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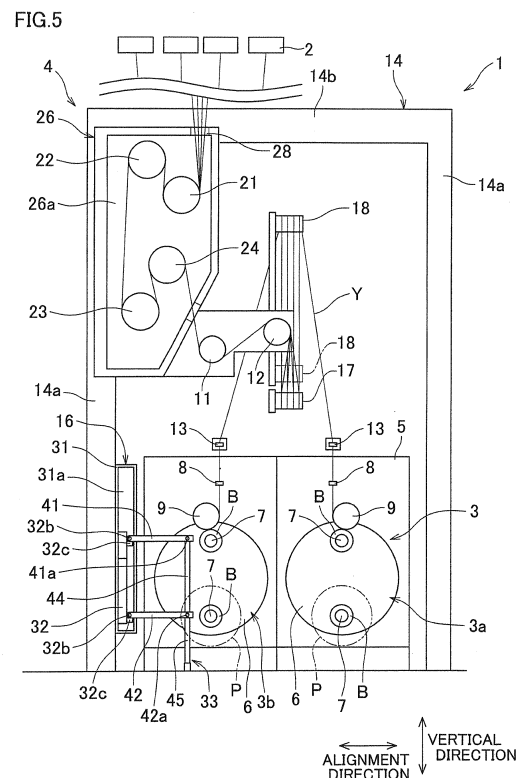
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(54) **Spun yarn take-up apparatus**

(57) Onto godet rollers 21 to 24 arranged in parallel with a bobbin holder 7, a yarn threading operation can be performed from the leading end side of the bobbin holder 7. A working platform 33 is able to selectively take an operation posture in which footboards 41 and 42 extend in the horizontal direction and a retracted posture in which the footboards 41 and 42 extend in the vertical direction. In the operation posture, the working platform 33 is located on the leading end side of the bobbin holder 7. The operation posture is taken when the yarn threading operation is performed. The retracted posture is deviated from a yarn winding device 3 with respect to an alignment direction. A storage 31 having a slidable component 32 stored therein is provided laterally to the yarn winding device 3. The working platform 33 is attached to the slidable component 32. Moving the slidable component 32 in the winding axis direction with the working platform 33 taking the retracted posture causes the working platform 33 to be stored into the storage 31.



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a spun yarn take-up apparatus including a yarn winding device that winds a yarn onto a bobbin.

Description of the Background Art

[0002] According to the disclosure of Japanese Patent Application Laid-Open No. 2011-144019, in such a configuration that a plurality of spun yarn take-up apparatuses, each of which includes a yarn winding device for winding a yarn onto bobbins that are attached to a bobbin holder configured to allow the bobbins to be attached and removed from the leading end thereof, a godet roller located upstream of the yarn winding device, and the like, are installed side by side horizontally in a plane orthogonal to the axial direction of the bobbin holder; neighboring two of the spun yarn take-up apparatuses are paired such that corresponding one side surfaces of the two spun yarn take-up apparatuses are arranged opposed to each other with a narrow gap therebetween. Such pairs of spun yarn take-up apparatuses are aligned at intervals horizontally in the plane orthogonal to the axial direction of the bobbin holder.

[0003] In Japanese Patent Application Laid-Open No. 2011-144019, the godet roller whose rotation axis extends in a direction orthogonal to a bobbin holder shaft of the yarn winding device is arranged above the yarn winding device. In order to perform a yarn threading operation onto the godet roller, a space for the yarn threading operation is ensured on the opposite side-surface side of each yarn winding device which is opposite to the one side surface thereof. An operator, on a working platform arranged in this space, performs the yarn threading operation onto the godet roller of the spun yarn take-up apparatus.

[0004] In Japanese Patent Application Laid-Open No. 2011-144019, an operation space needs to be ensured on a side-surface side of the yarn winding device, which requires an increased space for installation of the yarn take-up apparatus. Even in a case of arranging only one spun yarn take-up apparatus, the need to ensure an operation space on a side-surface side of the yarn winding device still remains, which requires an increased space for installation of the yarn take-up apparatus.

[0005] In order to reduce the space required for installation of the spun yarn take-up apparatus, it is conceivable to arrange the godet roller such that the rotation axis thereof extends in parallel with the bobbin holder shaft and additionally rollers including the godet roller are placed on the leading end side of the yarn winding device at a time of the yarn threading operation, thereby allowing the operator to perform the yarn threading operation onto

the rollers from the leading end side of the bobbin holder of the yarn winding device. In this case, the operator is able to perform the yarn threading operation onto the rollers including the godet roller, while being in a space on the leading end side of the bobbin holder, which is intended for attachment and removal of bobbins to and from the bobbin holder. Accordingly, it is not necessary to separately ensure a space for the yarn threading operation. Thus, the space required for installation of the spun yarn take-up apparatus can be reduced.

[0006] In this case, however, it is necessary that the working platform on which the operator performs the yarn threading operation is arranged on the leading end side of the bobbin holder. Therefore, when attachment and removal of bobbins are performed from the leading end of the bobbin holder, the working platform may be an obstruction. Providing a common working platform that is shared among a plurality of spun yarn take-up apparatuses and configuring this working platform to be movable across the plurality of spun yarn take-up apparatuses enables the working platform to be retracted to a position in which the working platform does not obstruct the attachment and removal of bobbins. However, this makes it necessary to, for example, lay a rail for allowing the working platform to move, which results in a complicated apparatus structure.

[0007] In addition, it is also necessary that a working wagon is moved to a suitable place in a time period from when the apparatus is stopped to when the yarn threading operation is started. This not only is troublesome, but also makes it impossible to simultaneously perform the yarn threading operation in a plurality of spun yarn take-up apparatuses because the working platform is shared among the plurality of spun yarn take-up apparatuses. Particularly, an initial yarn threading operation in which a yarn is threaded to the rollers including the godet rollers of all the spun yarn take-up apparatuses is cumbersome.

SUMMARY OF THE INVENTION

[0008] An object of the present invention is to provide a spun yarn take-up apparatus configured to prevent a working platform used for performing a yarn threading operation onto each roller from being an obstruction in attachment and removal of bobbins to and from a bobbin holder of a yarn winding device even in a case where a godet roller is arranged in parallel with the bobbin holder and arranged on the leading end side of the yarn winding device.

[0009] A first invention provides a spun yarn take-up apparatus including: a yarn winding device including a bobbin holder that has a winding spindle extending in a horizontal direction and that allows a bobbin to be attached and removed from a leading end of the bobbin holder, the yarn winding device being configured to form a package by winding a yarn onto a bobbin attached to the bobbin holder; a plurality of godet rollers arranged above the yarn winding device, and configured to take

up a yarn discharged from a spinning machine, draw the yarn, and then feed the yarn to the yarn winding device; and a working platform used for performing a yarn threading operation onto at least one of the plurality of godet rollers, the working platform being not shared with another spun yarn take-up apparatus. The plurality of godet rollers have rotation axes thereof extending in parallel with an axial direction of the winding spindle. The working platform is configured to selectively take an operation posture and a retracted posture. The working platform taking the operation posture is located on a leading end side of the bobbin holder relative to the bobbin holder with respect to the axial direction of the winding spindle. The operation posture is taken when the yarn threading operation is performed. The working platform taking the retracted posture is distant from the bobbin holder.

[0010] In the first invention, the working platform can selectively take either one of the operation posture and the retracted posture. Accordingly, putting the working platform into the operation posture allows the yarn threading operation onto the godet rollers to be performed by using the working platform, while putting the working platform into the retracted posture can prevent the working platform from being an obstruction in attachment and removal of the bobbin.

[0011] A second invention provides a spun yarn take-up apparatus that is the spun yarn take-up apparatus according to the first invention, in which: when the working platform takes the operation posture, the working platform overlaps the package with respect to an orthogonal plane orthogonal to the axial direction of the winding spindle; and when the working platform takes the retracted posture, the working platform does not overlap the package with respect to the orthogonal plane.

[0012] The second invention exerts the following effect. That is, in a case where the working platform taking the operation posture overlaps the package with respect to the orthogonal plane, the working platform may be an obstruction particularly in attachment and removal of the bobbin to and from the bobbin holder. In such a case, however, putting the working platform into the retracted posture can prevent the working platform from being an obstruction in attachment and removal of the bobbin to and from the bobbin holder.

[0013] A third invention provides a spun yarn take-up apparatus that is the spun yarn take-up apparatus according to the first or second invention, in which: the working platform includes a footboard swingably supported on a swing shaft extending in parallel with the axial direction of the winding spindle, the swing shaft being arranged in a position that is deviated from the bobbin holder with respect to an orthogonal plane orthogonal to the axial direction of the winding spindle; when the operation posture is taken, the footboard is arranged to extend in a horizontal direction; and when the retracted posture is taken, the footboard is arranged to be inclined relative to a horizontal plane so that a horizontal length of the footboard with respect to the orthogonal plane is shorter than

when the operation posture is taken.

[0014] In the third invention, the horizontal length of the working platform with respect to the orthogonal plane is shorter in the retracted posture than in the operation posture. Accordingly, enabling the working platform to selectively take either one of the operation posture and the retracted posture can suppress a size increase in the spun yarn take-up apparatus with respect to the horizontal direction within the orthogonal plane.

[0015] A fourth invention provides a spun yarn take-up apparatus that is the spun yarn take-up apparatus according to the third invention, further including: a storage for storing the working platform, the storage being provided in a position deviated from the bobbin holder in a direction within the orthogonal plane; and a slidable component having the swing shaft provided thereon, the slidable component being configured to move in the axial direction of the winding spindle and thereby allow a portion thereof to which the swing shaft is attached to enter and exit the storage. The working platform is able to be stored into the storage by, under a state where the working platform takes the retracted posture, the slidable component being moved in the axial direction of the winding spindle until the portion to which the swing shaft is attached is received into the storage.

[0016] In the fourth invention, the working platform can be stored in the storage that is provided in the position deviated from the bobbin holder in the direction within the orthogonal plane. Additionally, the working platform is stored in the storage while taking the retracted posture in which the horizontal length of the working platform with respect to the orthogonal plane is shortened. Therefore, the horizontal length (width) of the storage with respect to the orthogonal plane is not so long. Accordingly, providing the storage can suppress a size increase in the spun yarn take-up apparatus.

[0017] A fifth invention provides a spun yarn take-up apparatus that is the spun yarn take-up apparatus according to the fourth invention, in which a wall of the storage on the bobbin holder side with respect to the orthogonal plane extends farther to the leading end side of the bobbin holder with respect to the axial direction of the winding spindle than the bobbin holder does.

[0018] In the fifth invention, the wall of the storage on the bobbin holder side with respect to the orthogonal plane extends further to the leading end side of the bobbin holder with respect to the axial direction of the winding spindle than the bobbin holder does. Accordingly, at a time of pulling out the working platform from the storage, until a portion of the slidable component to which the working platform is attached comes to a position farther to the leading end side of the bobbin holder in the axial direction of the winding spindle than the bobbin holder does, the footboard is not swingable beyond the wall of the storage toward the operation posture (toward the side closer to the bobbin holder). This can prevent the working platform from interfering with the bobbin holder in the course of the pull-out of the working platform from the

storage into the operation posture.

[0019] In the present invention, the working platform can selectively take either one of the operation posture and the retracted posture. Accordingly, putting the working platform into the operation posture allows the yarn threading operation onto each roller to be performed by using the working platform, while putting the working platform into the retracted posture can prevent the working platform from being an obstruction in attachment and removal of the bobbin.

These and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. 1 is a diagram illustrating an arrangement of spun yarn take-up apparatuses according to the present invention;

FIG. 2 is a view of the spun yarn take-up apparatus as seen from the leading end side of a winding spindle with respect to the axial direction thereof;

FIG. 3 is a view of the spun yarn take-up apparatus of FIG. 2 as seen along the arrow III;

FIG. 4 is a view corresponding to FIG. 3, showing a state where a slidable component is pulled out from a storage;

FIG. 5 is a view corresponding to FIG. 2, showing a state where a working platform takes an operation posture;

FIG. 6 is a view corresponding to FIG. 3, showing the state where the working platform takes the operation posture;

FIG. 7A is a perspective view of a working platform unit, illustrating the state shown in FIGS. 2 and 3;

FIG. 7B is a perspective view of the working platform unit, illustrating the state shown in FIG. 4;

FIG. 7C is a perspective view of the working platform unit, illustrating the state shown in FIGS. 5 and 6; and

FIG. 8 is a view of a spun yarn take-up apparatus according to one modification as seen from the leading end side of the winding spindle with respect to the axial direction thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] In the following, a preferred embodiment of the present invention will be described.

[0022] As shown in FIG. 1, a spun yarn take-up machine 1 (spun yarn take-up apparatus) according to the present embodiment is configured such that, in order to achieve an effective arrangement of a plurality of spun yarn take-up machines 1 within a limited space under consideration of, for example, the arrangement of a plurality of spinnerets that spin out a plurality of yarns Y in

spinning machines 2 (see FIG. 2) located upstream of (i.e., above) the spun yarn take-up machines 1 with respect to a yarn running direction and the fact that attachment and removal of a plurality of bobbins B to and from bobbin holders 7 which will be described later are performed from the leading end side of the bobbin holders 7 that are cantilevered; a plurality of spun yarn take-up machines 1 are aligned in an alignment direction orthogonal to the axes of the bobbin holders 7 which will be described later (in the direction of an orthogonal plane that is horizontal and orthogonal to the axes of the bobbin holders 7) in a plan view, and a working space S where an operator performs operations is ensured on the leading end side of the bobbin holders 7.

[0023] As shown in FIGS. 2 to 6, each of the spun yarn take-up machines 1 is configured such that the plurality of yarns Y that are spun out and serially supplied from the spinning machine 2 located above the spun yarn take-up machine 1 are fed to a yarn winding device 3 located in a lower part of the spun yarn take-up machine 1 through godet rollers 21 to 24 and guide rollers 11, 12, 17, and 18 of a roller unit 4 which will be described later, so that the plurality of yarns Y are wound in the yarn winding device 3. In states shown in FIGS. 2 to 6, a door 26b of a thermal insulation box 26 which will be described later is opened.

[0024] The yarn winding device 3 is arranged below the spinning machine 2. The yarn winding device 3 forms a plurality of packages P by winding, onto the plurality of bobbins B, the plurality of yarns Y supplied from the spinning machines 2 through the godet rollers 21 to 24 and the four guide rollers 11, 12, 17, and 18.

[0025] The yarn winding device 3 includes two winding units 3a and 3b. Each of the winding units 3a and 3b includes a main body frame 5, a disc-shaped turret 6, two bobbin holders 7, traverse guides 8, a contact roller 9, and the like. The disc-shaped turret 6 is rotatably provided on the main body frame 5. The two bobbin holders 7 are cantilevered by the turret 6, and their winding spindles extend in a horizontal direction. To the bobbin holder 7, the plurality of bobbins B are attached in tandem along the axial direction of the winding spindle. The traverse guides 8 traverse the yarns Y. The contact roller 9 is vertically movable relative to the main body frame 5, and configured to move toward and away from the bobbins B attached to the bobbin holder 7. In the following description, the axial direction of the winding spindle will be referred to as a winding axis direction, the leading end side of the bobbin holder 7 with respect to the winding axis direction will be simply referred to as the leading end side in the winding axis direction, and the base end side of the bobbin holder 7 with respect to the winding axis direction will be simply referred to as the base end side in the winding axis direction.

[0026] Each of the winding units 3a and 3b is configured such that the bobbin holder 7 is driven in rotation by a motor (not shown) to thereby cause a rotation of the plurality of bobbins B attached to the bobbin holder 7,

thus winding the plurality of yarns Y onto the plurality of rotating bobbins B, respectively. At a time when each of the yarns Y is wound onto the bobbin B, each of the traverse guides 8 arranged above each of the plurality of bobbins B traverses the yarn Y in the axial direction of the bobbin B about a fulcrum guide 13 which will be described later.

[0027] The yarn Y traversed about the fulcrum guide 13 by the traverse guide 8 is wound onto the bobbin B, to form the package P. At this stage, when the yarn is wound onto the bobbin B, the contact roller 9 is brought into contact with an outer circumference of the package P, and rotated while applying a predetermined contact pressure thereto, for shaping of the package P. After the plurality of packages P attached to the bobbin holder 7 reach full winding, the packages P are pushed from the base end side to the leading end side of the bobbin holder 7 by a pusher (not shown), and eventually removed from the bobbin holder 7 from the leading end side thereof.

[0028] The roller unit 4 includes a frame 14, a thermal insulation box 26, godet rollers 21 to 24, four guide rollers 11, 12, 17, and 18, a plurality of fulcrum guides 13, a working platform unit 16, and the like.

[0029] The frame 14 is a frame having a frame-like shape arranged at an end portion of the yarn winding device 3 on the leading end side in the winding axis direction. The frame 14 includes two pillars 14a and a connecting portion 14b. The two pillars 14a each extending in the vertical direction are arranged on both sides of the yarn winding device 3 with respect to the alignment direction. The connecting portion 14b extends in the alignment direction and connects upper end portions of the two pillars 14a to each other.

[0030] The thermal insulation box 26 is a substantially rectangular parallelepiped box made of a thermal insulation material. The thermal insulation box 26 is fixed to the pillar 14a shown left hand in FIG. 2 or to the connecting portion 14b. The thermal insulation box 26 has a door 26b that is openable to the working space S side. When the door 26b is opened, an internal space 26a of the thermal insulation box 26 is exposed to the working space S side.

[0031] The godet rollers 21 to 24 are provided in the internal space 26a of the thermal insulation box 26, and arranged in the mentioned order from the upstream in the yarn running direction.

[0032] The godet roller 21 is arranged almost immediately below the spinning machine 2. The godet roller 22 is arranged in a position above the godet roller 21 and deviated (to the left side in FIG. 2) from the godet roller 21 with respect to the alignment direction. The godet roller 23 is arranged below the godet roller 22 and in a position lower than the godet roller 21. The godet roller 24 is arranged in a position above the godet roller 23 and deviated (to the right side in FIG. 2) from the godet roller 23 with respect to the alignment direction. The position of the godet roller 24 is lower than the positions of the godet rollers 21 and 22.

[0033] The godet rollers 21 to 24 are drive rollers cantilevered by a frame (not shown) at their ends on the side opposite to the door 26b. The plurality of yarns Y fed from the spinning machine 2 are taken up by the most upstream godet roller 21. At this stage, through a slit 28 formed in an upper wall of the thermal insulation box 26, the yarns Y fed from the spinning machine 2 are introduced into the internal space 26a of the thermal insulation box 26, and taken up by the godet roller 21.

[0034] The plurality of yarns Y taken up by the godet roller 21 are wound on the godet rollers 21 to 24 sequentially from the upstream, with winding angles of less than or equal to 360 degrees. When the godet rollers 21 to 24 are driven in rotation by a motor (not shown), the plurality of yarns Y are fed downstream in the running direction. At this stage, in general, the godet rollers 21 to 24 are rotated in such a manner that a downstream godet roller is rotated at a higher peripheral speed than an upstream godet roller. For example, the two godet rollers 21 and 22 on the upstream side are rotated substantially at the same peripheral speed, while the two godet rollers 23 and 24 on the downstream side are rotated substantially at the same peripheral speed that is higher than the peripheral speed of the godet rollers 21 and 22. Thereby, the plurality of yarns Y are drawn due to a difference in the peripheral speeds of the rollers.

[0035] The godet rollers 21 to 24 are also heating rollers having heaters provided therein, and hence the yarns Y wound on the godet rollers 21 to 24 are preheated before being drawn and thermoset after being drawn. Since the godet rollers 21 to 24 are arranged in the internal space 26a of the thermal insulation box 26, closing the door 26b prevents heat generated by the heaters from leaking to the outside of the thermal insulation box 26. Here, depending on the type of a yarn to be produced, part or all of the godet rollers 21 to 24 may be unheated by not driving the heaters.

[0036] The guide rollers 11, 12, 17, and 18 are drive rollers arranged above the yarn winding device 3 and configured to be driven in rotation by a motor (not shown). The guide rollers 11, 12, 17, and 18 are provided outside the thermal insulation box 26.

[0037] The guide roller 11 is arranged in parallel with the winding axis direction, and located almost immediately below the most downstream godet roller 24. The guide roller 11 is rotatably supported on the frame 14. The guide roller 12 is arranged in parallel with the winding axis direction, and located in a position above the guide roller 11 and deviated (to the right side in FIG. 2) from the guide roller 11 with respect to the alignment direction. The guide roller 12 is rotatably supported on the frame 14. The guide roller 17 is located below the guide roller 12, and arranged perpendicular to the godet rollers 21 to 24 and the guide rollers 11 and 12, that is, perpendicular to the winding axis direction.

[0038] The guide roller 18 is arranged in parallel with the guide roller 17, that is, perpendicular to the winding axis direction. The guide roller 18 is attached to a guide

rail 19 that extends downward from a position almost immediately above a substantially central portion of the bobbin holder 7 with respect to the axial direction thereof toward the leading end side of the bobbin holder 7. As indicated by the arrow A in FIG. 3, the guide roller 18 is movable on the guide rail 19.

[0039] At a time of yarn winding, the guide roller 18 is moved to a position that is between the two winding units 3a and 3b with respect to the alignment direction and that is almost immediately above a position coincident with the substantially central portion of the bobbin holder 7 with respect to the winding axis direction, as indicated by the solid line in FIGS. 2 and 3. On the other hand, at a time of performing a yarn threading operation onto the rollers, the guide roller 18 is moved to a position near the guide roller 17 and closer to the leading end side in the winding axis direction than at a time of yarn winding, as indicated by the dashed line in FIGS. 2 and 3. This allows yarn threading to be performed from the leading end side of the bobbin holder 7 in the winding axis direction.

[0040] The guide roller 17 and the guide rail 19 having the guide roller 18 attached thereto described above are attached to an apparatus frame (not shown).

[0041] The guide roller 11 takes up the yarns Y fed from the godet roller 24, and then feeds these yarns Y to the guide roller 12. At this stage, through a slit 29 formed in a side wall of the thermal insulation box 26, the yarns Y fed from the guide roller 11 arranged in the internal space 26a of the thermal insulation box 26 are supplied to the guide roller 12 arranged outside the thermal insulation box 26. The guide roller 12 takes up the yarns Y fed from the guide roller 11, and then feeds these yarns Y to the guide roller 17. The guide roller 17 feeds the yarns Y to the guide roller 18. The guide roller 18 takes up the yarns Y, and then feeds these yarns Y to the plurality of fulcrum guides 13.

[0042] The plurality of fulcrum guides 13 are provided below the guide roller 18 and above the plurality of traverse guides 8, and arranged immediately above the plurality of traverse guides 8 and the plurality of bobbins B attached to the bobbin holder 7. The plurality of fulcrum guides 13 are aligned along the winding axis direction at the same intervals as those of the plurality of bobbins B.

[0043] The working platform unit 16 includes a storage 31, a slidable component 32, a working platform 33, and the like. The storage 31 is provided in a position deviated (to the left side in FIG. 2) from the yarn winding device 3 including the bobbin holders 7 with respect to the alignment direction. The storage 31 is fixed to a portion of the pillar 14a shown lefthand in FIG. 2, almost at the same height as the yarn winding device 3. The storage 31 has a storage space 31a that extends in the winding axis direction. A wall 31b of the storage 31 on the bobbin holder 7 side extends farther to the leading end side in the winding axis direction than the bobbin holder 7 does.

[0044] The slidable component 32 is a substantially rectangular plate-like member elongated in the winding axis direction. The slidable component 32 is arranged

within the storage space 31a, and movable along the storage space 31a in the winding axis direction. This allows a leading end portion of the slidable component 32 in the winding axis direction to enter and exit the storage space 31a.

[0045] The working platform 33 includes two footboards 41 and 42 and three leg portions 43, 44, and 45. The footboard 41 is formed of a substantially rectangular plate-like member whose both end portions with respect to the winding axis direction are bent toward the same direction at substantially 90 degrees. The footboard 41 is swingably supported on a swing shaft 32a extending in the winding axis direction. The swing shaft 32a is provided in an upper end region of a surface of the slidable component 32 facing the yarn winding device 3 side.

[0046] Similarly to the footboard 41, the footboard 42 is formed of a substantially rectangular plate-like member whose both end portions with respect to the winding axis direction are bent toward the same direction as the direction in which both end portions of the footboard 41 are bent. The footboard 42 is swingably supported on a swing shaft 32b extending in the winding axis direction. The swing axis 32b is provided in a lower end region of the surface of the slidable component 32 facing the yarn winding device 3 side. The region where the swing shaft 32b is provided is on the leading end side relative to the footboard 41.

[0047] The leg portion 43 supports an end portion of the footboard 41 on the base end side with respect to the winding axis direction. The leg portion 43 is, at the upper end thereof, swingably supported on a swing shaft 41a extending in the winding axis direction. The swing shaft 41a is provided in an end portion of the footboard 41 on the side opposite to the side where the swing shaft 32a is provided.

[0048] The leg portion 44 supports an end portion of the footboard 41 on the leading end side with respect to the winding axis direction and an end portion of the footboard 42 on the base end side with respect to the winding axis direction. The leg portion 44 is, at the upper end thereof, swingably supported on the swing shaft 41a mentioned above, and at a substantially central portion thereof, swingably supported on a swing shaft 42a extending in the winding axis direction. The swing shaft 42a is provided in an end portion of the footboard 42 on the side opposite to the side where the swing shaft 32b is provided.

[0049] The leg portion 45 supports an end portion of the footboard 42 on the leading end side with respect to the winding axis direction. The leg portion 45 is, at the upper end thereof, swingably supported on the swing shaft 42a mentioned above.

[0050] The leg portion 43 and the leg portion 44 are connected to each other by a single connection member 46. The leg portion 44 and the leg portion 45 are connected to each other by two connection members 46. As a result, while the leg portions 43 to 45 are swinging, the positional relationship among them is maintained.

[0051] In the working platform 33 having the above-described configuration, the footboards 41 and 42 and the leg portions 43 to 45 are swingable to enable the working platform 33 to selectively take a posture (operation posture) in which the footboards 41 and 42 extend in the horizontal direction while the leg portions 43 to 45 support the end portions of the footboards 41 and 42 on the side opposite to the side where the swing axes 32a and 32b are provided as shown in FIGS. 5, 6, and 7C, and a posture (retracted posture) in which the footboards 41 and 42 extend in the vertical direction (being inclined relative to a horizontal plane) while the leg portions 43 to 45 extend downward from portions thereof supported on the swing axes 41a and 42a as shown in FIGS. 4 and 7B.

[0052] Stoppers 32c are arranged beneath the swing axes 32a and 32b of the slidable component 32, respectively, to prevent the footboards 41 and 42 from swinging beyond their positions in the operation posture when they swing in a direction (the clockwise direction in FIG. 5) away from their positions in the retracted posture.

[0053] A notch 42b is formed in the end portion of the footboard 42 on the side opposite to the side where the footboard 42 is supported on the swing shaft 32b. When the above-mentioned operation posture is taken, the leg portion 44 extends vertically through the footboard 42 while passing through the notch 42b.

[0054] A notch 42c is formed in the bent end portion of the footboard 42 on the base end side in the winding axis direction. When the above-mentioned retracted posture is taken, the lower one of the two connection members 46 connecting the leg portion 43 and the leg portion 44 to each other is placed in the notch 42c. This prevents occurrence of interference of this connection member 46 with the footboard 42.

[0055] When the working platform 33 takes the operation posture, the footboards 41 and 42 and the leg portions 43 to 45 overlap the packages P with respect to the alignment direction. When the working platform 33 takes the retracted posture, the working platform 33 does not overlap the bobbin holder 7 with respect to the alignment direction and locates within a range where the storage space 31a of the storage 31 is arranged with respect to the alignment direction.

[0056] Next, operations of the slidable component 32 and the working platform 33 of the working platform unit 16 will be described. At a time of not performing the yarn threading operation onto the godet rollers 21 to 24, for example, at a time of winding the yarns Y, as shown in FIGS. 2, 3, and 7A, the working platform 33 takes the retracted posture, so that the working platform 33 as well as the slidable component 32 is stored in the storage space 31a of the storage 31.

[0057] At a time of performing the yarn threading operation onto the godet rollers 21 to 24 and the guide rollers 11, 12, 17, and 18, firstly, the leading end portion of the slidable component 32 is pulled out together with the working platform 33 from the storage space 31a to the

working space S, as shown in FIGS. 4 and 7B. Then, as shown in FIGS. 5, 6, and 7C, the footboards 41 and 42 and the leg portions 43 to 45 are swung to put the working platform 33 into the operation posture. Then, for performing the yarn threading operation, an operator W climbs up, one by one, upper surfaces of the footboards 42 and 41 of the working platform 33 taking the operation posture. Then, the operator W, resting on the upper surface of the footboard 41, performs the yarn threading operation.

[0058] After the yarn threading operation is completed, the footboards 41 and 42 and the leg portions 43 to 45 are swung in the manner opposite to that described above. Thereby, the working platform 33 taking the operation posture as shown in FIGS. 5, 6, and 7C is put into the retracted posture as shown in FIGS. 4 and 7B, and then the slidable component 32 is moved toward the base end side in the winding axis direction. As a result, as shown in FIGS. 2, 3, and 7A, the slidable component 32 and the working platform 33 are stored in the storage space 31a of the storage 31.

[0059] Here, it is not necessary that the operator W is constantly on the working platform during the whole of the yarn threading operation performed onto the godet rollers 21 to 24 and the guide rollers 11, 12, 17, and 18. Instead, it may be acceptable that, when performing the yarn threading operation onto part of the rollers, the operator W climbs down the working platform 33 and stands on a floor, as appropriate.

[0060] The above-described embodiment enables the yarn threading operation onto the godet rollers 21 to 24 and the guide rollers 11, 12, 17, and 18 to be performed in the working space S which is intended for attachment and removal of the bobbins B to and from the bobbin holder 7. Therefore, a space intended for the yarn threading operation does not have to be ensured between neighboring spun yarn take-up machines 1. Accordingly, a space required for installation of the spun yarn take-up machine 1 is reduced.

[0061] In performing the yarn threading operation onto the godet rollers 21 to 24 and the guide rollers 11, 12, 17, and 18, yarn threading is also performed onto, for example, the plurality of fulcrum guides 13 and the plurality of traverse guides 8 aligned in the winding axis direction. The yarn threading onto them can be automatically performed by using a well-known yarn threading device (for example, see Japanese Patent Application Laid-Open Nos. 2008-297078 and 2011-102174).

[0062] At this stage, unlike the disclosure of the Japanese Patent Application Laid-Open No. 2011-162927 and the like, the yarns Y threaded onto the godet rollers 21 to 24 do not run back and forth between the rollers. Therefore, a range where the yarns Y are threaded is not so long in the axial direction of the godet rollers 21 to 24. Thus, the operator W on the working platform 33 (footboard 41) can readily perform the yarn threading operation.

[0063] In addition, the working platform 33 used for the

yarn threading operation is able to selectively take either one of the operation posture and the retracted posture described above. Accordingly, putting the working platform 33 into the operation posture allows the yarn threading operation to be performed, while putting the working platform 33 into the retracted posture can prevent the working platform 33 from being an obstruction in attachment and removal of the bobbins B to and from the bobbin holder 7.

[0064] Moreover, the working platform 33 is provided individually for each of the spun yarn take-up machines 1. This makes it possible to simultaneously perform the yarn threading operation in the plurality of spun yarn take-up machines 1.

[0065] Furthermore, in the present embodiment, when the working platform 33 takes the operation posture, the footboards 41 and 42 extend in the horizontal direction, while when the working platform 33 takes the retracted posture, the footboards 41 and 42 extend in the vertical direction and therefore the length thereof with respect to the alignment direction is smaller than in the operation posture. Accordingly, enabling the working platform 33 to selectively take either one of the operation posture and the retracted posture can suppress a size increase in the spun yarn take-up machine 1 with respect to the alignment direction.

[0066] Furthermore, in the present embodiment, at a time of not performing the yarn threading operation, for example, at a time of yarn winding, the working platform 33 can be stored in the storage space 31a of the storage 31 which is provided in the position deviated from the yarn winding device 3 in the alignment direction. Additionally, as described above, the length of the working platform 33 taking the retracted posture is short with respect to the alignment direction. Therefore, providing the storage 31 in the position deviated from the yarn winding device 3 in the alignment direction can suppress a size increase in the spun yarn take-up machine 1.

[0067] Furthermore, the wall 31b of the storage 31 on the yarn winding device 3 side extends farther to the leading end side in the winding axis direction than the bobbin holder 7 does. Accordingly, at a time of pulling out the slidable component 32 and the working platform 33 from the storage 31, until the working platform 33 comes to a position farther to the leading end side in the winding axis direction than the bobbin holder 7 does, the vertically extending footboards 41 and 42 of the working platform 33 taking the retracted posture is restricted from falling over into a horizontal state by the wall 31b of the storage 31. This can prevent the footboards 41 and 42 from falling over and interfering with the bobbin holder 7 in the course of the pull-out of the slidable component 32 and the working platform 33.

[0068] Next, various modifications of the present embodiment will be described. Note that the same configurations as those of the present embodiment may not be described as appropriate.

[0069] Although in the above-described embodiment

the storage 31 and the slidable component 32 are provided individually for each of the spun yarn take-up machines 1, this is not limiting. For example, in one modification, as shown in FIG. 8, two neighboring spun yarn take-up machines 1 are configured symmetrically to each other in the alignment direction, and the storage 31 and the slidable component 32 are arranged between the two spun yarn take-up machines 1 and fixed to the pillars 14a of the spun yarn take-up machines 1. The same working platform 33 as the above-described one is provided to each of the surfaces of the slidable component 32 with respect to the alignment direction.

[0070] In this case, one storage 31 and one slidable component 32 are shared between two spun yarn take-up machines 1, which can reduce the number of component parts of the apparatus. In this case as well, the working platform 33 is provided individually for each of the spun yarn take-up machines 1, and therefore it is possible to simultaneously perform the yarn threading operation in the plurality of spun yarn take-up machines 1.

[0071] In the above-described embodiment, the wall 31b of the storage 31 on the yarn winding device 3 side extends farther to the leading end side in the winding axis direction than the bobbin holder 7 does. However, this is not limiting, and it may be acceptable that the wall 31b extends merely to a position located on the base end side in the winding axis direction relative to the leading end of the bobbin holder 7. Even in such a case, occurrence of interference of the working platform 33 with the bobbin holder 7 can be prevented by, for example, enabling the working platform 33 to be fixed to the slidable component 32 when the retracted posture is taken and, after the pull-out of the slidable component 32 is completed, unfixing the working platform 33 so that the working platform 33 takes the operation posture.

[0072] In the above-described embodiment, the slidable component 32 having the working platform 33 attached thereto is moved in the winding axis direction, and thereby the working platform 33 is storable in the storage space 31a of the storage 31. However, the working platform 33 may not be storable. For example, in a possible configuration, a plate-like member fixed to the frame 14 is arranged in the same position as the position where the slidable component 32 locates when pulled out from the storage 31 (that is, in the same position as the position of the slidable component 32 shown in FIGS. 4 and 7B), and the working platform 33 is attached to this plate-like member.

[0073] In such a case as well, putting the working platform 33 into the retracted posture avoids overlap between the working platform 33 and the packages P with respect to the winding axis direction, and therefore can prevent the working platform 33 from being an obstruction in attachment and removal of the bobbins B to and from the bobbin holder 7. In this case, for example, enabling the working platform 33 to be fixed to the above-mentioned plate-like member while taking the retracted posture can prevent the footboards 41 and 42 from falling

over and thus putting the working platform 33 into the operation posture at a time of, for example, attaching and removing the bobbins B to and from the bobbin holder 7.

[0074] In the above-described embodiment, the working platform 33 includes the footboards 41 and 42 and the leg portions 43 to 45, and is configured such that the footboards 41 and 42 extend in the horizontal direction when the operation posture is taken while the footboards 41 and 42 extend in the vertical direction when the retracted posture is taken. However, this is not limiting. For example, it may be acceptable to configure the working platform 33 such that, when the retracted posture is taken, the footboards 41 and 42 are inclined relative to both a horizontal plane and the vertical direction.

[0075] Moreover, such a configuration that the orientation of the footboards 41 and 42 changes depending on whether the working platform 33 takes the operation posture or the retracted posture is not limiting, either. For example, the working platform 33 may be configured to be movable in the alignment direction while keeping a state where the footboards 41 and 42 extend in the horizontal direction.

[0076] In the above-described embodiment, the working platform 33 overlaps the packages P with respect to the alignment direction when the working platform 33 takes the operation posture. However, this is not limiting. The working platform 33 may be located in a position deviated from the packages P with respect to the alignment direction when the working platform 33 takes the operation posture.

[0077] In such a case as well, the working platform 33, when taking the operation posture, is located in a position that is on the leading end side in the winding axis direction relative to the bobbin holder 7 and closer to the bobbin holder 7 with respect to the alignment direction. Thus, in a case where the working platform 33 is fixed in the operation posture, the working platform 33 may undesirably obstruct, for example, an operator performing the operation of attaching and removing the bobbins B to and from the bobbin holder 7. Therefore, putting the working platform 33 into the retracted posture can prevent the working platform 33 from being an obstruction in attachment and removal of the bobbins B to and from the bobbin holder 7.

[0078] In the above-described embodiment, when the working platform 33 takes the retracted posture, the working platform 33 is located in a position retracted from its position in the operation posture in the alignment direction. However, this is not limiting. For example, in a possible configuration, a working platform is movable up and down, so that the working platform is vertically retracted from its position in the operation posture by being moved to a position below the packages P such as a position under the floor on which the spun yarn take-up machine 1 is installed, or by being moved to a position above the packages P. In this case, the posture of the working platform located below or above the packages P corresponds to the retracted posture according to the

present invention.

[0079] In the case illustrated in the above-described embodiment, one spun yarn take-up machine 1 includes the yarn winding device 3 having two winding units 3a and 3b. However, the present invention is applicable to a spun yarn take-up apparatus including a yarn winding device having either one of the winding units 3a and 3b or to a spun yarn take-up apparatus including a yarn winding device having three or more winding units.

[0080] Furthermore, instead of providing the winding units 3a and 3b as two separate winding units, they may be provided as a single winding unit by forming their main body frames 5 as one piece or connecting their main body frames 5 into an integrated body. In this case, parts of the component members, such as a driving unit (not shown) for driving the turret 6 and a controller (not shown), may be shared.

While the invention has been described in detail, the foregoing description is in all aspects illustrative and not restrictive. It is understood that numerous other modifications and variations can be devised without departing from the scope of the invention.

Claims

1. A spun yarn take-up apparatus comprising:

a yarn winding device including a bobbin holder that has a winding spindle extending in a horizontal direction and that allows a bobbin to be attached and removed from a leading end of the bobbin holder, the yarn winding device being configured to form a package by winding a yarn onto a bobbin attached to the bobbin holder; a plurality of godet rollers arranged above the yarn winding device, and configured to take up a yarn discharged from a spinning machine, draw the yarn, and then feed the yarn to the yarn winding device; and

a working platform used for performing a yarn threading operation onto at least one of the plurality of godet rollers, the working platform being not shared with another spun yarn take-up apparatus, wherein

the plurality of godet rollers have rotation axes thereof extending in parallel with an axial direction of the winding spindle, and

the working platform is configured to selectively take an operation posture and a retracted posture,

the working platform taking the operation posture being located on a leading end side of the bobbin holder relative to the bobbin holder with respect to the axial direction of the winding spindle, the operation posture being taken when the yarn threading operation is performed, and

the working platform taking the retracted posture being distant from the bobbin holder.

2. The yarn take-up apparatus according to claim 1, wherein
 - when the working platform takes the operation posture, the working platform overlaps the package with respect to an orthogonal plane orthogonal to the axial direction of the winding spindle, and
 - when the working platform takes the retracted posture, the working platform does not overlap the package with respect to the orthogonal plane.
3. The spun yarn take-up apparatus according to claim 1 or 2, wherein
 - the working platform includes a footboard swingably supported on a swing shaft extending in parallel with the axial direction of the winding spindle, the swing shaft being arranged in a position that is deviated from the bobbin holder with respect to an orthogonal plane orthogonal to the axial direction of the winding spindle,
 - when the operation posture is taken, the footboard is arranged to extend in a horizontal direction, and
 - when the retracted posture is taken, the footboard is arranged to be inclined relative to a horizontal plane so that a horizontal length of the footboard with respect to the orthogonal plane is shorter than when the operation posture is taken.
4. The spun yarn take-up apparatus according to claim 3, further comprising:
 - a storage for storing the working platform, the storage being provided in a position deviated from the bobbin holder in a direction within the orthogonal plane; and
 - a slidable component having the swing shaft provided thereon, the slidable component being configured to move in the axial direction of the winding spindle and thereby allow a portion thereof to which the swing shaft is attached to enter and exit the storage,
 - wherein the working platform is able to be stored into the storage by, under a state where the working platform takes the retracted posture, the slidable component being moved in the axial direction of the winding spindle until the portion to which the swing shaft is attached is received into the storage.
5. The spun yarn take-up apparatus according to claim 4, wherein
 - a wall of the storage on the bobbin holder side with respect to the orthogonal plane extends farther to the leading end side of the bobbin holder with respect to the axial direction of the winding spindle than the bobbin holder does.

FIG.1

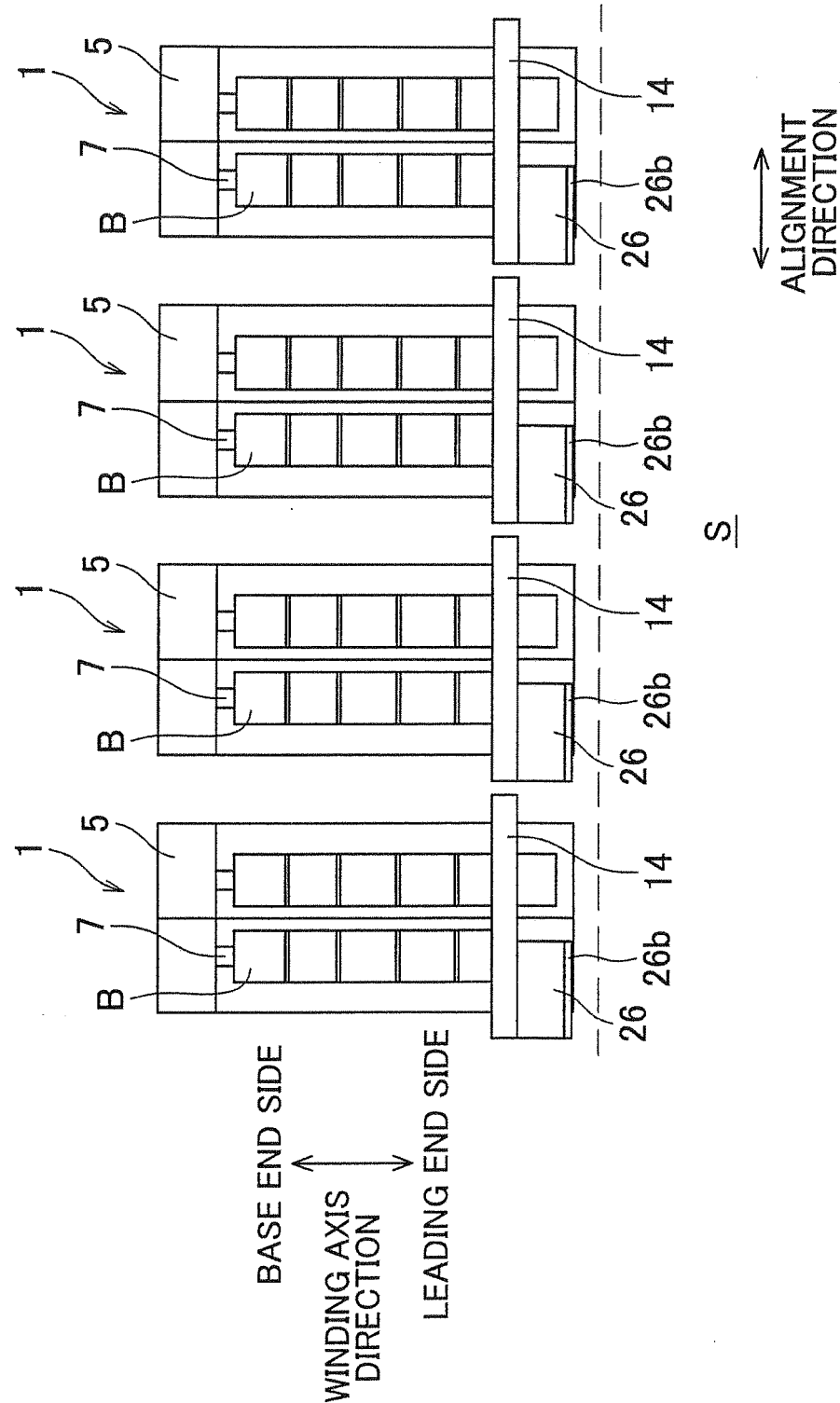


FIG.2

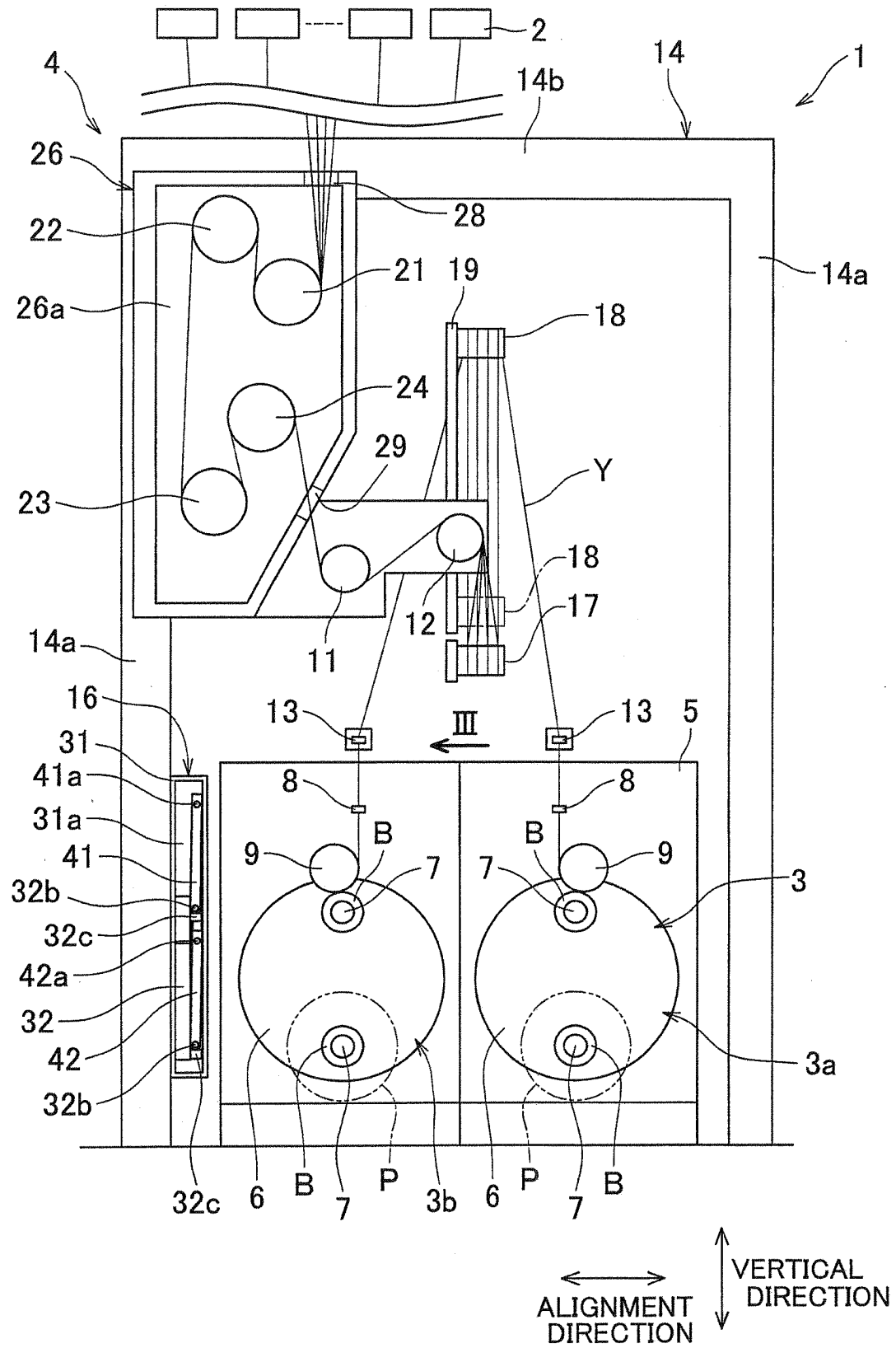


FIG.3

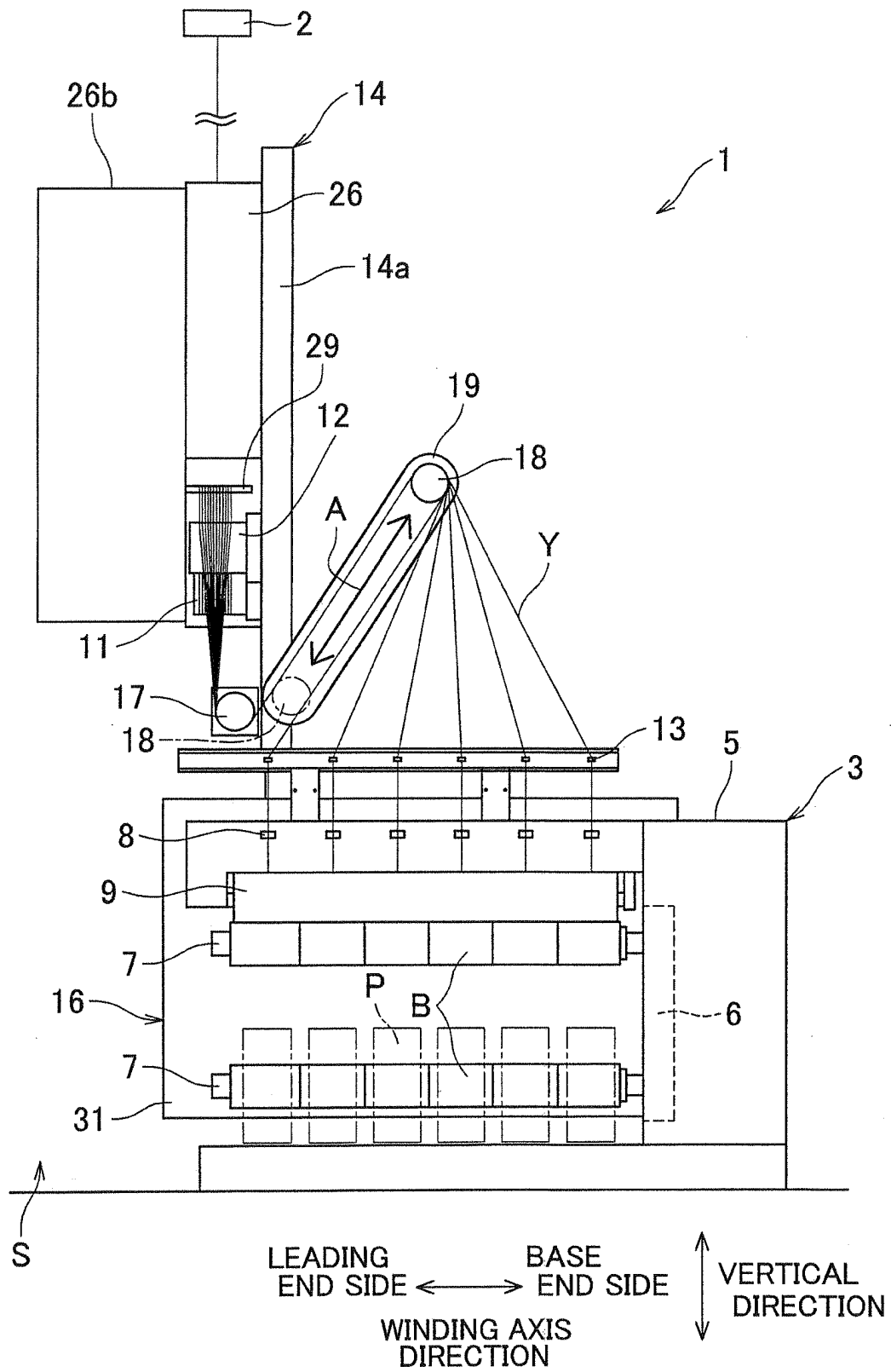


FIG.4

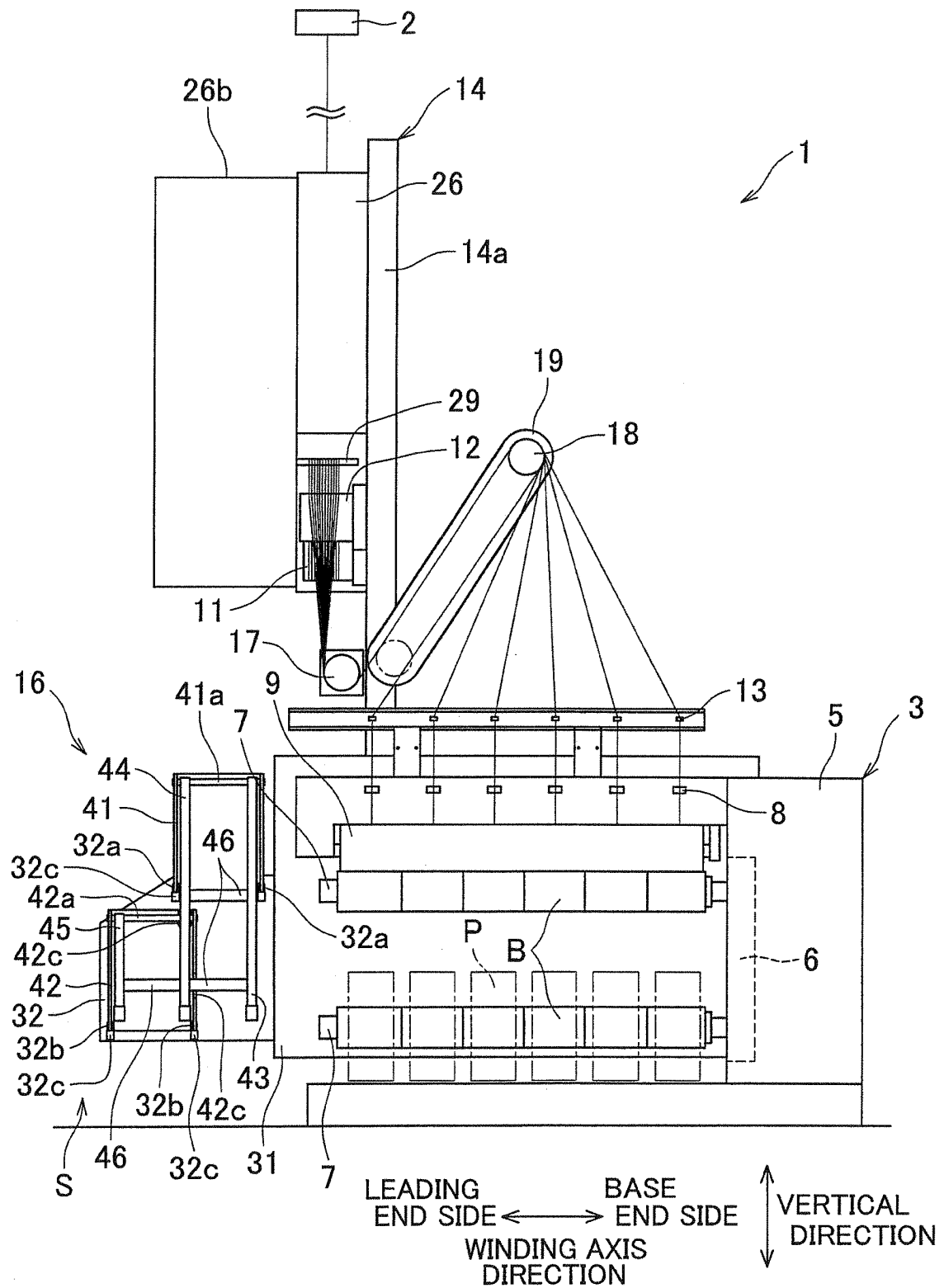


FIG.5

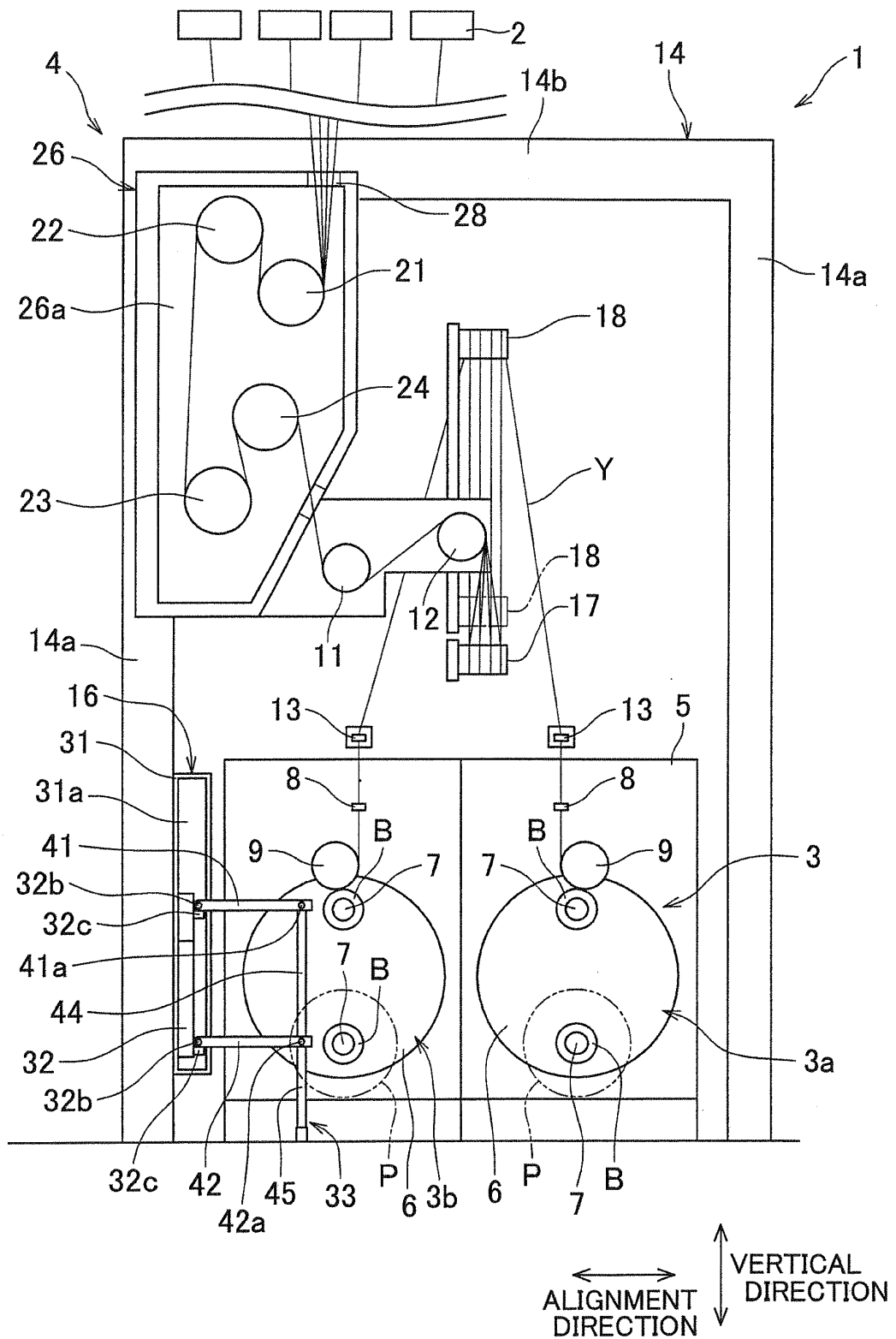


FIG.6

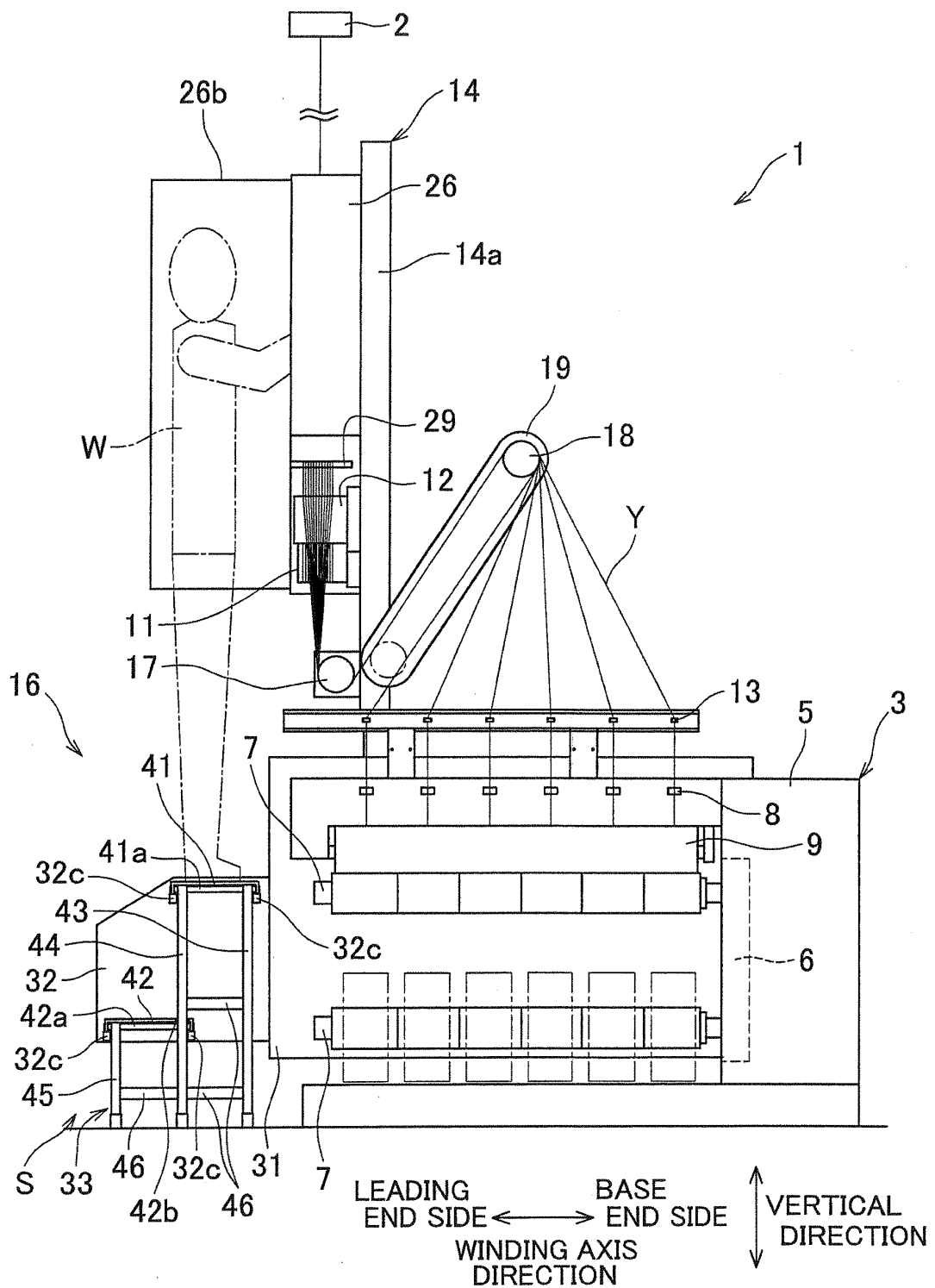


FIG.7A

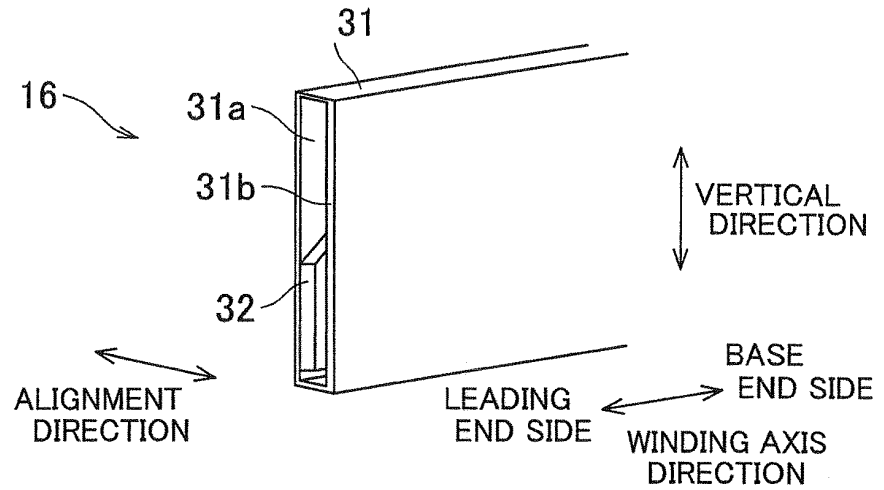


FIG.7B

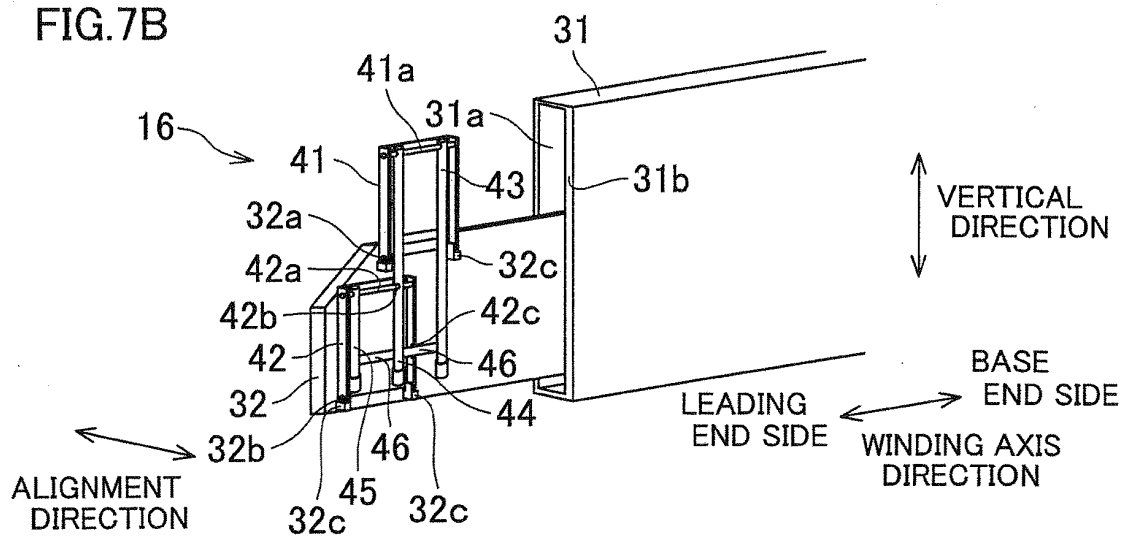


FIG.7C

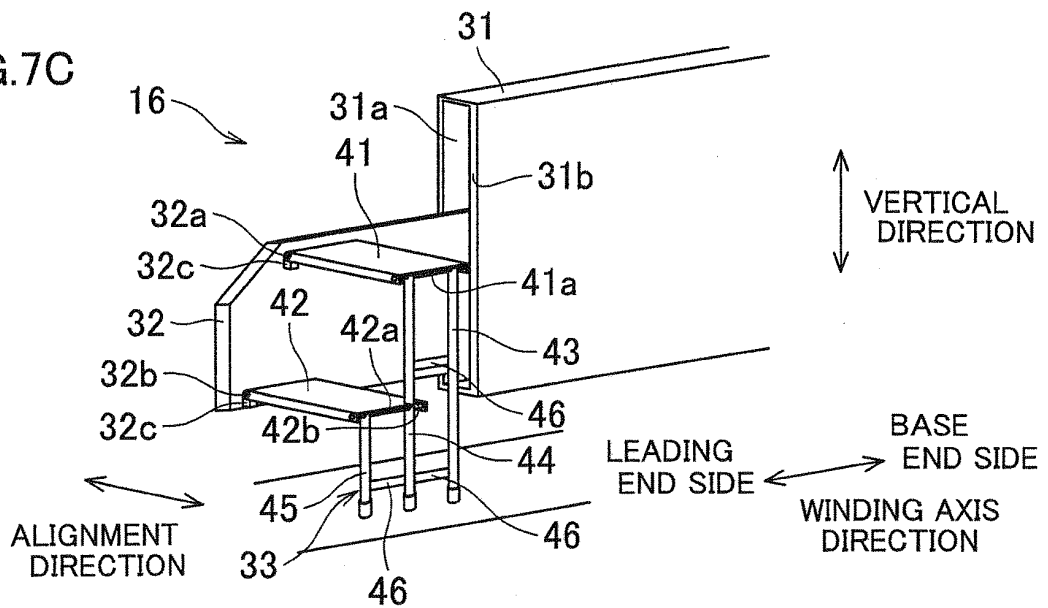
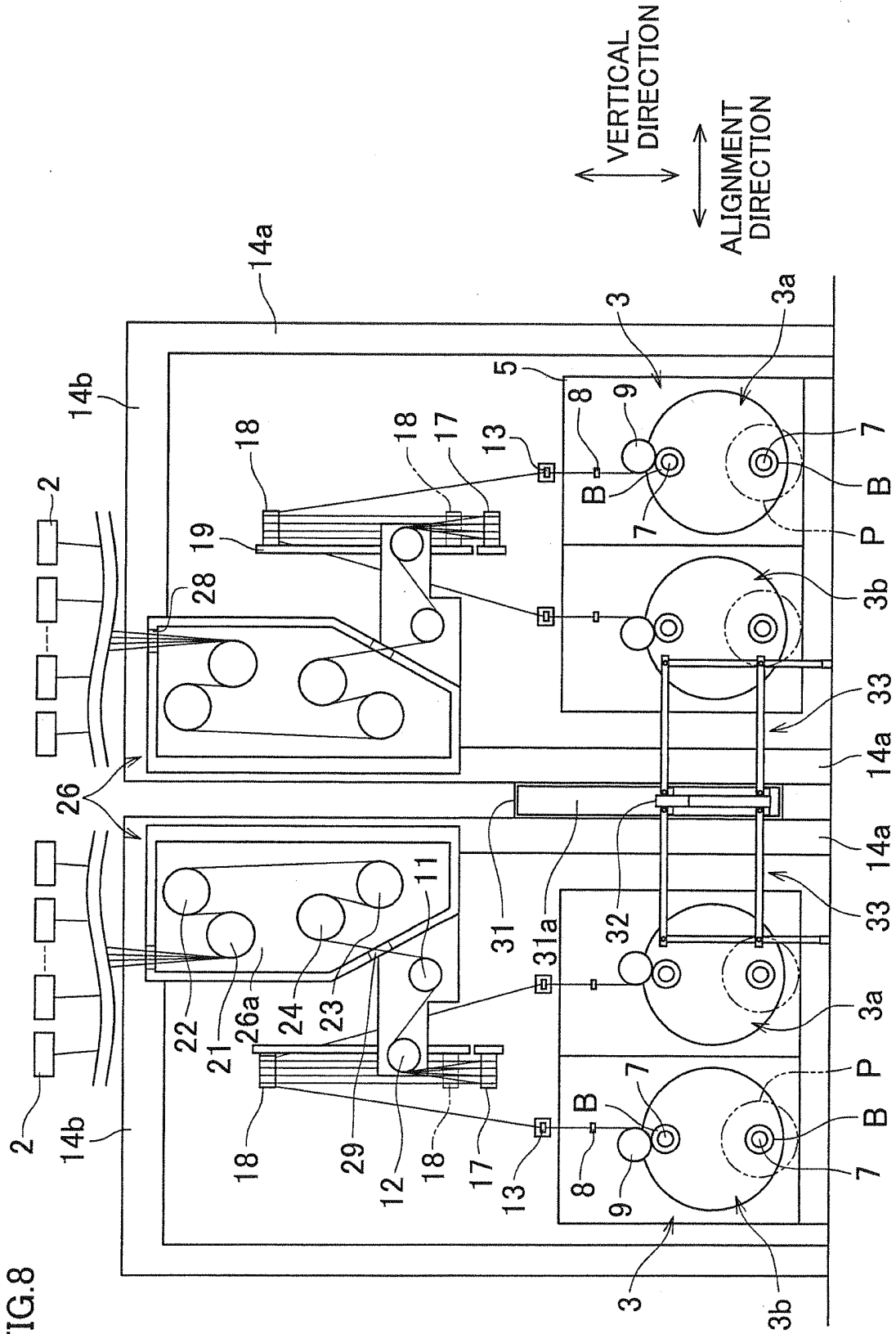


FIG.8



REFERENCES CITED IN THE DESCRIPTION

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