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(54) **YARN WINDING MACHINE**

GARNWICKELMASCHINE

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Description

Technical field

[0001] The present invention relates to a yarn winding machine provided with a plurality of bobbin holders.

Background Art

[0002] Patent Literature 1 is Japanese Patent Application Publication No. 2001-019274.

[0003] A spinning winding machine disclosed in Patent Literature 1 produces a package by winding a yarn on a bobbin. The spinning winding machine includes two bobbin holders and a turret. A plurality of bobbins are attached to each of the two bobbin holders. Two bobbin holders are attached to the turret. The position of the bobbin holder changes between a winding position, a standby position, and a yarn switching position by rotation of the turret. While one bobbin holder is positioned at the winding position to produce the package, the other bobbin holder is positioned at the standby position. After the yarn winding is completed, the two bobbin holders are positioned at the yarn switching positions by rotation of the turret. Next, the spinning winding machine switches from a state of winding the yarn on the bobbin of one bobbin holder to a state of winding the yarn on the bobbin of the other bobbin holder by operating a slide guide.

Summary of Invention

[0004] The spinning winding machine of Patent Literature 1 sets the position of one bobbin holder to the position of the full package at the time of yarn switching, in other words a position shifted 90° clockwise from the winding position in order to thread the yarn on the bobbin of one bobbin holders before starting package produce. However, in a yarn winding machine having two winding units arranged upper and lower for producing a package by winding a yarn fed from a yarn feeding roller, it is necessary to avoid interference between a bobbin holder of the upper yarn winding unit and the yarn heading for the lower yarn winding unit from the yarn feed roller. Therefore, it is necessary to be largely offset the lower winding unit with respect to the upper winding unit. As a result, the installation area of the yarn winding machine becomes large, and there is room for improvement.

[0005] EP 2 664 570 A1 presents a spun yarn winding device and spun yarn winding facility. A spun yarn winding device is compacted in a vertical direction provided with: a machine body; a turret; a feeding roller fixed to the machine body, is not in contact with the winding bobbins and feeds yarns to the winding bobbins at a speed equal to or faster than the winding speed; a traverse device is fixed in upstream side of advance direction of the yarns relative to the feeding roller and which traverses the yarns; a peripheral speed detection unit detecting the peripheral speed of the winding bobbins; and a control

unit performing basic operation for maintaining the free length of the yarns at a standard length by controlling the rotational angle of the turret during a yarn winding period, the free length of the yarns located between the feeding roller and the winding bobbins.

[0006] The present invention has been made in view of the above circumstances, and a primary object thereof is to provide a configuration with a small installation area in a yarn winding machine having two winding units arranged at upper and lower for producing a package by winding a yarn fed from a yarn feed roller.

[0007] Problems to be solved by the present invention are as described above, and next, means for solving the problems and effects thereof will be described.

[0008] According to an aspect of the present invention, a yarn winding machine with the following configuration is provided. That is, the yarn winding machine includes a lower winding unit and an upper winding unit. The lower winding unit winds a yarn fed from a yarn feed roller to produce a package. The upper winding unit is arranged at a higher position than the lower winding unit and at an offset position perpendicular to an axial direction of the package with respect to the lower winding unit in the plan view, and the upper winding unit winds the yarn fed from the yarn feed roller to produce the package. The upper winding unit includes a first bobbin holder, a second bobbin holder, a bobbin holder moving mechanism, and a contact roller. The first bobbin holder holds the first bobbin. The second bobbin holder holds the second bobbin. The first bobbin holder and the second bobbin holder are attached to the bobbin holder moving mechanism, and the bobbin holder moving mechanism changes a position of the first bobbin holder and the second bobbin holder by rotating around a rotation axis parallel to the axial direction of the package. The contact roller rotates in contact with the first bobbin, the second bobbin, or the package when producing the package. With relation to a position in which the bobbin holder moving mechanism holds the first bobbin holder or the second bobbin holder, a position where the first bobbin, the second bobbin, or the package contact with the contact roller and the yarn is wound on the first bobbin or the second bobbin to produce the package is defined as 0° or 360°. A rotation direction of rotating from 0° toward an offset direction in which the upper winding unit is offset with respect to the lower winding unit is defined as positive. The bobbin holder moving mechanism sets the position of the first bobbin holder to a position larger than 270° and smaller than 360° by receiving a signal for threading the yarn to the first bobbin.

[0009] As a result, the offset amount in which the upper winding unit is offset with respect to the lower winding unit can be reduced, and the installation area of the yarn winding machine can be reduced.

[0010] In the yarn winding machine described above, after receiving a signal for threading the yarn on the first bobbin, the bobbin holder moving mechanism preferably sets the position of the first bobbin holder to a position

larger than 290° and smaller than 340°.

[0011] As a result, the yarn threading of the upper winding unit can be performed at a position farther from the yarn path of the lower winding unit and at a position where the possibility of contact between the yarn and the contact roller is further reduced.

[0012] In the yarn winding machine described above, after receiving a signal for performing a yarn switching in which when the yarn is wound on the first bobbin, the yarn comes to be wound on the second bobbin, or when the yarn is wound on the second bobbin, the yarn comes to be wound on the first bobbin, the bobbin holder moving mechanism preferably sets a position of one of the first bobbin holder and the second bobbin holder to 180° and sets the other position to 0°.

[0013] As a result, when performing the yarn switching in which after threading the yarn on the first bobbin, the yarn wound on the first bobbin come to be wound on the second bobbin, or the yarn switching in which after producing the package, the yarn wound on the fully wound package of the first bobbin or the second bobbin come to be wound on the second bobbin or the first bobbin which is not wound the yarn, the yarn switching can be performed in a state where the first bobbin and the second bobbin are positioned far from the yarn path of the lower winding unit.

[0014] In the yarn winding machine described above, the bobbin holder moving mechanism preferably rotates so that positions of the first bobbin holder and the second bobbin holder are changed only in the positive direction from the state where the yarn is threaded on the first bobbin to the state where the yarn is wound on the second bobbin to produce the package.

[0015] Control of the bobbin holder moving mechanism can be simplified. In addition, since the first bobbin on which the yarn layer is formed by waste winding does not pass through the area of the lower winding unit near the yarn path, the offset amount can be reduced.

[0016] The yarn winding machine described above preferably has the following configuration. That is, by receiving a signal for threading the yarn on the first bobbin, a position of the first bobbin holder is set to the position larger than 270° and smaller than 360°, and then by receiving a signal indicating a completion of an operation of threading the yarn to the first bobbin, a position of the first bobbin holder is set to a position greater than 0° and less than 180°.

[0017] As a result, it is possible to prevent the first bobbin from being wound thicker at a position greater than 270° and less than 360°, so that the first bobbin or its yarn layer is less likely to interfere with the yarn path of the lower winding unit.

[0018] In the yarn winding machine described above, the upper winding unit preferably includes a windbreak plate for preventing accompanying flow generated by a rotation of the package formed on the first bobbin holder or the second bobbin holder from affecting the yarn wound at the lower winding unit.

[0019] By providing the windbreak plate, the influence of the accompanying flow on the yarn can be reduced.

[0020] In the yarn winding machine described above, when the package formed on the second bobbin is fully wound, in a state where the bobbin holder moving mechanism sets a position of the first bobbin holder to a position of less than $\pm 45^\circ$ with respect to 0°, the yarn wound on the second bobbin preferably switched to be wound on the first bobbin.

[0021] As a result, the fully wound package does not pass through a range close to the yarn path to the lower winding unit. Therefore, it is possible to further reduce the offset amount of the upper winding unit. In addition, the operation of winding the yarn connected to the package on the first bobbin can be easily performed.

Brief Description of Drawings

[0022]

FIG. 1 is a front view of a yarn winding machine according to an embodiment of the present invention.

FIG. 2 is a block diagram of the yarn winding machine.

FIG. 3 is a process diagram showing a process from performing yarn threading operation and waste winding to starting producing of the package.

FIG. 4 is a schematic front view showing each position of the bobbin holder.

FIG. 5 is a schematic front view showing that a first bobbin holder moves to a yarn threading position.

FIG. 6 is a schematic front view showing a stage during movement of the first bobbin holder from the yarn threading position to the standby position.

FIG. 7 is a schematic front view showing the process of winding a yarn on a bobbin of a second bobbin holder.

FIG. 8 is a schematic front view showing a lowering operation of a contact roller and a traverse device to start producing the package.

FIG. 9 is a process diagram showing process up to completing a yarn threading operation and a waste winding according to a modification.

FIG. 10 is a schematic front view showing movement of a bobbin holder position at a yarn threading position to a waste winding position.

FIG. 11 is a schematic front view showing a stage during process of set the first bobbin holder to a first switching position and set the second bobbin holder to a second switching position.

FIG. 12 is a schematic front view showing a yarn switching process of setting the first bobbin holder to the first switching position and the second bobbin holder to the second switching position.

FIG. 13 is a schematic front view showing process of winding on the first bobbin of the first bobbin holder after the yarn switching.

FIG. 14 is a schematic front view showing a preferred angular range of the first switching position.

Description of Embodiments

[0023] Next, an embodiment of the present invention will be described with reference to drawings. FIG. 1 is a front view of a yarn winding machine 1 according to an embodiment of the present invention. FIG. 2 is a block diagram of the yarn winding machine 1. In the following description, upstream or downstream in a yarn running direction may simply be referred to as "upstream" or "downstream".

[0024] An unillustrated spinning machine is arranged upstream of the yarn winding machine 1 illustrated in FIG. 1. A yarn 93 produced by the spinning machine is supplied to the yarn winding machine 1 via a yarn feed roller. The yarn winding machine 1 winds the yarn 93 on bobbins 91, 92 and form yarn layers to produce packages 94. The yarn 93 is an elastic yarn such as spandex. However, the type of yarn 93 is not limited to that yarn, and a synthetic yarn including nylon, polyester, or the like may be used.

[0025] As illustrated in FIG. 1, the yarn winding machine 1 includes an upper winding unit 10a and a lower winding unit 10b. The yarn 93 is separately fed to each of the upper winding unit 10a and the lower winding unit 10b from the common yarn feed roller 100, and the packages 94 are separately produced at the upper winding unit 10a and the lower winding unit 10b. The yarn 93 includes a plurality of the yarns 93, and each of the winding unit 10 is supplied with the plurality of yarns 93 arranged in the axial direction of the package 94. Each of the winding unit 10 winds each of the plurality of yarns 93 to produce the plurality of package 94.

[0026] The upper winding unit 10a and the lower winding unit 10b are basically provided with the same device. Therefore, the upper winding unit 10a will be described below as a representative. As illustrated in FIG. 1, the upper winding unit 10a includes a frame 11, a first housing 20, a second housing 30, and a turret plate (bobbin holder moving mechanism) 40.

[0027] The frame 11 is a member that holds each component provided in the upper winding unit 10a. The first housing 20 is attached with a traverse device 21. As a result of the traverse device 21 reciprocating in a winding width direction (axial direction of the package 94) with a traverse guide 23 described later being engaged with the yarn 93, each yarn 93 forwarded downstream is traversed. As illustrated in FIG. 2, the traverse device 21 includes a traverse cam 22, the traverse guide 23, and a traverse motor 24. FIG. 2 shows a block diagram of one winding unit (upper winding unit 10a or lower winding unit 10b).

[0028] The traverse cam 22 is a roller-shaped member arranged parallel to the bobbin 91, 92. A spiral cam groove is formed on an outer peripheral surface of the traverse cam 22. The traverse cam 22 is rotationally

driven by a traverse motor 24.

[0029] The traverse guide 23 is a part that engages the yarn 93. A distal end of the traverse guide 23 includes, for example, a substantially U-shaped guide part that engages with the yarn 93 while sandwiching the yarn 93 in the winding width direction. A proximal end of the traverse guide 23 is positioned in a cam groove of the traverse cam 22. When the traverse cam 22 is rotationally driven, it is possible to reciprocate the traverse guide 23 in the winding width direction.

[0030] The traverse motor 24 is controlled by a control device 50. The control device 50 includes a CPU, a ROM, and a RAM. The CPU executes various controls related to the upper winding unit 10a by reading a program stored in the ROM into the RAM and executing such a program.

[0031] The second housing 30 is rotatably attached with a contact roller 31. When the yarn 93 is wound, the contact roller 31 is driven to rotate with a contact with the yarn layer of the package 94 with a certain pressure to form a yarn layer shape of the package 94 into a shape.

[0032] An operation panel 32 is provided on the second housing 30. The operation panel 32 is a device operated by an operator. The operator applies an instruction to the upper winding unit 10a by operating the operation panel 32. Examples of the instruction applied by the operator include starting yarn threading, starting winding, stopping winding, and changing a winding condition.

[0033] As illustrated in FIG. 2, the upper winding unit 10a includes a lifting and lowering device 60. The lifting and lowering device 60 lifts and lowers the first housing 20 and the second housing 30 altogether. Specifically, the first housing 20 and the second housing 30 are attached to an unillustrated lifting and lowering member. A ball nut 61 is attached to the lifting and lowering member. A screw rod 62 is attached to the frame 11. When the screw rod 62 is rotated by using a lifting and lowering motor 63, it is possible to lift and lower the first housing 20 and the second housing 30. The lifting and lowering motor 63 is controlled by the control device 50. It is noted that the lifting and lowering device 60 may be realized by using a cylinder instead of the ball screw.

[0034] The turret plate 40 is a disk-shaped member. The turret plate 40 is rotatably attached to the frame 11. A rotation axis of the turret plate 40 is at a center position of the turret plate 40. The turret plate 40 is rotationally driven by a turret motor 53 illustrated in FIG. 2. The turret motor 53 is controlled by the control device 50.

[0035] At two locations facing each other across the center position, within the turret plate 40, a first bobbin holder 41 and a second bobbin holder 42 are each provided. The first bobbin holder 41 is attachable with the first bobbin 91 including a plurality of the first bobbins 91 to be aligned in the axial direction. The second bobbin holder 42 is attachable with the second bobbin 92 including a plurality of the second bobbins 92 to be aligned in the axial direction. When the turret plate 40 is rotated, it is possible to change positions of the first bobbin holder 41 and the second bobbin holder 42. It is noted that as long

as it is possible to change the positions of the first bobbin holder 41 and the second bobbin holder 42, a different device may be used instead of the turret plate 40.

[0036] The first bobbin holder 41 is rotatable with respect to the turret plate 40 with the axial position of the first bobbin holder 41 being the center of rotation. The first bobbin holder 41 is rotationally driven by a first bobbin holder motor 54 illustrated in FIG. 2. Similarly, the second bobbin holder 42 is rotatable with respect to the turret plate 40 with the axial position of the second bobbin holder 42 being the center of rotation. The second bobbin holder 42 is rotationally driven by a second bobbin holder motor 55 illustrated in FIG. 2. The first bobbin holder motor 54 and the second bobbin holder motor 55 are controlled by the control device 50.

[0037] As illustrated in FIG. 1, in a state where the first bobbin holder 41 and the second bobbin holder 42 are arranged vertically, the yarn 93 is wound on a first bobbin of the first bobbin holder 41 at a higher position to produce the package 94. In the following description, a bobbin attached to the first bobbin holder 41 is referred to as a first bobbin 91, and a bobbin attached to the second bobbin holder 42 is referred to as a second bobbin 92.

[0038] Once a predetermined amount of yarn 93 has been wound on the first bobbin 91 attached to the first bobbin holder 41 and full winding of the package 94 has been achieved, the turret plate 40 rotates to switch the positions of the first bobbin holder 41 and the second bobbin holder 42. Thereafter, while the package 94 in which the full winding is achieved is collected, the yarn 93 is wound on the second bobbin 92 attached to the second bobbin holder 42.

[0039] The one ends (turret plate 40 side ends) of the bobbin holders 41, 42 are supported to the turret plate 40. The yarn winding machine 1 further includes a support member 74 that supports the other ends (the ends opposite to the turret plate 40) of the bobbin holders 41, 42 positioned for producing the package 94.

[0040] As illustrated in FIG. 1, the bobbin holders 41, 42 of the upper winding upper winding unit 10a pass through the vicinity of the yarn 93 from the yarn feed roller 100 to the lower winding unit 10b by the rotation of the turret plate 40. Also, the accompanying flow is generated by the rotation of the package 94 formed on the bobbin holders 41, 42 of the upper winding unit 10a. A windbreak plate 75 is provided with the upper winding unit 10a in order to suppress the accompanying flow from acting on the yarn 93 wound on the lower winding unit 10b. The windbreak plate 75 is not provided with the lower winding unit 10b. The windbreak plate 75 may be omitted from the upper winding unit 10a.

[0041] Next, the yarn threading operation and the waste winding (dead winding or preliminary winding) will be described. The yarn threading operation is an operation in which the operator winds the yarn 93 on the bobbins 91, 92 in a prior step to producing the package 94. The waste winding is an operation to wind the yarn 93 having a low quality at the start of winding, which is

performed after the yarn threading operation. The yarn 93 that has been wound up by the waste winding is discarded.

[0042] The reason why the yarn 93 has low quality is as follows. That is, at the step of the yarn threading by the operator, the yarn 93 is wound in a state in which the yarn 93 is not engaged with the traverse guide 23. Also, the traverse guide 23 is driven at a lower speed than usual. Therefore, even if the yarn 93 is engaged with the traverse guide 23 after the yarn threading, the quality of the yarn 93 is low until the traverse guide 23 reaches the normal speed.

[0043] In the present embodiment, the winding width direction, the axial direction of the package 94, and the axial directions of the bobbin holders 41, 42 are all parallel. In the description below, these directions are collectively referred to simply as the "axial direction". The direction in which the yarn feed roller 100 is positioned with respect to the yarn winding machine 1 is referred to as the "height direction". In particular, the side closer to the yarn feed roller 100 in the height direction is referred to as an upper side, and the opposite side is referred to as a lower side. A direction perpendicular to both the axial direction and the height direction is referred to as a "direction perpendicular to the axis".

[0044] FIG. 3 shows the process from performing the yarn threading operation and the waste winding to starting the produce of the package 94. Process from S1 to S7 is process related to the yarn threading operation, the waste winding, and preparation thereof. First, the process from S1 to S7 is performed on the upper winding unit 10a, and then the process from S1 to S7 is performed on the lower winding unit 10b. The process from S1 to S7 will be specifically described below.

[0045] First, the operator performs a predetermined first operation on the operation panel 32 (S1). The first operation is an operation for notifying the yarn winding machine 1 that the yarn threading operation is to be performed. The first operation is to operate a predetermined button on the operation panel 32, for example.

[0046] By performing the first operation, the operation panel 32 transmits a yarn threading start signal to the control device 50 (S2). The yarn threading start signal is an electrical signal that is transmitted to the control device 50 by performing the first operation on the operation panel 32. The yarn threading start signal may be referred to as a signal for threading the yarn to the first bobbin 91.

[0047] By receiving the yarn threading start signal, the control device 50 controls the turret motor 53 to rotate the turret plate 40 counterclockwise, thereby setting the first bobbin holder 41 at the yarn threading position (S3, from state 1 to state 2 in FIG. 5). The yarn threading position is a position of the first bobbin holder 41 when the operator performs the yarn threading operation.

[0048] Here, each position of the bobbin holders 41, 42 will be described with reference to FIG. 4. When the bobbin holders 41, 42 are arranged vertically, the higher position of the bobbin holder 41, 42 is the winding position

and the lower position of the bobbin holder 41, 42 is the standby position. The yarn winding machine 1 winds the yarn 93 on the bobbins 91, 92 of the bobbin holders 41, 42 at the winding position to produce the package 94. The winding position is a position where the bobbins 91, 92 of the bobbin holders 41, 42 or the package 94 contacts the contact roller 31. A center of rotation of the turret plate 40 is referred to as a point C. The position of the bobbin holders 41, 42 (more specifically, the positions of the axes of the bobbin holders 41, 42) is expressed using an angle with the point C as a reference (center), as follows. That is, the winding position is 0° (or 360°) and the standby position is 180°. As illustrated in FIG. 4, the direction in which the upper winding unit 10a is offset with respect to the lower winding unit 10b is defined as the offset direction. The offset described above is an offset at the position projected on the horizontal plane (in other words, offset in plain view), and the offset direction is parallel to the direction perpendicular to the axis. A rotation direction in which an object (a bobbin holder) positioned at the winding position rotates toward (along) the offset direction (counterclockwise in FIG. 4) is positive. In this embodiment, the turret plate 40 rotates only counterclockwise, that is, so that the positions of the bobbin holders 41, 42 are changed only in the positive direction.

[0049] As illustrated in FIG. 4, the yarn threading position in the present embodiment is at a position larger than 270° and smaller than 360°. If the yarn threading position is 0° or more and less than 180°, the yarn 93 contacts the contact roller 31, then the yarn threading operation may fail. If the yarn threading position is 180° or more and 270° or less, in a situation where the turret plate 40 rotates counterclockwise after the yarn threading operation, the first bobbin 91 on which the yarn 93 is wound by the yarn threading operation or the yarn layer by performing the waste winding may contact with the windbreak plate 75 (even if there is no windbreak plate 75, there is a possibility of interfering with the yarn path of the lower winding unit 10b). By changing the position of the windbreak plate 75 in the direction perpendicular to the axis away from the first bobbin 91, contact with the windbreak plate 75 can be reliably prevented, but in this case, an installation area of the yarn winding machine 1 increases because an offset amount of the upper winding unit 10a with respect to the lower winding unit 10b. For the reasons described above, it is preferable that the yarn threading position is at a position larger than 270° and smaller than 360°. Also, if the bobbin holders 41, 42 are much close to the support member 74 or the windbreak plate 75, the yarn threading operation may become difficult. Furthermore, if the bobbin holders 41, 42 are positioned close to the contact roller 31, the possibility of contact of the yarn 93 and the contact roller 31 arises. Therefore, it is more preferable that the yarn threading position is at a position larger than 290° and smaller than 340°. In the present embodiment, the yarn threading position is set at 300°.

[0050] After adjusting the bobbin holder 41 to the yarn threading position, the control device 50 controls the first

bobbin holder motor 54 to rotationally drive the first bobbin 91 (S4). Next, the control device 50 drives the traverse device 21 at low speed (S5). The low speed of the traverse device 21 indicates that the traverse speed is lower than the traverse speed when producing the package 94.

[0051] Next, the operator performs yarn threading operation (S6). Specifically, the operator holds the plurality of yarns 93 hooked on the yarn feed roller 100 with a suction gun or the like. Then, the operator winds the plurality of held yarn 93 on the bobbin holder 41 of the upper winding unit 10a. The upper winding unit 10a is provided with a yarn dividing guide that individually holds the plurality of yarns 93 while maintaining the spacing between the plurality of yarns 93. The operator causes the yarns 93 to be held individually by the yarn dividing guide. Then, the yarn threading operation is completed. Since the first bobbin holder 41 has already been rotationally driven, the yarn 93 is wound on the first bobbin 91 attached to the first bobbin holder 41 by the completion of the yarn threading operation (waste winding, S7). State 3 in FIG. 6 shows a state in which the yarn threading operation is completed and the waste winding is being performed. Thereafter, the process from S1 to S7 is performed on the lower winding unit 10b.

[0052] After the process from S1 to S7 are performed on the upper winding unit 10a and the lower winding unit 10b, the process for starting the produce of the package 94 is performed. Specifically, the process from S11 to S16 in FIG. 3 corresponds to the process for starting the produce of the package 94. First, the process from S11 to S16 is performed on the upper winding unit 10a, and then the process from S11 to S16 is performed on the lower winding unit 10b. The process from S11 to S16 will be specifically described below.

[0053] First, the operator performs a predetermined second operation to the operation panel 32 (S11). The second operation is an operation for notifying the yarn winding machine 1 of the start of producing the package 94. The second operation is to operate a predetermined button on the operation panel 32, for example. The first operation and the second operation may be the same operation (for example, the operation of the same button) or different operation (for example, the operation of the different button).

[0054] By performing the second operation, the operation panel 32 transmits a producing start signal to the control device 50 (S12). The producing start signal is an electrical signal that is transmitted to the control device 50 by performing the second operation on the operation panel 32.

[0055] By receiving the producing start signal, the control device 50 controls the turret motor 53 to rotate the turret plate 40 counterclockwise, thereby setting the first bobbin holder 41 at the standby position and the second bobbin holder 42 at the winding position (S13, from state 3 in FIG. 6 to state 4 in FIG. 7).

[0056] Next, the control device 50 switches so that the

yarn 93 wound on the first bobbin 91 of the first bobbin holder 41 is wound on the second bobbin 92 of the second bobbin holder 42 (S14, from state 5 in FIG. 7 to state 6 in FIG. 8). Specifically, the winding member 81 is pressed against the yarn 93 stretched between the first bobbin holder 41 and the second bobbin holder 42 to increase a winding angle of the yarn 93 with respect to the second bobbin 92, thereby the yarn 93 is wound on the second bobbin 92 of the second bobbin holder 42. In this way, switching the winding of the yarn 93 from the bobbin 91 of one bobbin holder 41 to the bobbin 92 of the other bobbin holder 42 is referred to as yarn switching, and the yarn switching is performed in a state where the bobbin holders 41, 42 are positioned at the winding position and the standby position, respectively. That is, the positions where the bobbin holders 41, 42 are at 0° and 180°, respectively are the yarn switching positions. The producing start signal described above is also a yarn switching signal.

[0057] Next, the control device 50 switches the traverse device 21 from low speed drive to high speed drive (S15). The high speed of the traverse device 21 indicates that the traverse speed is higher than the traverse speed when performing the yarn threading and the traverse speed when producing the package 94. Thereafter, the control device 50 controls the lifting and lowering motor 63 to lower the traverse device 21 and the contact roller 31 (S16, state 7 in FIG. 8). Thereby, the contact roller 31 contacts with the second bobbin 92 of the second bobbin holder 42, and the produce of the package 94 is started. Thereafter, when the package 94 of the second bobbin 92 becomes a fully wound package 94 with a predetermined diameter, a yarn switching signal is generated and transmitted, the yarn switching is performed, and the turret plate 40 is moved so that the package 94 is formed on the first bobbin 91 of the first bobbin holder 41. The details of above the process will be described later. After that, formation of a fully wound package 94, the yarn switching, and the replacement of the fully wound package 94 with new bobbins 91, 92 are continuously repeated.

[0058] In the present embodiment, from a timing when the first bobbin holder 41 is positioned at the yarn threading position to a timing when the package 94 is produced by winding the yarn 93 on the second bobbin 92 of the second bobbin holder 42, the turret plate 40 rotates so that the positions of the bobbin holders 41, 42 are changed only in the positive direction. Therefore, control of the turret plate 40 is simple. Also, since the bobbin holder 41 does not come close to the windbreak plate 75 until the bobbin holder 41 reaches the standby position from the yarn threading position, the contact between the first bobbin holder 41 which the yarn 93 is wound by the yarn threading operation or the yarn layer of the waste winding and the windbreak plate 75 can be suppressed more reliably. In the present embodiment, the turret plate 40 rotates so that the positions of the bobbin holders 41, 42 are changed only in the positive direction, and the yarn switching is performed in a state where the first bobbin

holder 41 and the second bobbin holder 42 are positioned at 0° and 180°, respectively. Therefore, the fully wound package 94 does not come close to the windbreak plate 75, and this also makes it possible to suppress the amount by which the upper winding unit 10a is offset with respect to the lower winding unit 10b.

[0059] Next, a modification of the above embodiment will be described with reference to FIGS. 4, 9 and 10. Only the control of the turret plate 40 is different between the above embodiment and this modification, and the configuration of the yarn winding machine 1 is otherwise the same.

[0060] In the above embodiment, the yarn winding machine 1 performs the waste winding at the yarn threading position. Instead of that, in this modification, the yarn threading position and the waste winding position are different. Specifically, as illustrated in FIG. 4, the waste winding position in this modification is a 120° position. The waste winding position may be larger than 0° and smaller than 180°. In a case where the yarn threading position and the waste winding position are the same, if time of the waste winding is long, the yarn layer becomes large, and there is a possibility that the yarn layer and the windbreak plate 75 come into contact with each other. In this regard, since the waste winding position in this modification is far from the windbreak plate 75, contact between the yarn layer and the windbreak plate 75 can be more reliably prevented. In this modification, the reason why the waste winding position is set to the 120° position is as follows. That is, the positioning mechanisms of the turret plate 40 for positioning at each of the winding position, the standby position, and the yarn switching position are provided, in the same way, another positioning mechanism for positioning at the yarn threading position is required. Since the waste winding position is set at 120°, the waste winding position is opposite to the yarn threading position across the point C which is the center of rotation of the turret plate 40, and there is no need to provide a new positioning mechanism.

[0061] Hereinafter, process of this modification will be described with reference to FIG. 9 and FIG. 10. Since the process from S1 to S6 in FIG. 9 are the same as those in the above embodiment, description of these process is omitted.

[0062] The operator performs a predetermined third operation on the operation panel 32 after the yarn threading operation (S7). The third operation is an operation for notifying the yarn winding machine 3 that the yarn threading operation is completed. The third operation is to operate a predetermined button on the operation panel 32, for example.

[0063] By performing the third operation, the operation panel 32 transmits a yarn threading completion signal to the control device 50 (S8). The yarn threading completion signal is an electrical signal that is transmitted to the control device 50 by performing the third operation on the operation panel 32.

[0064] By receiving the yarn threading completion sig-

nal, the control device 50 controls the turret motor 53 to rotate the turret plate 40 counterclockwise, thereby setting the first bobbin holder 41 at the waste winding position (S9, from state 3A to state 3B in FIG. 10). As a result, the waste winding is continuously performed at the waste winding position (S10).

[0065] Next, with reference to FIG. 11 to FIG. 13, the process of newly winding yarn 93 on the first bobbin 91 after the fully wound package 94 is formed on the second bobbin 92 will be described.

[0066] When the fully wound package 94 is formed, the control device 50 controls the turret motor 53 to rotate the turret plate 40 counterclockwise, thereby setting the first bobbin holder 41 at the first switching position and the second bobbin holder 42 at the second switching position (from state A in FIG. 11 to state B in FIG. 12). The first switching position and the second switching position are positions of the bobbins 91, 92 when switching the bobbins 91, 92 for winding the yarn 93. Specifically, the first switching position is a position of the bobbin on which winding of the yarn 93 is newly started (in other words, a bobbin on which the yarn 93 is not wound, the first bobbin 91). The second switching position is a position of the bobbin (second bobbin 92) of the fully wound package 94. A preferable angular range of the first switching position will be described later.

[0067] Next, the control device 50 switches so that the yarn 93 wound on the second bobbin 92 (package 94) is wound on the first bobbin 91 (from state C in FIG. 12 to state D in FIG. 13). The specific process is the same as the yarn switching at the time of waste winding described above. The fully wound package 94 of the second bobbin 92 is removed from the second bobbin holder 42, and a new second bobbin 92 (the second bobbin 92 on which the yarn 93 is not wound) is attached to the second bobbin holder 42. The turret plate 40 rotates only in the same direction (positive direction) from a timing when the fully wound package 94 is formed on the second bobbin 92 to a timing when the yarn 13 is newly wound on the first bobbin.

[0068] Next, the control device 50 controls the lifting and lowering motor 63 to lower the traverse device 21 and the contact roller 31 (state E in FIG. 13). Thereby, the contact roller 31 contacts with the first bobbin 91, and the produce of the package 94 is started.

[0069] Next, a preferable angular range of the first switching position will be described with reference to FIG. 14.

[0070] As illustrated in FIG. 14, the first switching position is preferably a position within $\pm 45^\circ$ with respect to 0° . If the first switching position is 45° or more alternatively 180° or less, the second switching position is 210° or more alternatively 360° or less, and the fully wound package 94 closes to a yarn path to the lower winding unit 10b. Therefore, in order to prevent interference between the fully wound package 94 and the yarn path, an offset amount of the upper winding unit 10a with respect to the lower winding unit 10b is increased, so

the installation area of the yarn winding machine 1 is increased. Therefore, it is not preferable that the first switching position is 45° or more and 180° or less.

[0071] When the first switching position is 180° or more alternatively 315° or less, it becomes difficult to wind the yarn 93 connected to the fully wound package 94 on the first bobbin 91. Therefore, it is not preferable that the first switching position is 180° or more and 315° or less.

[0072] As described above, the first switching position is preferably a position within $\pm 45^\circ$ with respect to 0° . When the first switching position is not 0° , after switching so that the yarn 93 wound on the second bobbin 92 is wound on the first bobbin 91, the control device 50 controls the turret motor 53 and rotates the turret plate 40 to set first bobbin holder 41 at 0° position (winding position). That is, when the first switching position is larger than 315° and smaller than 360° , the control device 50 rotates the turret plate 40 counterclockwise (positive direction) after the switching. On the other hand, when the first switching position is larger than 0° and smaller than 45° , the control device 50 rotates the turret plate 40 clockwise (opposite direction) after the switching. After that, the upper winding unit 10a winds the yarn 93 on the first bobbin 91 to produce the package 94.

[0073] As described above, the yarn winding machine 1 of this embodiment includes the lower winding unit 10b and the upper winding unit 10a. The lower winding unit 10b winds the yarn 93 fed from the yarn feed roller 100 to produce the package 94. The upper winding unit 10a is arranged at a higher position than the lower winding unit 10b and at an offset position perpendicular to the axial direction of the package 94 with respect to the lower winding unit 10b in the plan view, the upper winding unit 10a winds the yarn 93 fed from the yarn feed roller 100 to produce the package 94. The upper winding unit 10a includes the first bobbin holder 41, the second bobbin holder 42, turret plate 40, and the contact roller 31. The first bobbin holder 41 holds the first bobbin 91. The second bobbin holder 42 holds the second bobbin 92. The first bobbin holder 41 and the second bobbin holder 42 are attached to the turret plate 40, and the turret plate 40 changes the position of the first bobbin holder 41 and the second bobbin holder 42 by rotating around the rotation axis parallel to the axial direction of the package 94. The contact roller 31 rotates in contact with the first bobbin 91, the second bobbin 92, or the package 94 when producing the package 94. With relation to the position in which the turret plate 40 holds the first bobbin holder 41 or the second bobbin holder 42, the position where the first bobbin 91, the second bobbin 92, or the package 94 contact with the contact roller 31 and the yarn is wound on the first bobbin 91 or the second bobbin 92 to produce the package 94 is defined as 0° or 360° , the rotation direction of rotating from the 0° toward the offset direction in which the upper winding unit 10a is offset with respect to the lower winding unit 10b is defined as positive, and the turret plate 40 sets the position of the first bobbin holder 41 to the position larger than 270° and smaller than

360° by receiving the signal for threading the yarn 93 to the first bobbin 91 (yarn threading start signal).

[0074] As a result, the offset amount in which the upper winding unit 10a is offset with respect to the lower winding unit 10b can be reduced, and the installation area of the yarn winding machine 1 can be reduced.

[0075] In the yarn winding machine 1 of the present embodiment, the turret plate 40 receives the signal for threading the yarn 93 on the first bobbin 91 and sets the position of the first bobbin holder 41 to the position larger than 290° and smaller than 340°.

[0076] As a result, the yarn threading of the upper winding unit 10a can be performed at a position farther from the yarn path of the lower winding unit 10b and at a position where the possibility of contact between the yarn 93 and the contact roller 31 is further reduced.

[0077] In the yarn winding machine 1 of the present embodiment, after receiving the signal for performing the yarn switching (the yarn switching signal) in which when the yarn 93 is wound on the first bobbin 91, the yarn 93 is wound on the second bobbin 92, or when the thread 93 is wound on the second bobbin 91, the yarn 93 is to be wound on the first bobbin 91, the turret plate 40 sets the position of one of the first bobbin holder 41 and the second bobbin holder 42 to 180° and sets the other position to 0°.

[0078] As a result, when performing the yarn switching in which after threading the yarn 93 on the first bobbin 91, the yarn wound on the first bobbin 91 is wound on the second bobbin 92, or the yarn switching in which after producing the package 94, the yarn wound on the fully wound package 94 of the first bobbin 91 or the second bobbin 92 is wound on the second bobbin 92 or the first bobbin 91 which is not wound the yarn 93, the yarn switching can be performed in a state where the first bobbin 91 and the second bobbin 92 are positioned far from the yarn path of the lower winding unit 10b.

[0079] In the yarn winding machine 1 of the present embodiment, from the state where the yarn 93 is threaded on the first bobbin 91 to the state where the yarn 93 is wound on the second bobbin 92 to produce the package 94, the turret plate 40 rotates so that the positions of the first bobbin holder 41 and the second bobbin holder 42 are changed only in the positive direction.

[0080] Control of the turret plate 40 can be simplified. In addition, since the first bobbin 91 on which the yarn layer is formed by waste winding does not pass through the area of the lower winding unit 10b near the yarn path, the offset amount can be reduced.

[0081] In the yarn winding machine 1 of the present embodiment, by receiving the signal for threading the yarn 93 on the first bobbin 91, the position of the first bobbin holder 41 is set to the position larger than 270° and smaller than 360°, and then by receiving the signal indicating the completion of the operation of threading the yarn 93 to the first bobbin 91 (the yarn threading completion signal), the position of the first bobbin holder 41 is set to the position greater than 0° and less than 180°.

[0082] As a result, it is possible to prevent the first bobbin 91 from being wound thicker at a position greater than 270° and less than 360°, so that the first bobbin 91 or its yarn layer is less likely to interfere with the yarn path of the lower winding unit 10b.

[0083] In the yarn winding machine 1 of the present embodiment, the upper winding unit 10a includes the windbreak plate 75 for preventing the accompanying flow generated by the rotation of the package 94 formed on the first bobbin holder 41 or the second bobbin holder 42 from affecting the yarn wound at the lower winding unit 10b.

[0084] By providing the windbreak plate 75, the influence of the accompanying flow on the yarn 93 can be reduced.

[0085] In the yarn winding machine 1 of the present embodiment, when the package 94 formed on the second bobbin 92 is fully wound, in a state where the turret plate 40 sets the position of the first bobbin holder 41 to the position of less than $\pm 45^\circ$ with respect to 0°, the yarn 93 wound on the second bobbin 92 is switched to be wound on the first bobbin 91.

[0086] As a result, the fully wound package 94 does not pass through a range close to the yarn path to the lower winding unit 10b. Therefore, it is possible to further reduce the offset amount of the upper winding unit 10a. In addition, the operation of winding the yarn 93 connected to the package 94 on the first bobbin 91 can be easily performed.

[0087] Although a preferred embodiment of the present invention has been described above, the above-described configuration can be modified, for example, as follows.

[0088] Although the traverse device 21 of the above embodiment is of cam drum type, the traverse device 21 may have a different configuration as long as it is possible to reciprocate the traverse guide 23 in the winding width direction. For example, instead of the traverse device 21, a belt-type traverse device may be used.

[0089] The process diagram in the above embodiment and the modification is an example, and some of the processes may be omitted, the contents of some of the processes may be changed, or a new process may be added.

Claims

1. A yarn winding machine, comprising:

a lower winding unit (10b) which winds a yarn (93) fed from a yarn feed roller (100) to produce a package (94); and
an upper winding unit (10a) which is arranged at a higher position than the lower winding unit (10b) and at an offset position perpendicular to an axial direction of the package (94) with respect to the lower winding unit (10b) in the plan

view, and winds the yarn (93) fed from the yarn feed roller (100) to produce the package (94), wherein the upper winding unit (10a) comprising:

a first bobbin holder (41) which holds the first bobbin (91);
 a second bobbin holder (42) which holds the second bobbin (92);
 a bobbin holder moving mechanism (40) to which the first bobbin holder (41) and the second bobbin holder (42) are attached, and changes a position of the first bobbin holder (41) and the second bobbin holder (42) by rotating around a rotation axis parallel to the axial direction of the package (94); and
 a contact roller (31) which rotates in contact with the first bobbin (91), the second bobbin (92), or the package (94) when producing the package (94),

characterized in that with relation to a position in which the bobbin holder moving mechanism (40) holds the first bobbin holder (41) or the second bobbin holder (42), a position where the first bobbin (91), the second bobbin (92), or the package (94) contact with the contact roller (31) and the yarn (93) is wound on the first bobbin (91) or the second bobbin (92) to produce the package (94) is defined as 0° or 360°, a rotation direction of rotating from 0° toward an offset direction in which the upper winding unit (10a) is offset with respect to the lower winding unit (10b) is defined as positive, and the bobbin holder moving mechanism (40) sets the position of the first bobbin holder (41) to a position larger than 270° and smaller than 360° by receiving a signal for threading the yarn (93) to the first bobbin (91).

2. The yarn winding machine (1) according to claim 1, wherein the bobbin holder moving mechanism (40) sets the position of the first bobbin holder (41) to a position larger than 290° and smaller than 340° by receiving the signal for threading the yarn (93) to the first bobbin (91).
3. The yarn winding machine (1) according to claim 1 or 2, wherein after receiving a signal for performing a yarn switching in which when the yarn (93) is wound on the first bobbin (91), the yarn (93) comes to be wound on the second bobbin (92), or when the yarn (93) is wound on the second bobbin (92), the yarn (93) comes to be wound on the first bobbin (91), the bobbin holder moving mechanism (40) preferably sets a position of

one of the first bobbin holder (91) and the second bobbin holder (92) to 180° and sets the other position to 0°.

4. The yarn winding machine (1) according to any one of claims 1 to 3, wherein the bobbin holder moving mechanism (40) rotates so that positions of the first bobbin holder (41) and the second bobbin holder (42) are changed only in the positive direction from the state where the yarn (93) is threaded on the first bobbin (91) to the state where the yarn (93) is wound on the second bobbin (92) to produce the package (94).
5. The yarn winding machine (1) according to any one of claims 1 to 4, wherein the bobbin holder moving mechanism (40) sets a position of the first bobbin holder (41) to a position larger than 270° and smaller than 360° by receiving the signal for threading the yarn (93) to the first bobbin (91), and sets a position of the first bobbin holder (41) to a position larger than 0° and smaller than 180° by receiving a signal of a completion of threading the yarn (93) to the first bobbin (91).
6. The yarn winding machine (1) according to any one of claims 1 to 5, wherein the upper winding unit (10a) includes a windbreak plate (75) for preventing accompanying flow generated by a rotation of the package (94) formed on the first bobbin holder (41) or the second bobbin holder (42) from affecting the yarn (93) wound at the lower winding unit (10b).
7. The yarn winding machine (1) according to any one of claims 1 to 6, wherein when the package (94) formed on the second bobbin (92) is fully wound, in a state where the bobbin holder moving mechanism (40) sets a position of the first bobbin holder (41) to a position of less than $\pm 45^\circ$ with respect to 0°, the yarn (93) wound on the second bobbin (92) switched to be wound on the first bobbin (91).

Patentansprüche

1. Garnwickelmaschine, die Folgendes umfasst:
 eine untere Wickeleinheit (10b), die ein Garn (93), das von einer Garnzuführrolle (100) zugeführt wird, wickelt, um ein Gebinde (94) herzustellen; und
 eine obere Wickeleinheit (10a), die an einer höheren Position als die untere Wickeleinheit (10b) und in der Draufsicht an einer versetzten

Position, die zu einer axialen Richtung des Gebindes (94) senkrecht ist, in Bezug auf die untere Wickereinheit (10b) angeordnet ist und das Garn (93), das von der Garnzuführrolle (100) zugeführt wird, wickelt, um das Gebinde (94) herzustellen, wobei die obere Wickereinheit (10a) Folgendes umfasst:

einen ersten Spulenhalter (41), der die erste Spule (91) hält;
einen zweiten Spulenhalter (42), der die zweite Spule (92) hält;
einen Spulenhalter-Bewegungsmechanismus (40), an dem der erste Spulenhalter (41) und der zweite Spulenhalter (42) befestigt sind, und der durch Drehen um eine Drehachse, die zur axialen Richtung des Gebindes (94) parallel ist, eine Position des ersten Spulenhalters (41) und des zweiten Spulenhalters (42) ändert; und
eine Kontaktrolle (31), die sich in Kontakt mit der ersten Spule (91), der zweiten Spule (92) oder dem Gebinde (94) dreht, wenn das Gebinde (94) hergestellt wird,

dadurch gekennzeichnet, dass in Bezug auf eine Position, an der der Spulenhalter-Bewegungsmechanismus (40) den ersten Spulenhalter (41) oder den zweiten Spulenhalter (42) hält, eine Position, an der die erste Spule (91), die zweite Spule (92) oder das Gebinde (94) die Kontaktrolle (31) berühren und das Garn (93) auf die erste Spule (91) oder die zweite Spule (92) gewickelt wird, um das Gebinde (94) herzustellen, als 0° oder 360° definiert ist, eine Drehrichtung des Drehens ausgehend von 0° in Richtung einer Versatzrichtung, in der die obere Wickereinheit (10a) in Bezug auf die untere Wickereinheit (10b) versetzt ist, als positiv definiert ist, und
der Spulenhalter-Bewegungsmechanismus (40) aufgrund des Empfangens eines Signals zum Einziehen des Garns (93) in die erste Spule (91) die Position des ersten Spulenhalters (41) auf eine Position einstellt, die größer als 270° und kleiner als 360° ist.

2. Garnwickelmaschine (1) nach Anspruch 1, wobei der Spulenhalter-Bewegungsmechanismus (40) aufgrund des Empfangens des Signals zum Einziehen des Garns (93) in die erste Spule (91) die Position des ersten Spulenhalters (41) auf eine Position einstellt, die größer als 290° und kleiner als 340° ist.
3. Garnwickelmaschine (1) nach Anspruch 1 oder 2, wobei nach dem Empfangen eines Signals zum Durchfüh-

ren eines Garnwechsels, bei dem dann, wenn das Garn (93) auf die erste Spule (91) gewickelt wird, bewirkt wird, dass das Garn (93) auf die zweite Spule (92) gewickelt wird, oder dann, wenn das Garn (93) auf die zweite Spule (92) gewickelt wird, bewirkt wird, dass das Garn (93) auf die erste Spule (91) gewickelt wird, der Spulenhalter-Bewegungsmechanismus (40) vorzugsweise eine Position eines des ersten Spulenhalters (91) und des zweiten Spulenhalters (92) auf 180° einstellt und die andere Position auf 0° einstellt.

4. Garnwickelmaschine (1) nach einem der Ansprüche 1 bis 3, wobei sich der Spulenhalter-Bewegungsmechanismus (40) dreht, derart, dass die Positionen des ersten Spulenhalters (41) und des zweiten Spulenhalters (42) lediglich in der positiven Richtung aus dem Zustand, in dem das Garn (93) auf die erste Spule (91) eingezogen wird, in den Zustand (93), in dem das Garn (93) auf die zweite Spule (92) gewickelt wird, um das Gebinde (94) herzustellen, geändert werden.
5. Garnwickelmaschine (1) nach einem der Ansprüche 1 bis 4, wobei der Spulenhalter-Bewegungsmechanismus (40)

aufgrund des Empfangens des Signals zum Einziehen des Garns (93) auf die erste Spule (91) eine Position des ersten Spulenhalters (41) auf eine Position einstellt, die größer als 270° und kleiner als 360° ist, und
aufgrund des Empfangens eines Signals des Abschließens des Einziehens des Garns (93) auf die erste Spule (91) eine Position des ersten Spulenhalters (41) auf eine Position einstellt, die größer als 0° und kleiner als 180° ist.

6. Garnwickelmaschine (1) nach einem der Ansprüche 1 bis 5, wobei die obere Wickereinheit (10a) eine Windschutzplatte (75) zum Verhindern, dass eine begleitende Strömung, die durch eine Drehung des Gebindes (94) bewirkt wird, das auf dem ersten Spulenhalter (41) oder dem zweiten Spulenhalter (42) gebildet wird, das Garn (93), das an der unteren Wickereinheit (10b) gewickelt wird, beeinflusst, enthält.
7. Garnwickelmaschine (1) nach einem der Ansprüche 1 bis 6, wobei dann, wenn das Gebinde (94), das auf der zweiten Spule (92) gebildet wird, vollständig gewickelt ist, in einem Zustand, in dem der Spulenhalter-Bewegungsmechanismus (40) eine Position des ersten Spulenhalters (41) auf eine Position einstellt, die in Bezug auf 0° kleiner als $\pm 45^\circ$ ist, das Garn (93), das auf die zweite Spule (92) gewickelt wird, derart um-

geschaltet wird, dass es auf die erste Spule (91) gewickelt wird.

Revendications

1. Machine d'enroulement de fil, comportant :

une unité d'enroulement inférieure (10b) qui enroule un fil (93) fourni à partir d'un rouleau d'alimentation en fil (100) pour produire une pelote (94) ; et

une unité d'enroulement supérieure (10a) qui est agencée à une position plus haute que l'unité d'enroulement inférieure (10b) et à une position décalée perpendiculairement à une direction axiale de la pelote (94) par rapport à l'unité d'enroulement inférieure (10b) en vue de dessus, et enroule le fil (93) fourni à partir du rouleau d'alimentation en fil (100) pour produire la pelote (94),

dans laquelle l'unité d'enroulement supérieure (10a) comporte :

un premier porte-bobine (41) qui maintient la première bobine (91) ;

un second porte-bobine (42) qui maintient la seconde bobine (92) ;

un mécanisme de déplacement de porte-bobines (40) auquel le premier porte-bobine (41) et le second porte-bobine (42) sont fixés, et qui change une position du premier porte-bobine (41) et du second porte-bobine (42) en tournant autour d'un axe de rotation parallèle à la direction axiale de la pelote (94) ; et

un galet de contact (31) qui tourne en contact avec la première bobine (91), la seconde bobine (92) ou la pelote (94) lors de la production de la pelote (94),

caractérisée en ce que par rapport à une position dans laquelle le mécanisme de déplacement de porte-bobines (40) maintient le premier porte-bobine (41) ou le second porte-bobine (42), une position où la première bobine (91), la seconde bobine (92) ou la pelote (94) sont en contact avec le galet de contact (31), et le fil (93) est enroulé sur la première bobine (91) ou la seconde bobine (92) pour produire la pelote (94), est définie comme étant 0° ou 360°, un sens de rotation d'une rotation à partir de 0° vers une direction de décalage dans laquelle l'unité d'enroulement supérieure (10a) est décalée par rapport à l'unité d'enroulement inférieure (10b) est défini comme étant positif, et

le mécanisme de déplacement de porte-

bobines (40) fixe la position du premier porte-bobine (41) à une position supérieure à 270° et inférieure à 360° en recevant un signal pour enfiler le fil (93) sur la première bobine (91).

2. Machine d'enroulement de fil (1) selon la revendication 1, dans laquelle

le mécanisme de déplacement de porte-bobines (40) fixe la position du premier porte-bobine (41) à une position supérieure à 290° et inférieure à 340° en recevant le signal pour enfiler le fil (93) sur la première bobine (91).

3. Machine d'enroulement de fil (1) selon la revendication 1 ou 2, dans laquelle

après réception d'un signal pour effectuer un basculement de fil dans laquelle, lorsque le fil (93) est enroulé sur la première bobine (91), le fil (93) vient s'enrouler sur la seconde bobine (92), ou lorsque le fil (93) est enroulé sur la seconde bobine (92), le fil (93) vient s'enrouler sur la première bobine (91), le mécanisme de déplacement de porte-bobines (40) fixe de préférence une position d'un élément parmi le premier porte-bobine (91) et le second porte-bobine (92) à 180° et fixe l'autre position à 0°.

4. Machine d'enroulement de fil (1) selon l'une quelconque des revendications 1 à 3, dans laquelle

le mécanisme de déplacement de porte-bobines (40) tourne de sorte que des positions du premier porte-bobine (41) et du second porte-bobine (42) sont uniquement changées dans le sens positif de l'état où le fil (93) est enfilé sur la première bobine (91) à l'état dans lequel le fil (93) est enroulé sur la seconde bobine (92) pour produire la pelote (94).

5. Machine d'enroulement de fil (1) selon l'une quelconque des revendications 1 à 4, dans laquelle

le mécanisme de déplacement de porte-bobines (40)

fixe une position du premier porte-bobine (41) à une position supérieure à 270° et inférieure à 360° en recevant le signal pour enfiler le fil (93) sur la première bobine (91), et

fixe une position du premier porte-bobine (41) à une position supérieure à 0° et inférieure à 180° en recevant un signal de fin d'enfilage du fil (93) sur la première bobine (91).

6. Machine d'enroulement de fil (1) selon l'une quelconque des revendications 1 à 5, dans laquelle

l'unité d'enroulement supérieure (10a) inclut une plaque coupe-vent (75) pour empêcher un flux d'accompagnement généré par une rotation de la pelote (94) formée sur le premier porte-bobine (41) ou le second porte-bobine (42) d'affecter le fil (93) enroulé

sur l'unité d'enroulement inférieure (10b).

7. Machine d'enroulement de fil (1) selon l'une quelconque des revendications 1 à 6, dans laquelle lorsque la pelote (94) formée sur la seconde bobine (92) est complètement enroulée, dans un état où le mécanisme de déplacement de porte-bobines (40) fixe une position du premier porte-bobine (41) à une position inférieure à $\pm 45^\circ$ par rapport à 0° , le fil (93) enroulé sur la seconde bobine (92) est basculé pour être enroulé sur la première bobine (91).

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Fig.1

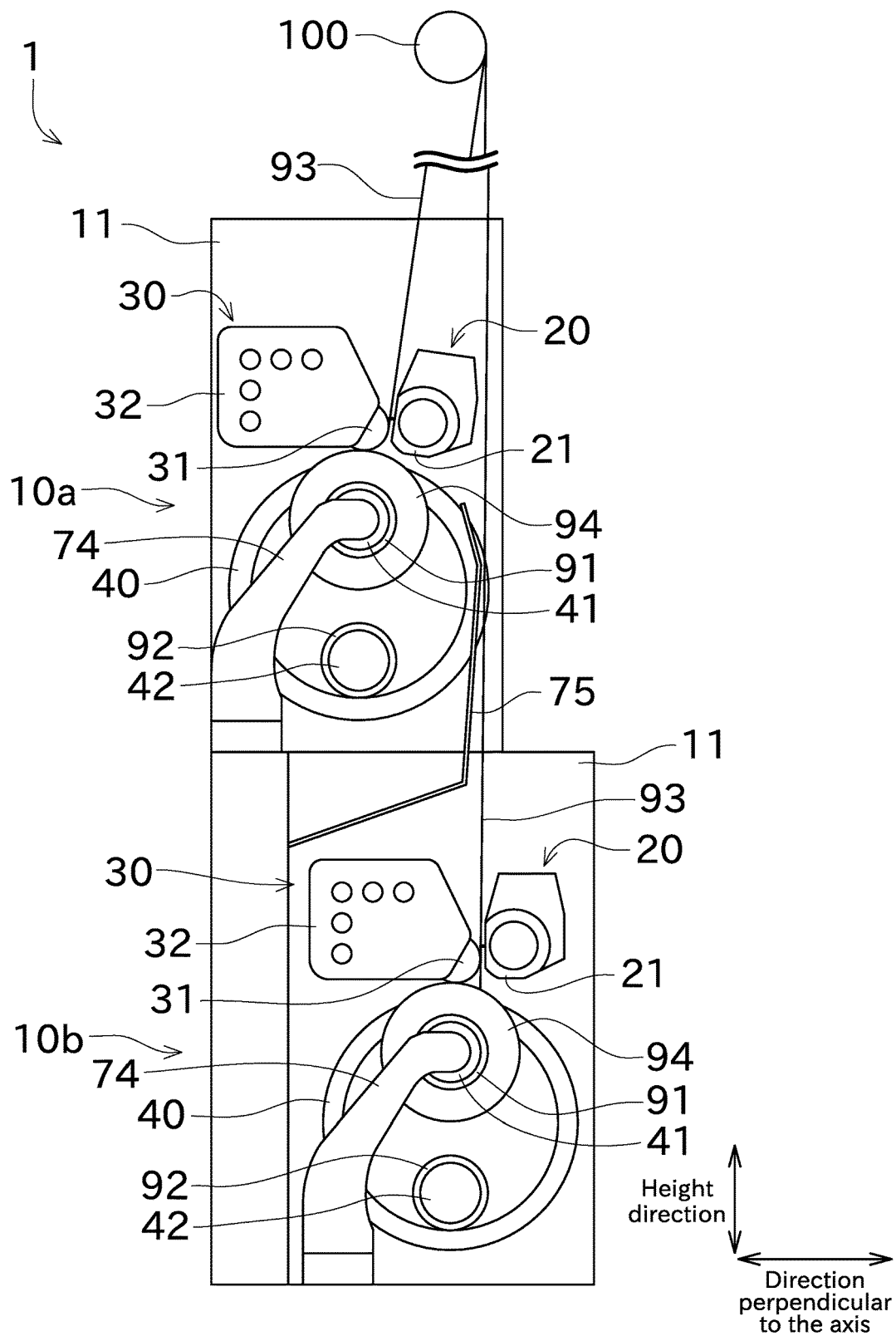


Fig.2

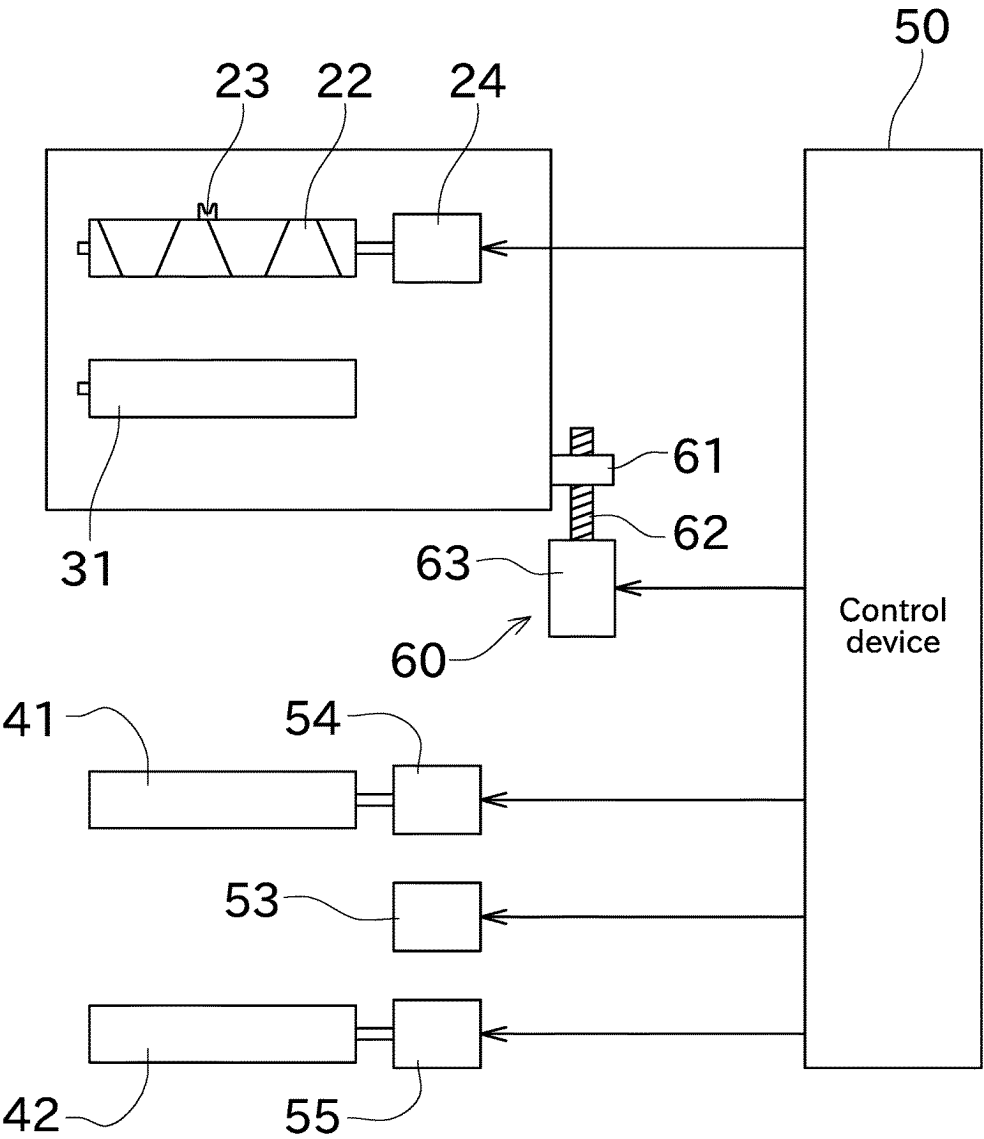


Fig.3

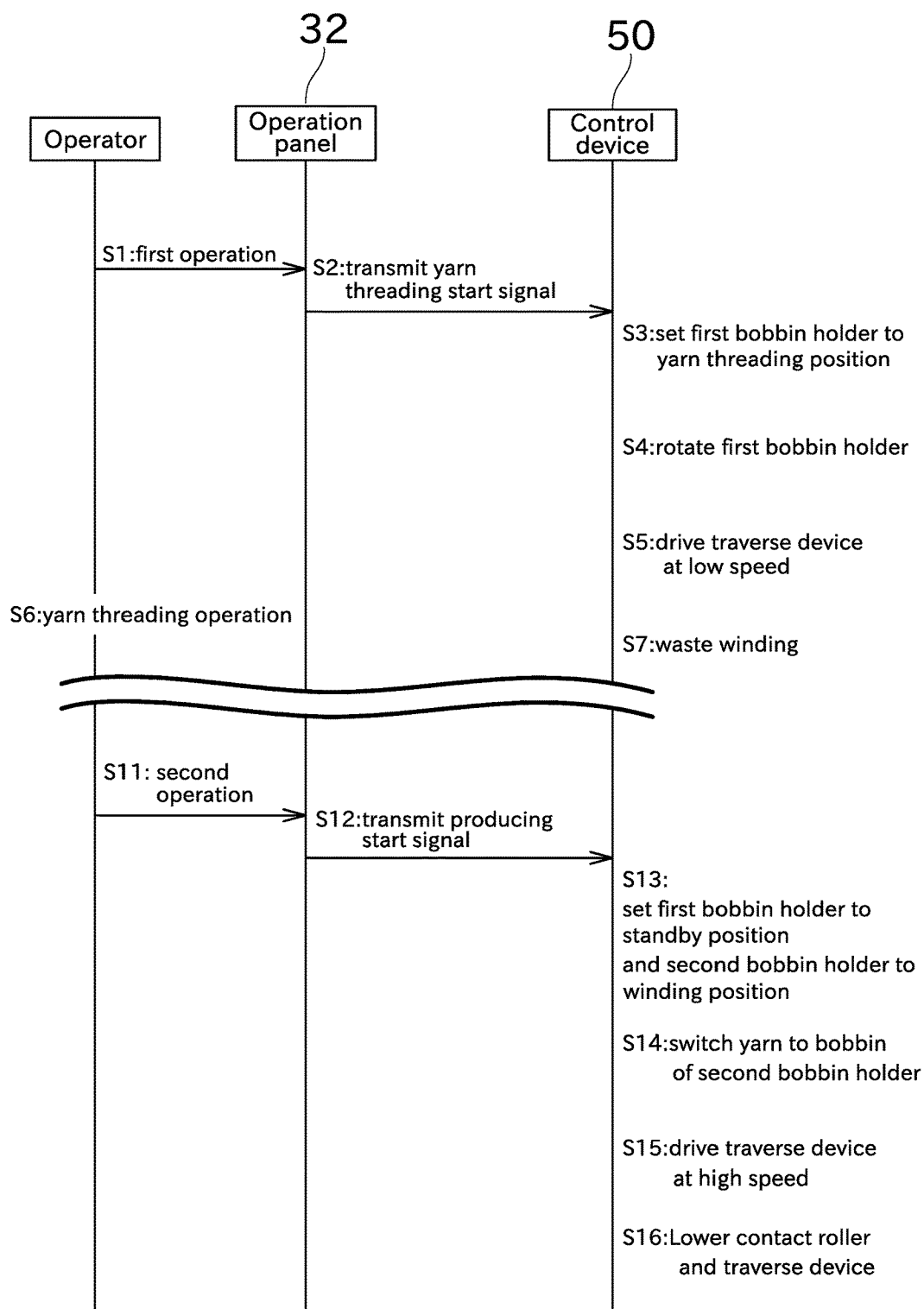


Fig.4

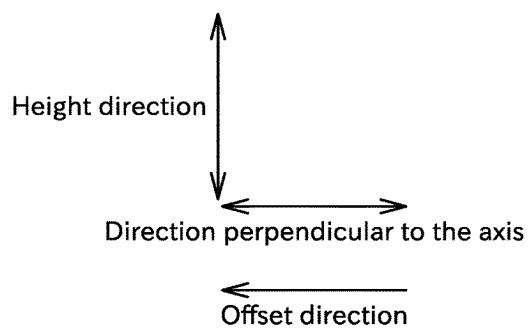
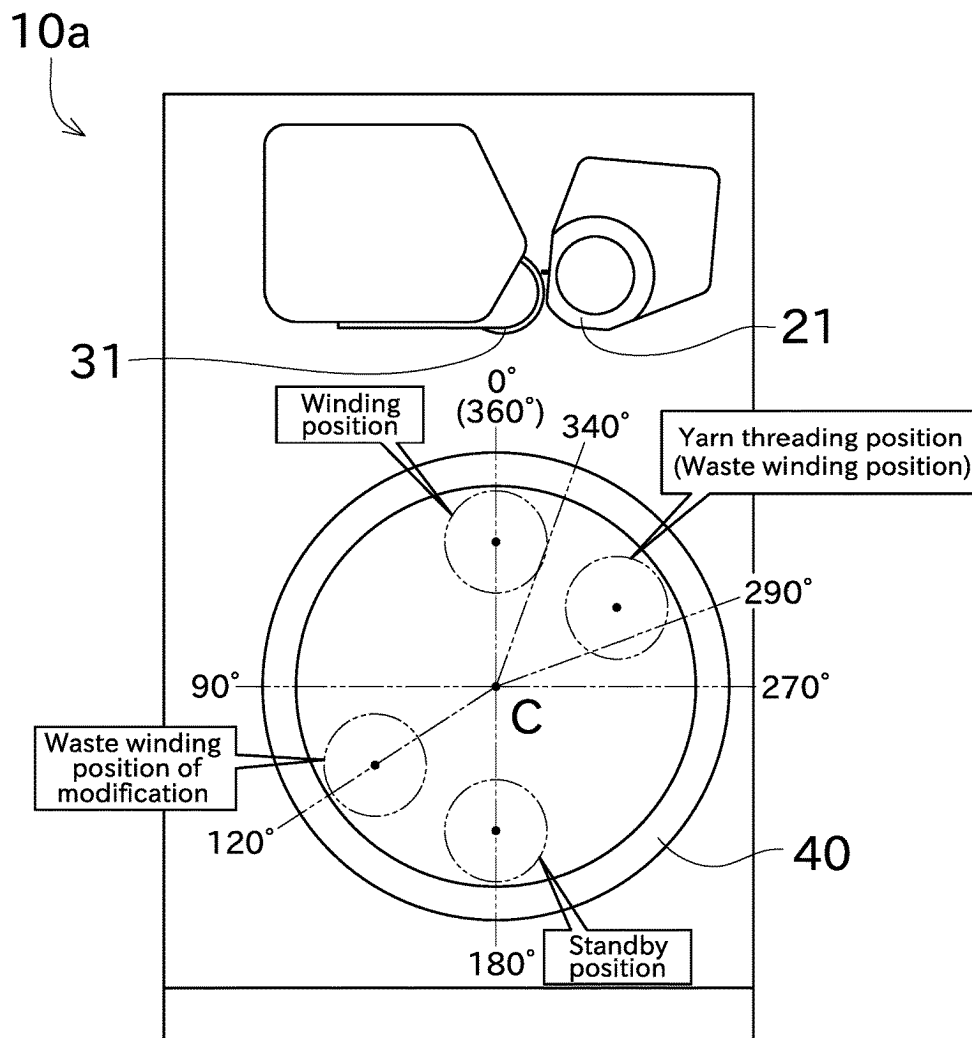


Fig.5

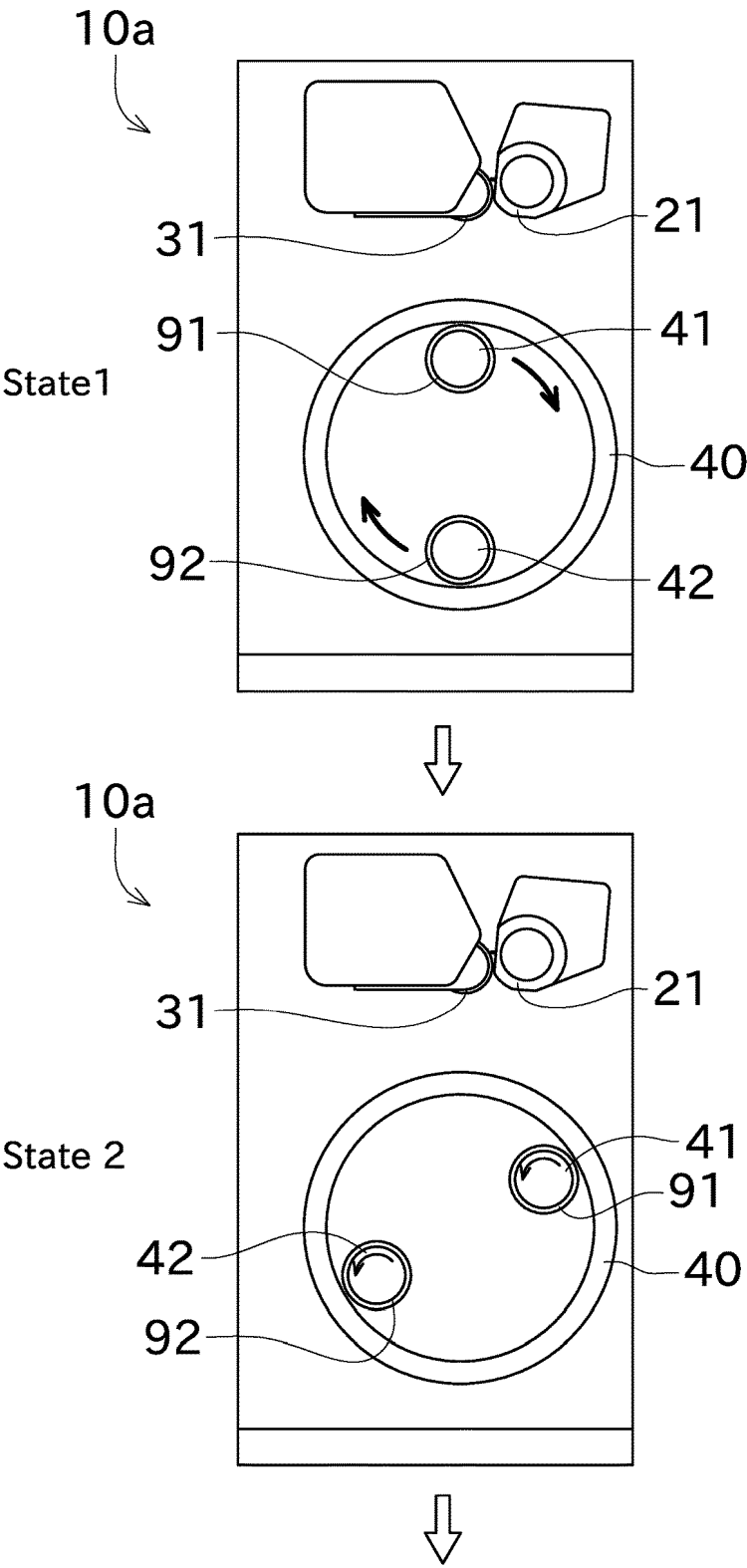


Fig.6

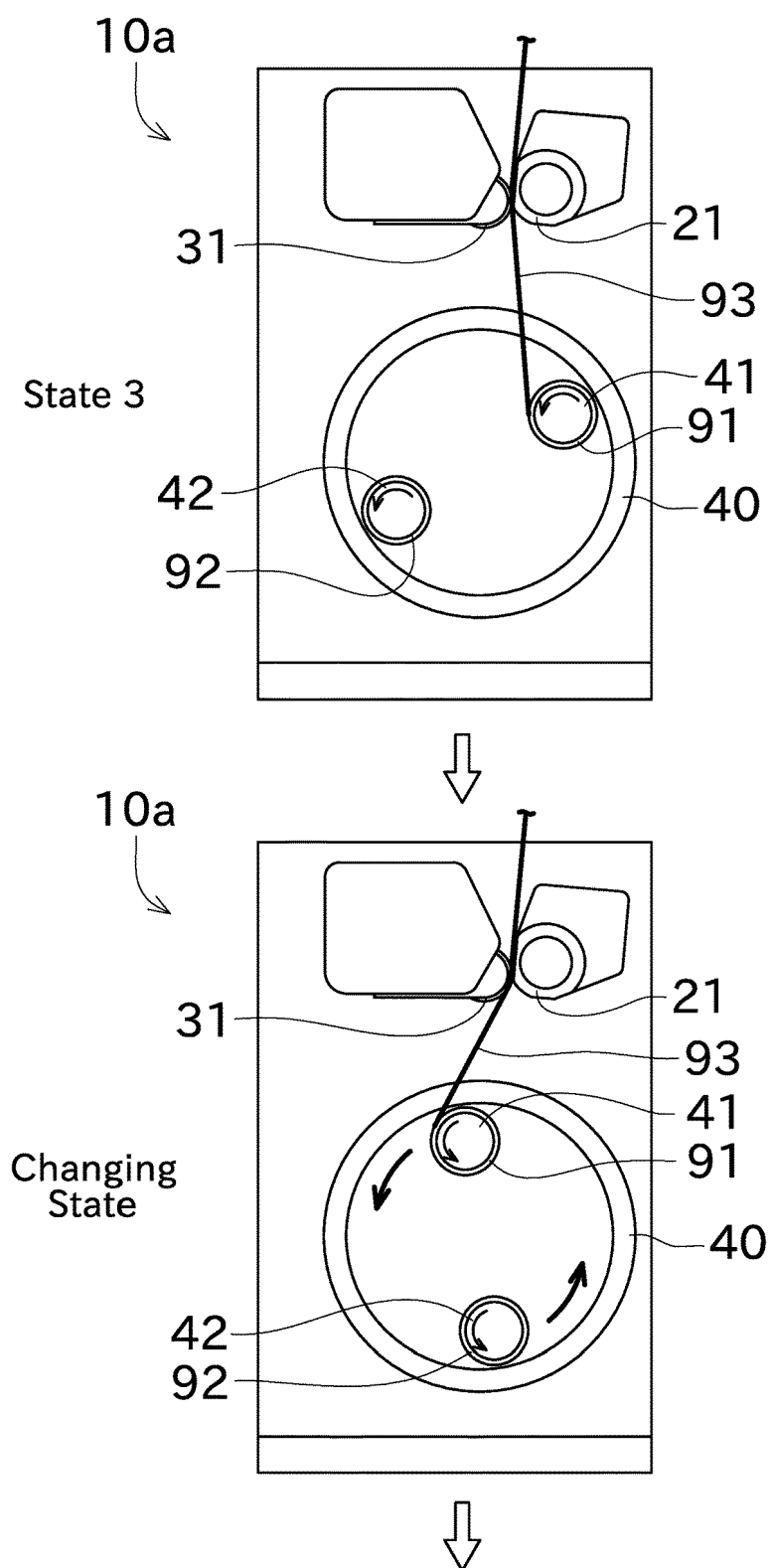


Fig.7

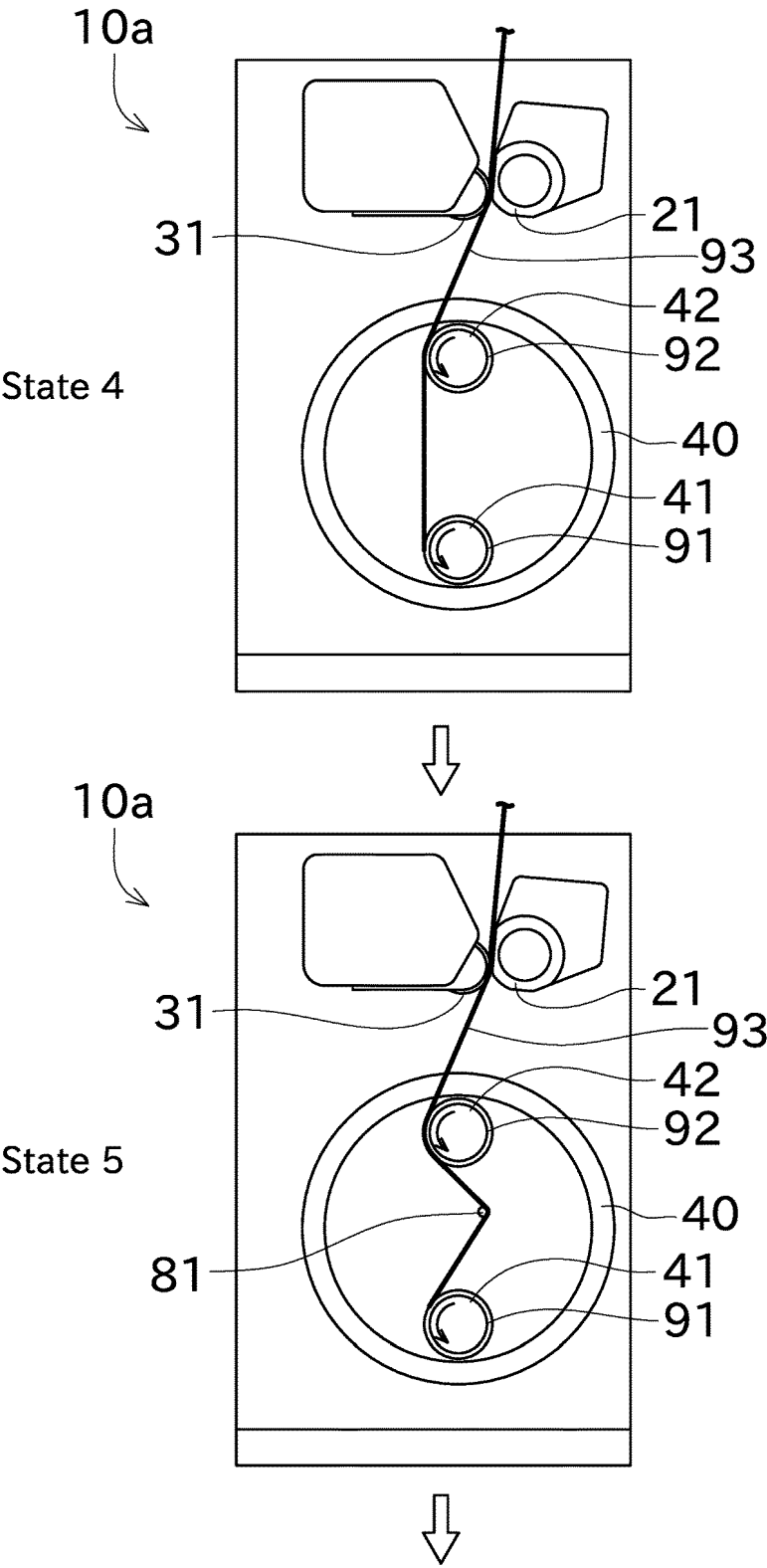


Fig.8

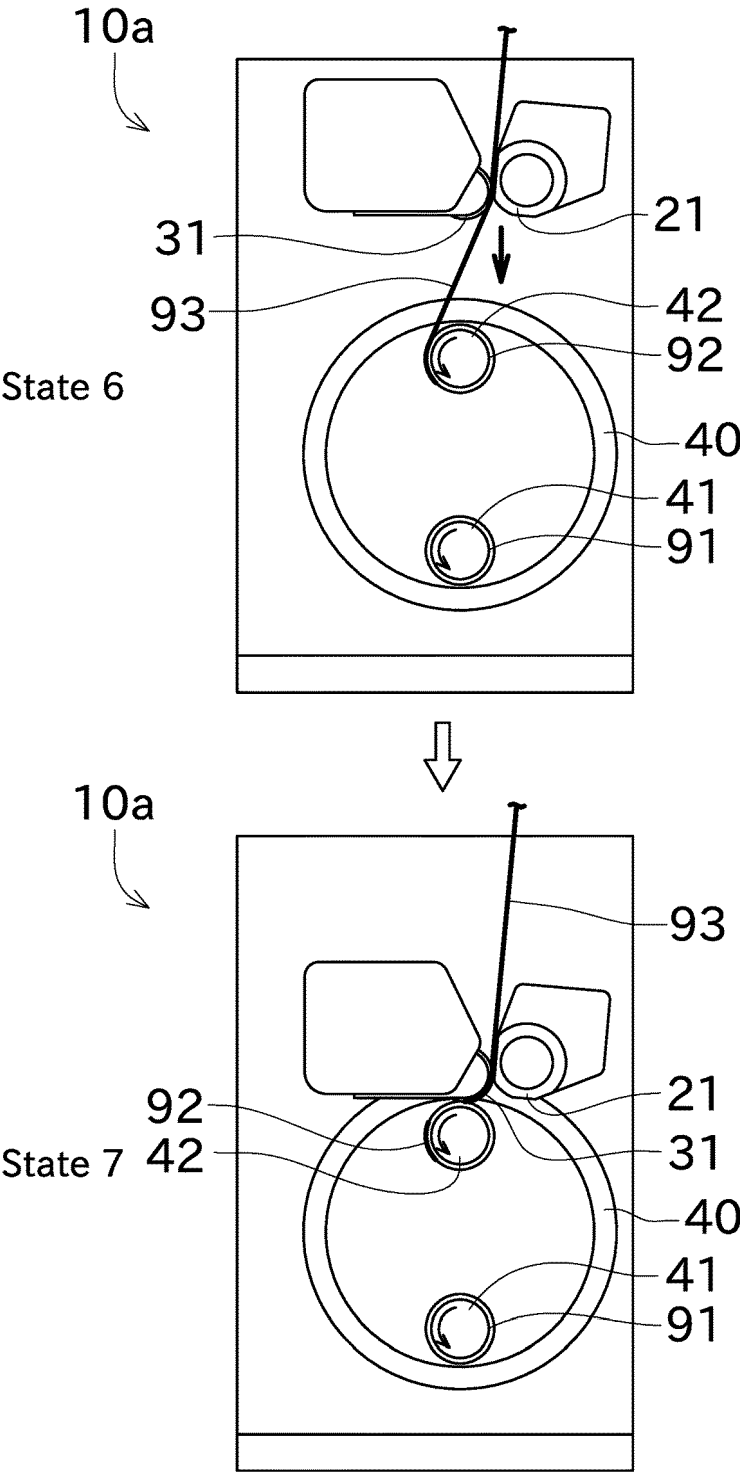


Fig.9

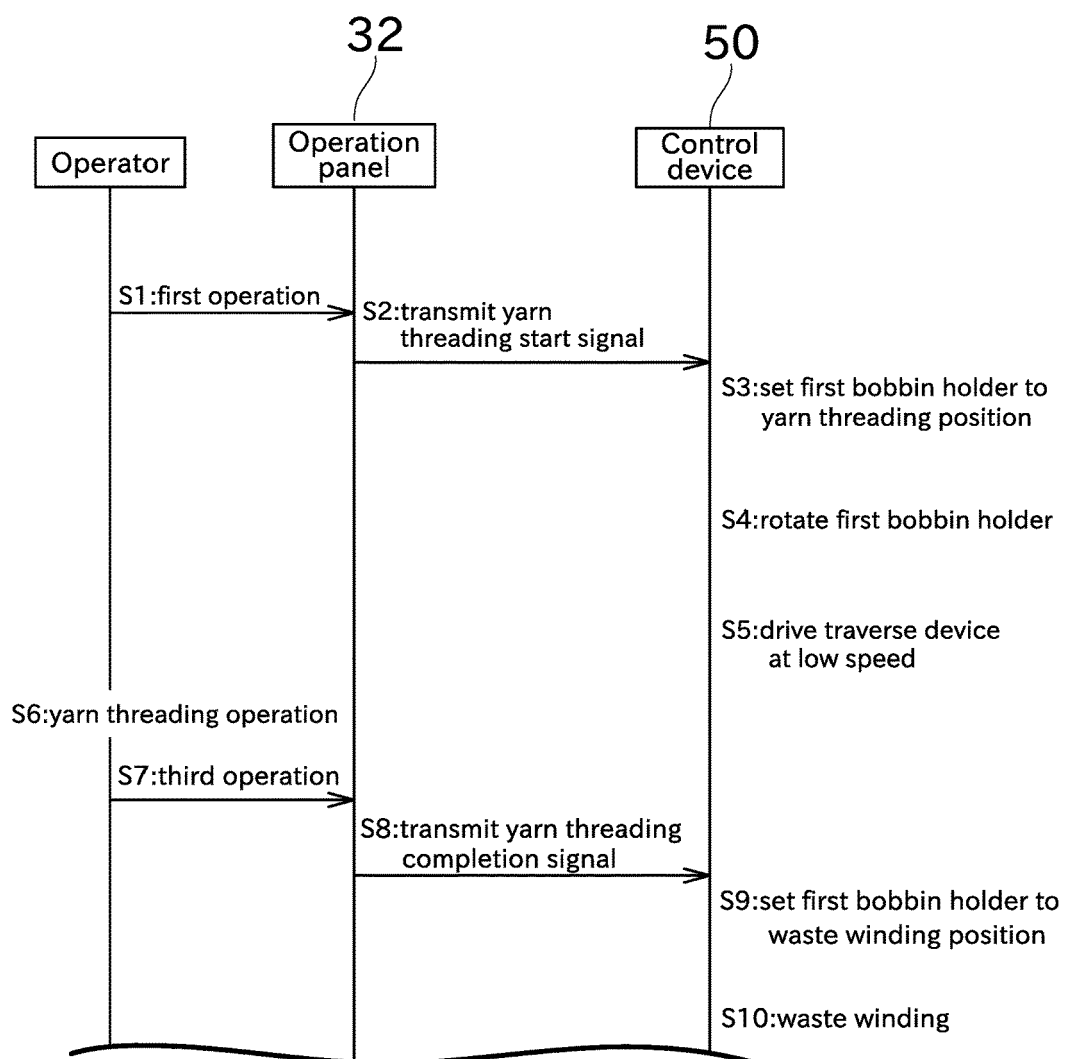


Fig.10

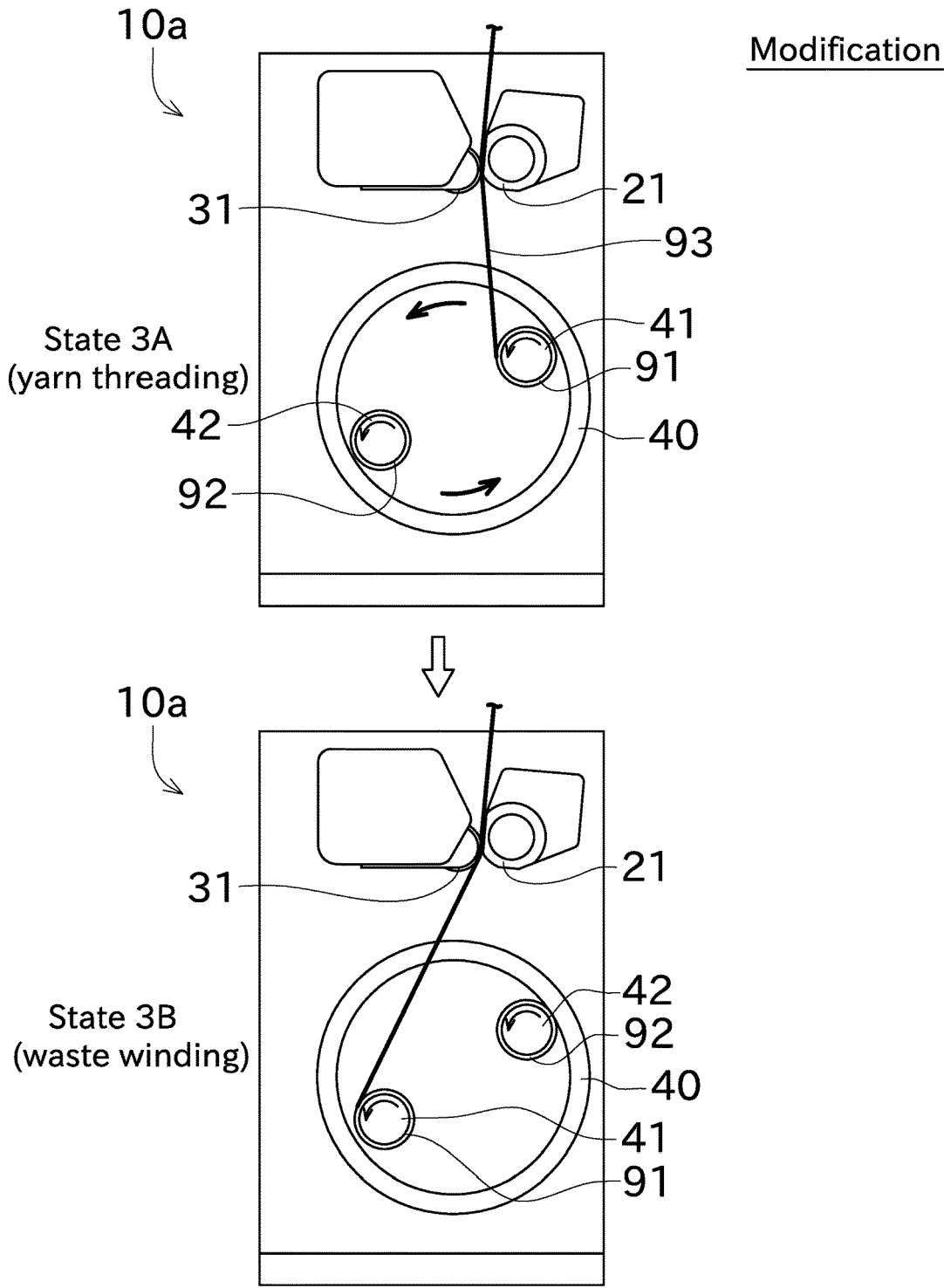


Fig.11

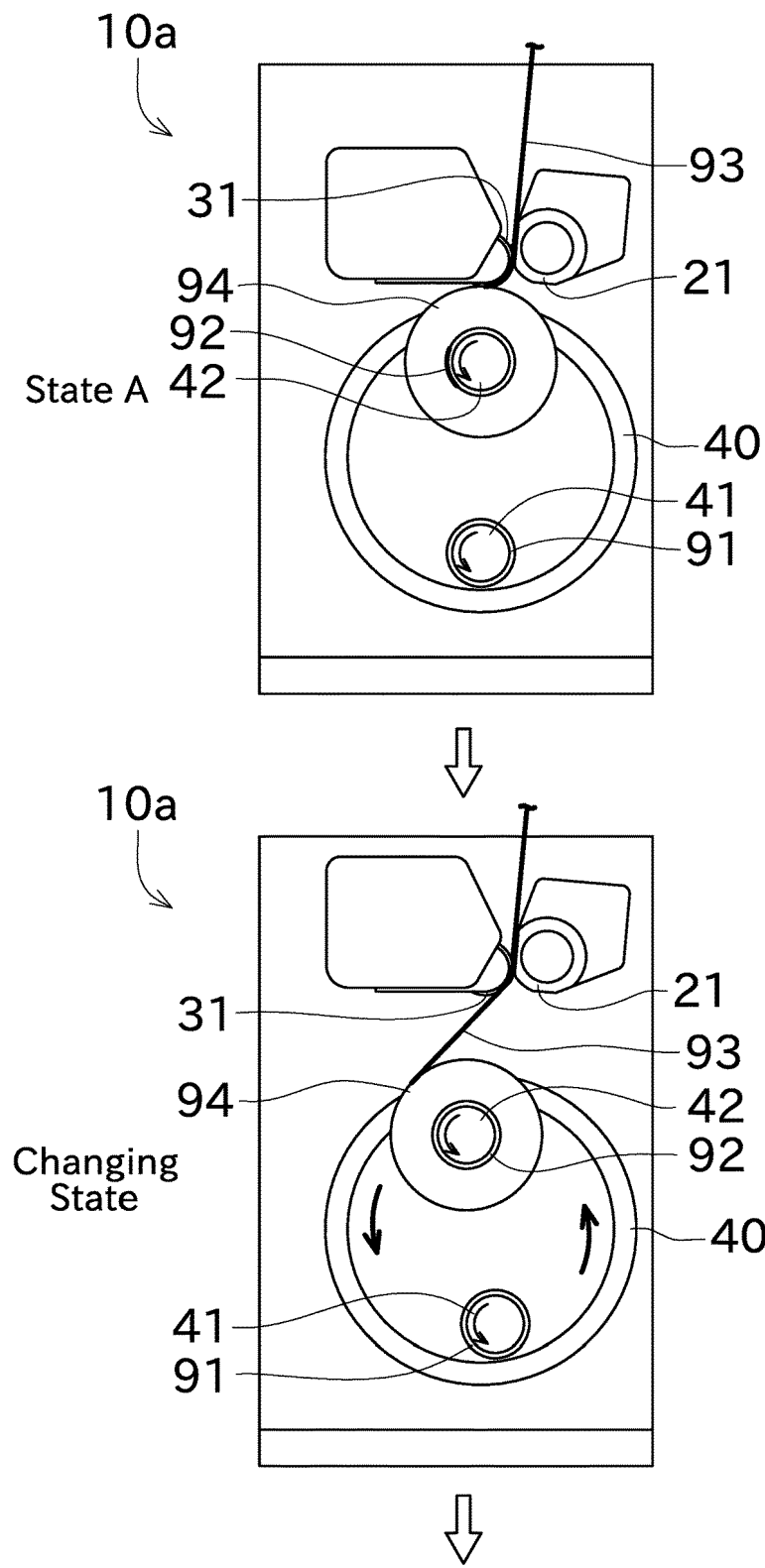


Fig.12

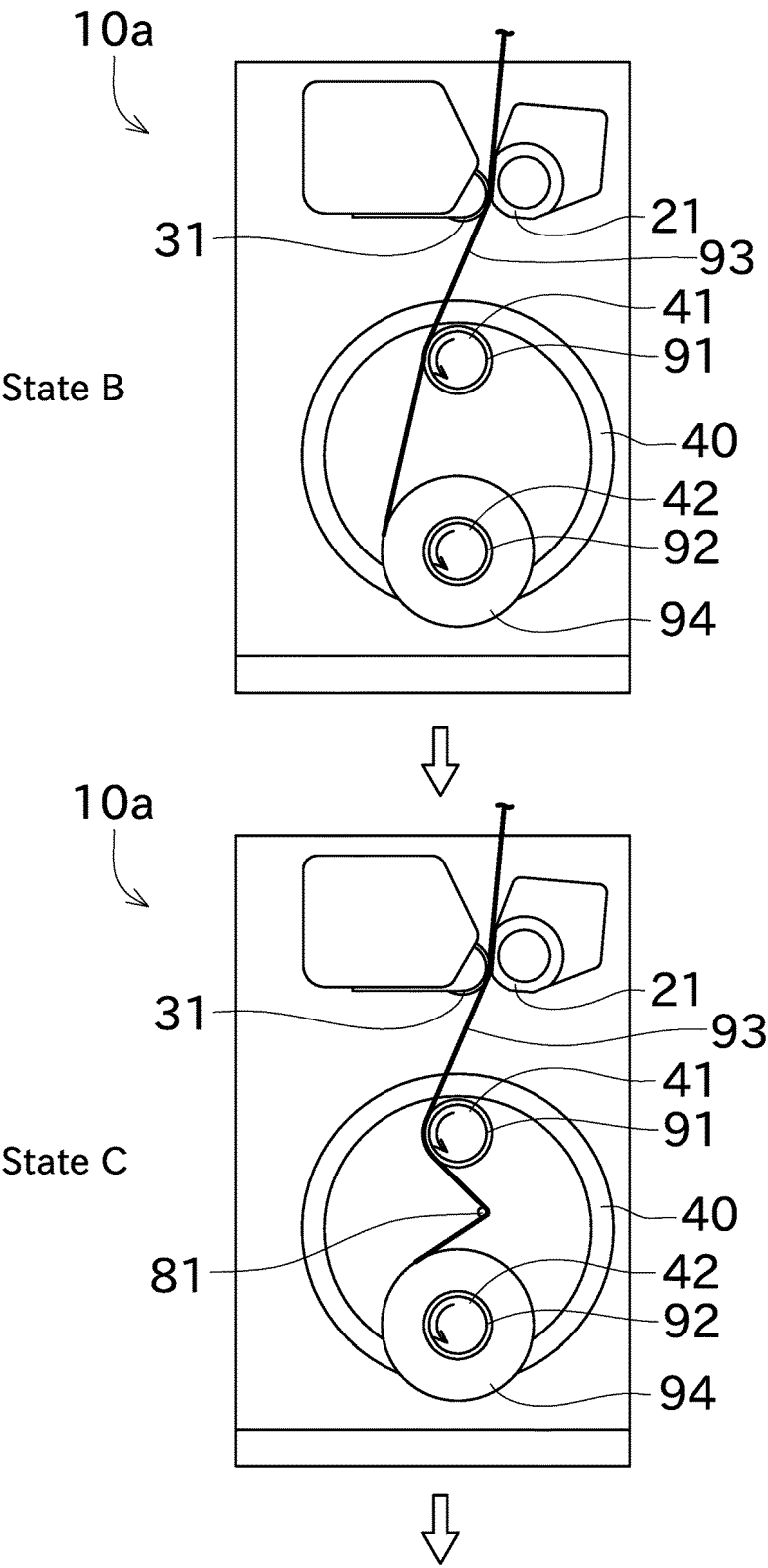


Fig.13

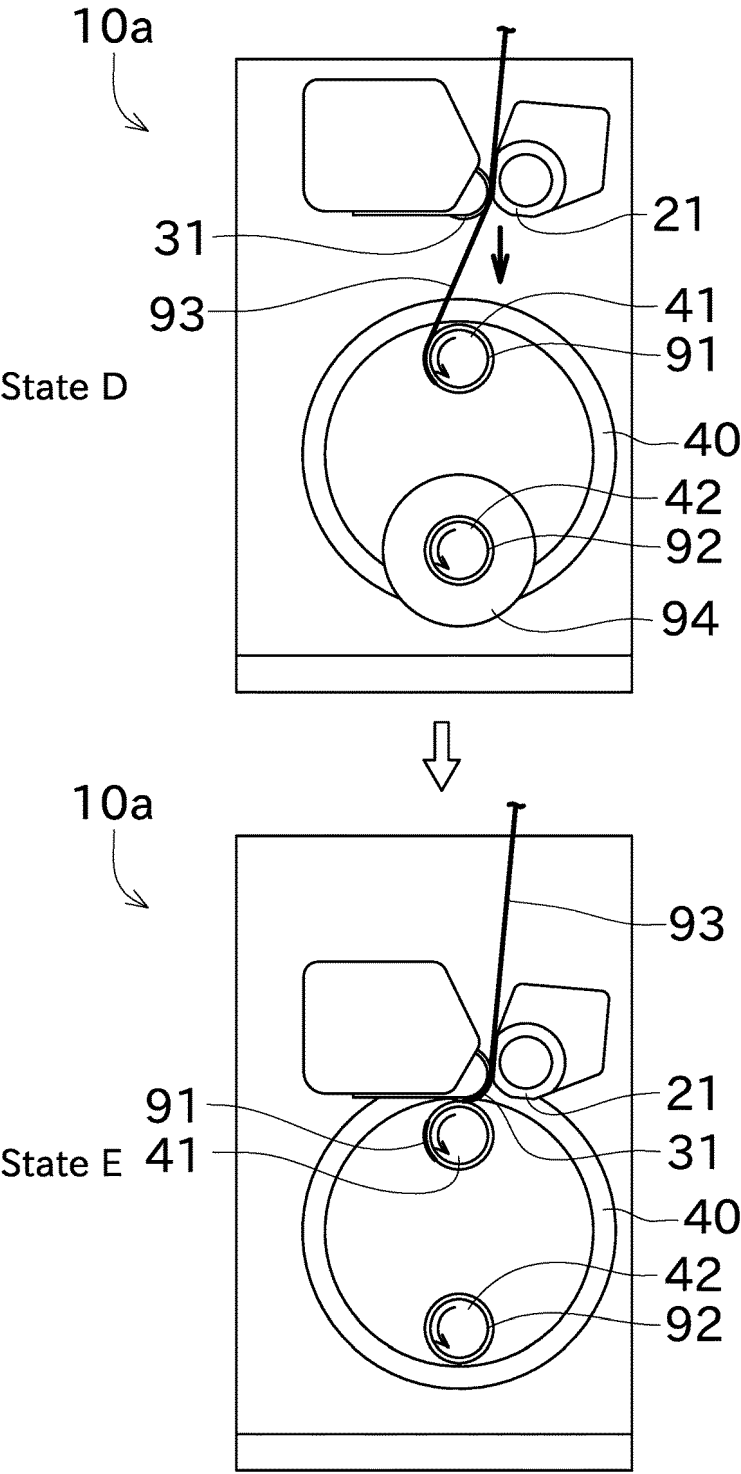
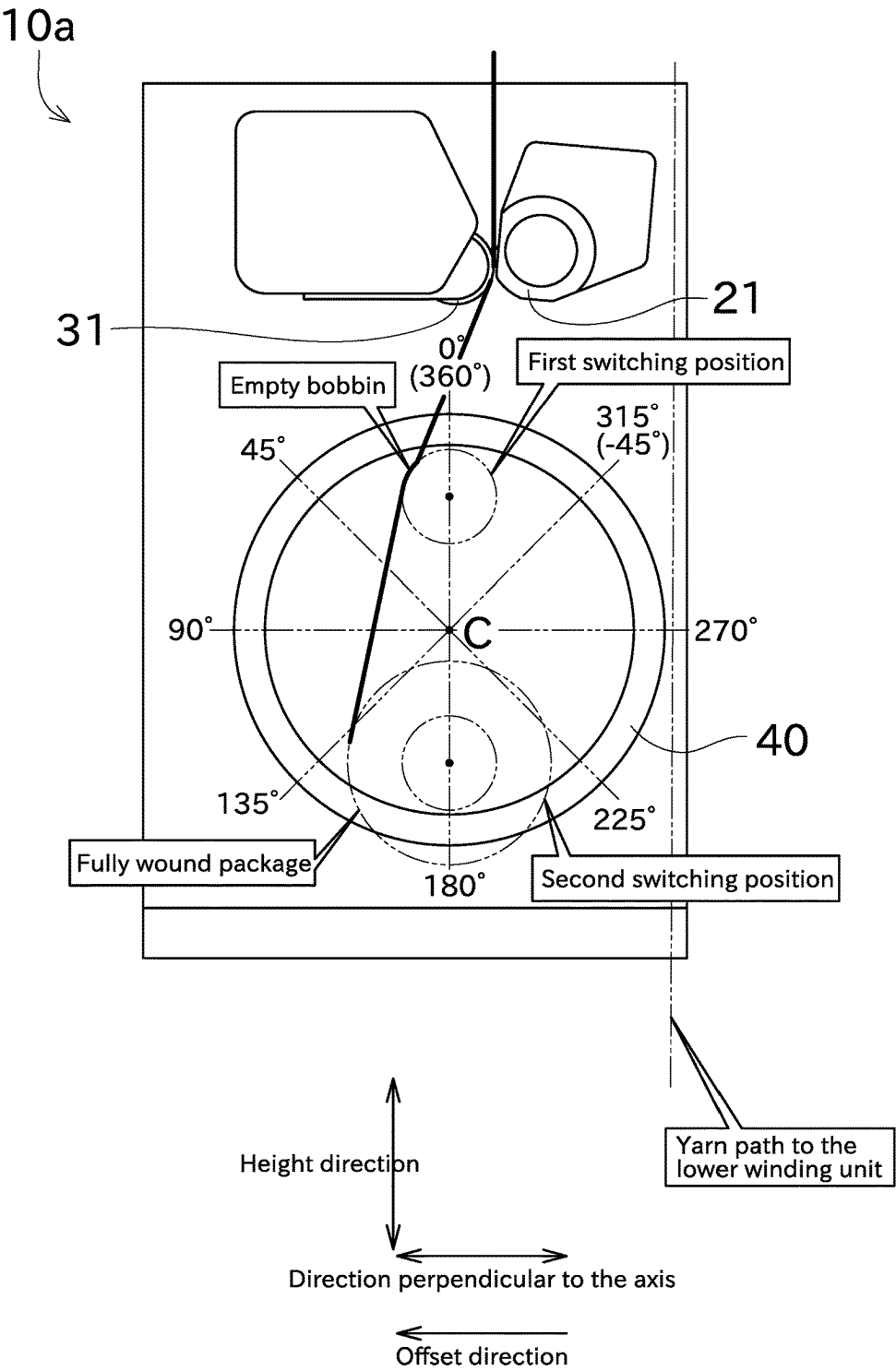


Fig.14



REFERENCES CITED IN THE DESCRIPTION

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