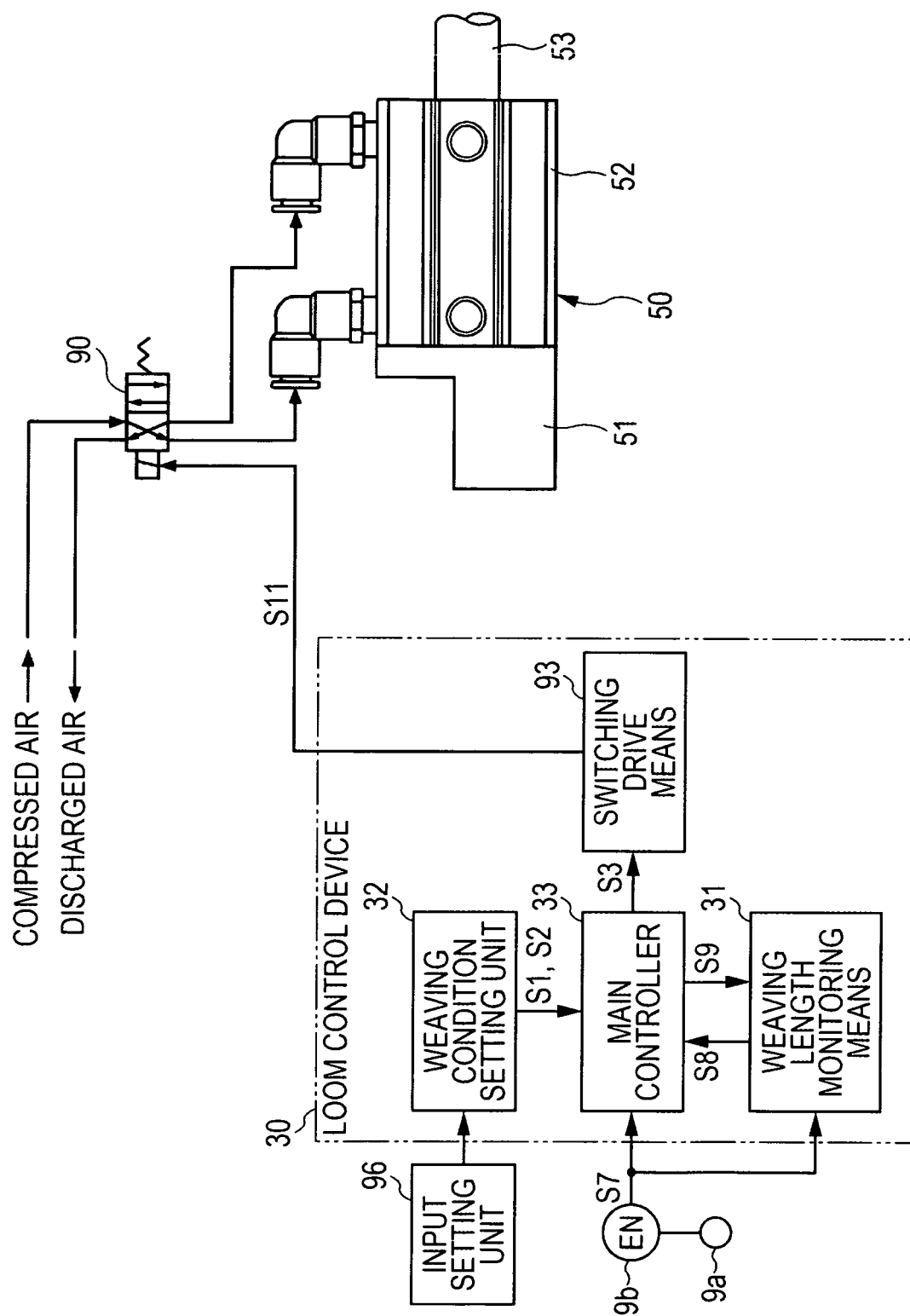
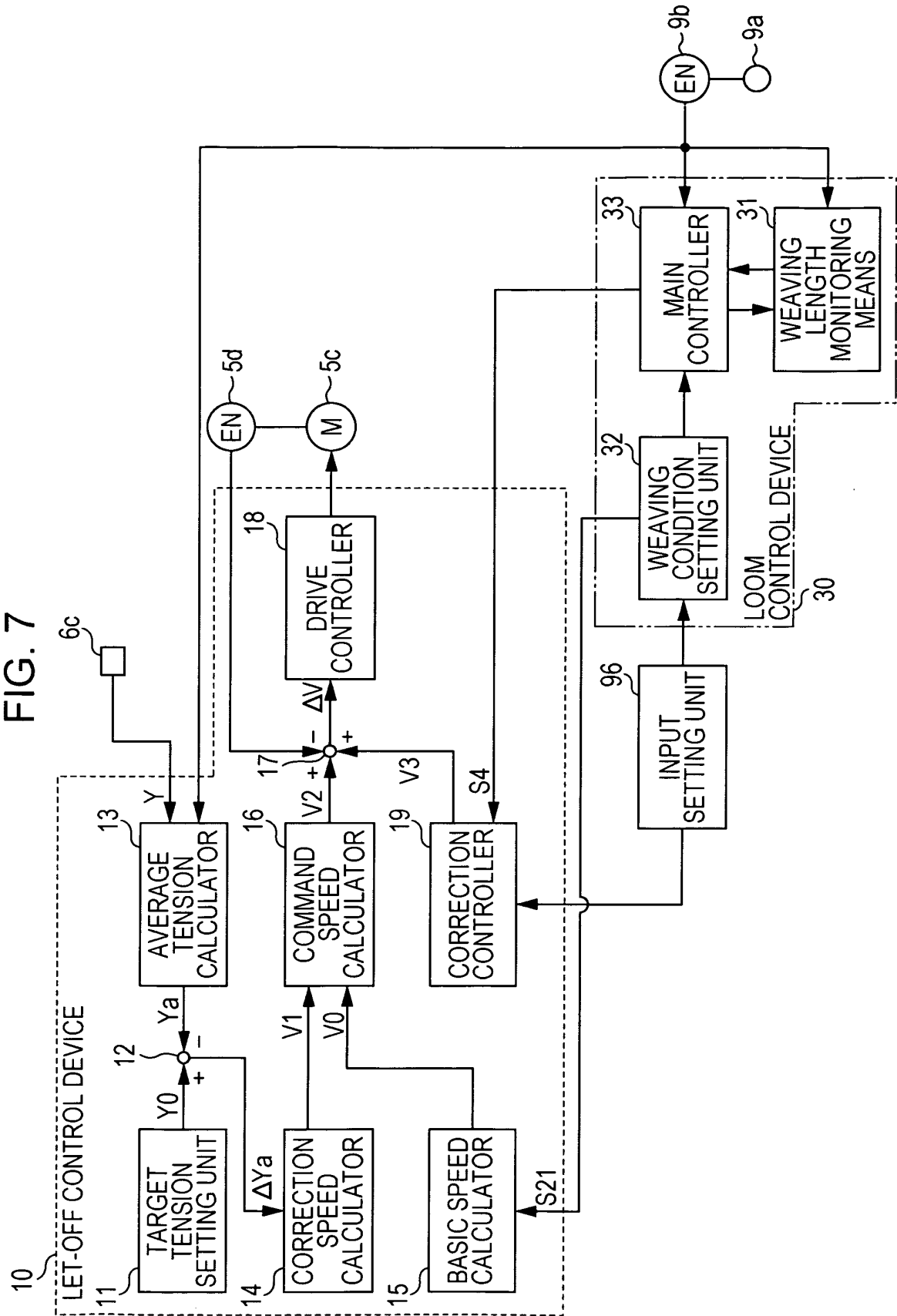


FIG. 7



REFERENCES CITED IN THE DESCRIPTION

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