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(54) **YARN WINDING DEVICE, YARN THREADING MEMBER, AND METHOD FOR THREADING YARNS
IN A YARN WINDING DEVICE**

GARNAUFWICKLUNGSVORRICHTUNG, FADENEINFÄDELUNGSELEMENT UND VERFAHREN
ZUM EINFÄDELN EINES FADENS IN DIE GARNAUFWICKLUNGSVORRICHTUNG

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a yarn winding device, a yarn threading member, and a method for threading yarns in the yarn winding device.

[0002] Patent Literature 1 (Japanese Unexamined Patent Publication No. 2015-164875, FIG. 2) discloses a yarn winding device configured to wind yarns spun out from a spinning apparatus located above the yarn winding device. The yarns are respectively wound onto bobbins in the yarn winding device. The yarn winding device includes bobbin holders, yarn guides (yarn fulcrum guides), traverse guides, and the like. The bobbins are attached to each of the bobbin holders so as to be arranged in the axial direction of the bobbin holders. The yarn guides are arranged in the axial direction of the bobbin holders so as to respectively correspond to the bobbins. Yarns forwarded from the spinning apparatus are respectively threaded onto the yarn guides. The yarns threaded onto the yarn guides are traversed by the respective traverse guides with respect to the yarn guides. The traversed yarns are wound around the respective bobbins attached to the bobbin holder as the bobbin holder rotates.

[0003] In the above-described yarn winding device, the yarns forwarded from the spinning apparatus need to be respectively threaded onto the yarn guides before being wound around the bobbins. To thread the yarns onto the yarn guides, the yarn winding device of Patent Literature 1 further includes the following arrangement.

[0004] Below the yarn guides, a guide rail is provided. The guide rail extends in a direction inclined relative to an arrangement direction of the yarn guides, in which the yarn guides are arranged. The guide rail is configured to guide a yarn threading member (yarn threading assisting tool) holding the yarns in a separate state (holding the yarns while separating the yarns from one another).

[0005] In the yarn winding device of Patent Literature 1, yarns are threaded onto the yarn guides in the following manner. First, an operator inserts the yarn threading member to the yarns forwarded from the spinning apparatus, to hold the yarns in the separate state with the yarn threading member. Subsequently, the operator brings an end of the yarn threading member into contact with the guide rail, and moves the yarn threading member along the guide rail toward the operator, while keeping the end of the yarn threading member in contact with the guide rail. Then, the yarn threading member moves along the guide rail in the direction inclined relative to the arrangement direction of the yarn guides. With this, the yarns held by the yarn threading member are sequentially and respectively threaded onto the yarn guides arranged in the arrangement direction.

[0006] In addition to the device of Patent Literature 1, examples of such devices for winding spun yarns also include a device disclosed in Patent Literature 2 (Japa-

nese Patent No. 4074545). The yarn winding device of Patent Literature 2 includes two yarn winding portions each having yarn guides. The two yarn winding portions are arranged left-right symmetrically. Between the two yarn winding portions, there is a yarn path of yarns coming down from a spinning apparatus. The yarn guides of the two yarn winding portions are arranged in two rows. The two rows of the yarn guides are located inward of the two winding portions, close to each other in a direction orthogonal to the arrangement direction of the yarn guides. Yarns spun out from the spinning apparatus are divided into two groups for the two left and right yarn winding portions, to be wound in the yarn winding portions.

SUMMARY OF THE INVENTION

[0007] In the yarn winding device of Patent Literature 1, the yarn threading member is, guided by the guide rail, moved in the predetermined direction inclined at a predetermined angle relative to the arrangement direction. This makes it less likely that the moving direction of the yarn threading member is diverted from the predetermined direction, to reduce errors in yarn threading. In addition, this facilitates the work of yarn threading, and enhances working efficiency.

[0008] When the arrangement of Patent Literature 1 is employed in a yarn winding device as is described in Patent Literature 2 for yarn threading, the device admits of improvement as specified below. That is, if the above arrangement is employed in the yarn winding device having two of yarn winding portions as described in Patent Literature 2, yarns have to be threaded in the following manner: a group of the yarns for one of the yarn winding portions are first threaded by moving the yarn threading member along a guide rail, and then the remaining yarns for the other of the yarn winding portions are threaded in the same way. To simplify the yarn threading process, it is desired to perform the yarn threading operations for the two yarn winding portions in parallel with each other.

[0009] An object of the present invention is to provide a yarn winding device arranged to enable yarn threading operations onto yarn guides of two yarn winding portions to be performed in parallel with each other.

[0010] According to a first aspect of the invention, a yarn winding device includes: two yarn winding portions each including (i) a bobbin holder to which bobbins are attached so that the bobbins are arranged in an axial direction of the bobbin holder, (ii) yarn guides arranged in the axial direction of the bobbin holder so as to respectively correspond to the bobbins, and (iii) a guide rail extending in a direction inclined relative to an arrangement direction of the yarn guides, the two yarn winding portions being aligned in a direction orthogonal to the arrangement direction; and a yarn threading member with which yarns are threaded onto the yarn guides of the two yarn winding portions.

[0011] The guide rails of the two yarn winding portions

are inclined relative to the arrangement direction in opposite directions to each other. The yarn threading member includes: two yarn holding portions provided to respectively correspond to the two yarn winding portions, each of the yarn holding portions configured to hold a half of the yarns in a separate state and to be engaged with the corresponding guide rail in a slidable manner; and a supporting portion supporting the two yarn holding portions so as to allow the yarn holding portions to get close to and away from each other.

[0012] Each of the two yarn winding portions includes: the yarn guides; and the guide rail extending in the direction inclined relative to the arrangement direction of the yarn guides (to the axial direction of the bobbin holder). In the present invention, "inclined relative to the arrangement direction" means that the direction in which the guide rail extends intersects the arrangement direction at an angle less than 90 degrees. The situation where the guide rail extends parallel to the arrangement direction and the situation where the guide rail extends orthogonally to the arrangement direction are excluded. Meanwhile, each of the two yarn holding portions of the yarn threading member is configured to hold the yarns Y in the separate state, which are to be wound in the corresponding yarn winding unit. The two yarn holding portions are supported so that the yarn holding portions are able to get close to and away from each other.

[0013] After the yarns are held by the two yarn holding portions, the yarn holding portions are respectively engaged with the guide rails of the yarn winding portions in a slidable manner. The two guide rails are inclined relative to the arrangement direction in the opposite directions to each other. The yarn threading member holding the yarns is moved in the arrangement direction of the yarn guides. With this movement, the two yarn holding portions move along the guide rails in their respective directions inclined relative to the arrangement direction of the yarn guides while being distanced from each other. This is because the supporting portion supports the two yarn holding portions so as to allow the yarn holding portions to get close to and away from each other. As a result, the yarns held by each yarn holding portion are sequentially threaded onto the yarn guides of the corresponding yarn winding portion. According to this aspect of the invention, the yarns are threaded onto the yarn guides of the two side-by-side yarn winding portions in parallel merely by moving the yarn threading member once in the arrangement direction. Thus, the process of yarn threading is simplified.

[0014] According to a second aspect of the invention, the yarn winding device of the first aspect is arranged such that the yarn threading member includes a handle coupled with the supporting portion and extending in the arrangement direction.

[0015] When a large number of yarn guides are arranged (i.e., when a large number of bobbins are provided), the yarn threading member has to be moved for a long distance in the arrangement direction to thread the

yarns onto the yarn guides. In this regard, the yarn threading member of this aspect includes the handle extending frontward from the supporting portion. Thus, the use of the handle makes it is easier to move the yarn threading member to a position far from an operator or the like.

[0016] According to a third aspect of the invention, the yarn winding device of the first or second aspect is arranged such that each of the yarn holding portions includes an engaging portion provided at an outer end portion of the yarn holding portion that is farther from the other of the yarn holding portions, the engaging portion being configured to be engaged with the corresponding guide rail.

[0017] In this aspect, the engaging portion is provided at the outer end portion of each yarn holding portion. This makes it easier for the yarn holding portion to move in the direction orthogonal to the arrangement direction when the yarn threading member moves in the arrangement direction.

[0018] According to a fourth aspect of the invention, the yarn winding device of any one of the first to third aspects is arranged such that each of the yarn guides is movable between: a winding position for forming a first pattern for winding of the yarns around the bobbins; and a yarn threading position for forming a second pattern in which the yarn guides are gathered near an end of the device in the arrangement direction so that the yarn guides are arranged at smaller intervals than those in the winding positions.

[0019] The yarn guides are able to be gathered near the one end in the arrangement direction. Thus, in the process of threading the yarns onto the yarn guides, the traveling distance of the yarn threading member is shorter, to facilitate the work of yarn threading.

[0020] According to a fifth aspect of the invention, there is provided a yarn threading member with which yarns are threaded onto yarn guides in two yarn winding portions each including (i) a bobbin holder to which bobbins are attached so that the bobbins are arranged in an axial direction of the bobbin holder, (ii) the yarn guides arranged in the axial direction of the bobbin holder so as to respectively correspond to the bobbins, and (iii) a guide rail extending in a direction inclined relative to an arrangement direction of the yarn guides, the guide rails of the two yarn winding portions being inclined relative to the arrangement direction in opposite directions to each other. The yarn threading member includes: two yarn holding portions provided to respectively correspond to the two yarn winding portions, each of the yarn holding portions configured to hold a half of the yarns in a separate state and to be engaged with the corresponding guide rail in a slidable manner; and a supporting portion supporting the two yarn holding portions so as to allow the yarn holding portions to get close to and away from each other.

[0021] After the yarns are held by the two yarn holding portions, the yarn holding portions are respectively engaged with the guide rails of the yarn winding portions in

a slidable manner. The yarn threading member holding the yarns is moved in the arrangement direction of the yarn guides. With this movement, the two yarn holding portions move along the guide rails while being distanced from each other. This is because the supporting portion supports the two yarn holding portions so as to allow the yarn holding portions to get close to and away from each other. With this, the yarns held by each yarn holding portion are sequentially threaded onto the yarn guides of the corresponding yarn winding portion.

[0022] According to a sixth aspect of the invention, there is provided a method for threading yarns, in the yarn winding device of any one of the first to fourth aspects, onto the guides of the two yarn winding portions using the yarn threading member. The method includes the steps of: a yarn holding step of controlling the two yarn holding portions of the yarn threading member so as to hold the yarns in a separate state; an engaging step of engaging each of the yarn holding portions with a portion of the corresponding guide rail to enable the yarn holding portion to slide along the guide rail, the portion of the guide rail being closer to one end of the guide rail in the arrangement direction than the yarn guides; and a yarn threading step of threading the yarns onto the yarn guides of the two yarn winding portions by moving the supporting portion toward the other ends of the guide rails in the arrangement direction to move the two yarn holding portions along their respective guide rails.

[0023] In this aspect, after the yarns are held by the two yarn holding portions, the two yarn holding portions are respectively engaged with the guide rails of the yarn winding portions in a slidable manner. The yarn threading member is moved in the arrangement direction of the yarn guides. Because the two yarn holding portions are relatively movable in the direction orthogonal to the arrangement direction, the yarn holding portions move along their respective guide rails while moving in the orthogonal direction relative to each other. With this, the yarns held by each yarn holding portion are sequentially threaded onto the yarn guides of the corresponding yarn winding portion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

FIG. 1 is a front elevational view of a spun yarn take-up apparatus related to an embodiment of the invention.

FIG. 2 is a side view of the spun yarn take-up apparatus.

FIG. 3 is a top view of guide supporters and guide units.

FIG. 4A and FIG. 4B each is an enlarged perspective view of a guide unit. Specifically, FIG. 4A shows a back-side guide unit and FIG. 4B shows a front-side guide unit.

FIG. 5 is a partial enlarged view of the guide sup-

porters in FIG. 3.

FIG. 6A and FIG. 6B each shows a yarn threading member.

FIG. 7 is a perspective view of the spun yarn take-up apparatus in which yarns have been placed on two godet rollers.

FIG. 8 is a partial enlarged view of the guide supporters immediately before yarn threading.

FIG. 9 is a partial enlarged view of the guide supporters after the completion of yarn threading.

FIG. 10 is a perspective view of the spun yarn take-up apparatus in which yarns have been threaded onto the guide units.

FIG. 11 is a perspective view of the spun yarn take-up apparatus in which the godet roller has been moved to a back position.

FIG. 12 is a perspective view of the spun yarn take-up apparatus in which the guide units have been moved to their winding positions.

FIG. 13A and FIG. 13B each shows a yarn threading member of a modification.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] The following will describe an embodiment of the present invention. Note that front, back, left, right, up, and down directions shown in FIG. 1 and FIG. 2 are respectively defined as front, back, left, right, up, and down directions of a spun yarn take-up apparatus, and the following description will be given using these terms of directions as needed.

(Schematic Structure of Spun Yarn Take-up Apparatus)

[0026] As shown in FIG. 1 and FIG. 2, a spun yarn take-up apparatus 1 includes two godet rollers 3 and 4, a yarn winding device 5, a controller 6, and the like.

[0027] Above the spun yarn take-up apparatus 1, a spinning apparatus 2 is provided. The spinning apparatus 2 is provided with spinnerets (not illustrated) from which synthetic fiber yarns Y are spun out, respectively.

[0028] The two godet rollers 3 and 4 are disposed below the spinning apparatus 2 so that the axes of the godet rollers are parallel to the left-right direction. The yarns Y spun out from the spinning apparatus 2 are wound on the godet roller 3 and then wound on the godet roller 4. The two godet rollers 3 and 4 are supported by a long supporting member 7 extending obliquely backward and upward from a position above a front end portion of the yarn winding device 5.

[0029] The godet roller 3 located upstream in a yarn running direction is attached to a front end portion of the supporting member 7. The other godet roller 4 is attached to the supporting member 7 so as to be movable in the lengthwise direction of the supporting member 7. The position of the godet roller 4 is switched by an unillustrated up-down motor between a front position and a back position. The front position is indicated with a two-dot

chain line in FIG. 2, and the back position is indicated with a solid line in FIG. 2. As will be detailed later, the godet roller 4 is at the front position during yarn threading, and the godet roller 4 is at the back position during yarn winding by the yarn winding device 5.

[0030] The two godet rollers 3 and 4 are driven and rotated by their respective drive motors which are not illustrated. Yarns Y spun out from the spinning apparatus 2 are forwarded to the yarn winding device 5 by the two godet rollers 3 and 4. As shown in FIG. 2, a yarn regulating guide 8 is provided upstream of the godet roller 3 in the yarn running direction, and a yarn regulating guide 9 is provided upstream of the godet roller 4 in the yarn running direction.

[0031] The yarn winding device 5 includes two winding units 10 (equivalent to yarn winding portions in the present invention). The two winding units 10 are arranged side by side in the left-right direction. Further, the two winding units 10 are arranged so that a yarn path of the yarns Y forwarded from the godet roller 3 and 4 located thereabove is positioned between the winding units 10 in the left-right direction. The two winding units 10 are arranged left-right symmetrically. The yarns Y spun out from the spinning apparatus 2 are divided into two groups and forwarded to the two winding units 10, respectively. For example, suppose that 24 yarns Y are forwarded from the spinning apparatus 2, a half of the yarns, i.e., 12 yarns Y are wound in the left winding unit 10 and the remaining 12 yarns are wound in the right winding unit 10.

[0032] Each winding unit 10 includes a supporting frame 11, a turret 12, and two bobbin holders 13. The supporting frame 11 is cantilevered horizontally by a base 14. The turret 12 is a disc-like member, and is rotatably attached to the base 14. The two bobbin holders 13 extending in the front-back direction are held and cantilevered by the turret 12. A plurality of (e.g., 12) bobbins B are attached to each bobbin holder 13 so as to be arranged in the axial direction of the bobbin holder 13. Each bobbin holder 13 is rotated and driven by an unillustrated motor. As the turret 12 rotates, the two bobbin holders 13 held by the turret 12 at upper and lower positions are replaced with each other.

[0033] Each winding unit 10 further includes guide units 15; traverse guides 16, and a contact roller 17.

[0034] As shown in FIG. 1 to FIG. 3, a guide supporter 19 long in the front-back direction is provided on an upper portion of each supporting frame 11. To the guide supporter 19, a guiding rail 20 extending in the front-back direction is fixed. The guide units 15 are attached to the guiding rail 20 so as to be movable in the front-back direction.

[0035] Each of the guide units 15 has a fulcrum guide 21 (equivalent to a yarn guide in the present invention). The fulcrum guides 21 respectively correspond to the bobbins B. The structure of each guide unit 15 will be detailed later.

[0036] The traverse guides 16 are attached to the supporting frame 11, and located below the guide units 15.

The yarn Y threaded onto the fulcrum guide 21 of each guide unit 15 is traversed back and forth by the corresponding traverse guide 16 with respect to the fulcrum guide 21. The traversed yarn Y is wound around the bobbin B attached to the rotating bobbin holder 13, and thereby a package P is formed.

[0037] The contact roller 17 is rotatably supported by a lower portion of the supporting frame 11. The contact roller 17 rotates while applying a predetermined contact pressure to packages P during the process of winding yarns around the bobbins B, to adjust the shapes of the packages P.

[0038] When the packages P held by the bobbin holder 13 at the upper position become full, the turret 12 rotates to switch the positions of the two bobbin holders 13 to each other. That is, the bobbin holder 13 at the lower position is moved to the upper position, and the yarns Y are wound around the bobbins B attached to the bobbin holder 13 having been moved to the upper position. Meanwhile, the bobbin holder 13 having the full packages P is moved to the lower position, and the full packages P are taken out at the lower position.

[0039] The controller 6 shown in FIG. 2 controls the overall operation of the spun yarn take-up apparatus 1. Specifically, the controller 6 transmits control signals to components of the spun yarn take-up apparatus 1, such as the motors for driving the godet rollers 3 and 4, the up-down motor for the godet roller 4, a controlling unit 18 of the yarn winding device 5, and the like.

(Details of Guide Units)

[0040] As shown in FIG. 3 and FIG. 4, each guide unit 15 includes: a guide holding member 22; and a fulcrum guide 21, an upper guide 23, and a lower guide 24, which are attached to the guide holding member 22.

[0041] The guide holding member 22 is attached to the guiding rail 20 so as to be movable in the front-back direction. Further, an air cylinder (not illustrated) is attached to the guide holding members 22 to drive the guide units 15 in the front-back direction. This enables each guide unit 15 to move between a winding position and a yarn threading position. The guide units 15 in their winding positions are arranged in a dispersed pattern (see FIG. 2 and FIG. 12). The guide units 15 in their yarn threading positions are gathered near the front end of the device so that the guide units 15 are arranged at smaller intervals in the front-back direction than those in the winding positions (arranged in a gathered pattern) (see FIG. 7 and FIG. 10).

[0042] The fulcrum guide 21 has a cylindrical shape. The fulcrum guide 21 is attached to the guide holding member 22 so that the axial direction of the fulcrum guide 21 is parallel to the left-right direction. The fulcrum guide 21 functions as a fulcrum when the yarn Y is traversed by the traverse guide 16. As shown in FIG. 2, for each of the fulcrum guides 21, the yarn Y is threaded on a farther portion of the surface of the fulcrum guide 21 that

is farther from the center of the line of the fulcrum guides 21. Specifically, as shown in FIG. 4A, as for the set of guide units 15 (15a) located on the back side, the yarns Y are respectively threaded on back portions of the surfaces of the fulcrum guides 21. Meanwhile, as shown in FIG. 4B, as for the set of the guide units 15 (15b) located on the front side, the yarns Y are respectively threaded on front portions of the surfaces of the fulcrum guides 21. As will be detailed later, the yarns Y are threaded onto the guide units 15 (the fulcrum guides 21) by moving all the yarns Y frontward using a yarn threading member 26 (see FIG. 8).

[0043] The upper guide 23 is a U-shape guide located above the fulcrum guide 21. The upper guide 23 is disposed so that the opening of the U-shape faces backward. The yarn Y threaded onto the fulcrum guide 21 from the back side is inserted into the upper guide 23 through the opening. The upper guide 23 restricts the movement of the yarn Y in the left-right direction.

[0044] The following points should be noted in order to thread yarns Y onto the back portions of the back-side fulcrum guides 21 and to thread yarns Y onto the front portions of the front-side fulcrum guides 21 while moving all the yarns Y frontward. First of all, the back-side guide units 15a need arrangement for preventing the yarns Y from moving forward of their respective fulcrum guides 21. Meanwhile, the front-side guide units 15b need arrangement for bringing the yarns Y coming from the back side to the positions in front of the fulcrum guides 21.

[0045] To deal with the above, a lower guide 24 is provided below each fulcrum guide 21. As shown in FIG. 4A and FIG. 4B, the lower guide 24 is a hook-shaped guide having a hook-like leading end portion. It should be noted that there is a difference in the orientation of the lower guides 24, between the back-side guide units 15a and the front-side guide units 15b.

[0046] As shown in FIG. 4A, the hook-like leading end portion of the lower guide 24 of each back-side guide unit 15a points backward. Thus, the hook-like leading end portion restricts the outward movement of the yarn Y, which has moved from the back side and entered to the inside of the lower guide 24. Meanwhile, as shown in FIG. 4B, the hook-like leading end portion of the lower guide 24 of each front-side guide unit 15b points forward. The yarn Y having moved from the back side moves frontward along the outer edge of the lower guide 24 instead of the fulcrum guide 21, and then the yarn Y enters to the inside of the lower guide 24.

[0047] As shown in FIG. 1 and FIG. 3, the two rows of the guide units 15 in the two winding units 10 are arranged so that the leading end portions of the fulcrum guides 21 in each row face to those in the other row. Further, the yarns are able to be threaded onto all the guide units 15 aligned in two rows in parallel by moving the yarn threading member 26 (will be described later) in the front-back direction between the two winding units 10.

(Arrangement for Yarn Threading)

[0048] The following will describe the arrangement for threading yarns Y onto the guide units 15. Note that in FIG. 5, the guide units 15 located above guide rails 25 and the yarn threading member 26 are illustrated by imaginary lines to clearly show the guide rails 25.

[0049] As shown in FIG. 3 and FIG. 5, each winding unit 10 is provided with the guide rail 25 extending in a direction inclined relative to the front-back direction, i.e., to the arrangement direction of the guide units 15. The guide rail 25 is fixed to a portion of the guide supporter 19 that is lower than the guide units 15, i.e., a portion thereof farther from the viewer in FIG. 5 than the guide units 15. A back end portion of the guide rail 25 is positioned backward of the guide units 15, and does not vertically overlap the guide units 15. The guide rails 25 of the two winding units 10 are arranged left-right symmetrically, and they are inclined relative to the front-back direction in opposite directions to each other. That is, the two guide rails 25 are inclined relative to the front-back direction in such a manner that the distance between the guide rails 25 increases toward the front ends thereof. In other words, the guide rails 25 extend outward toward the front ends. Each guide rail 25 has a guide groove 25a extending in the direction in which the guide rail 25 extends.

[0050] As shown in FIG. 6A and FIG. 6B, the yarn threading member 26 includes: two yarn holding portions 30 (30a and 30b); a supporting portion 31, and a handle 32. The two yarn holding portions 30 respectively correspond to the two left and right winding units 10. Each of the two yarn holding portions 30 has a plurality of yarn separation grooves 33 configured so that the yarns Y to be wound in the corresponding winding unit 10 are held therein in the separate state. As shown in FIG. 6A, the yarn separation grooves 33 of the two yarn holding portions 30 are arranged to form a fan-like shape as a whole, which fans out from a leading end portion of the yarn threading member toward a position for an operator, i.e., toward the handle 32. Each yarn holding portion 30 further includes two engaging portions 34 provided at its outer end portion, i.e., the portion thereof farther from the counterpart in the left-right direction. The engaging portions 34 project from the reverse surface of the yarn holding portion 30, in the direction away from the viewer in FIG. 6. The engaging portions 34 are configured to be engaged in the guide groove 25a of the corresponding guide rail 25 in a slidable manner. Thus, the two yarn holding portions 30 of the yarn threading member 26 are attachable to and detachable from the respective guide rails 25 at least at their back end portions.

[0051] The supporting portion 31 includes: a guide portion 35 fixed to a base end portion of the left yarn holding portion 30a; and a slide portion 36 fixed to a base end portion of the right yarn holding portion 30b. The slide portion 36 is engaged in the guide portion 35 so as to be slidable to the left and right. With this, the right yarn hold-

ing portion 30b is movable relative to the left yarn holding portion 30a. That is, the two yarn holding portions 30 are designed to be relatively movable in the left-right direction between: the state of FIG. 6A where the two left and right yarn holding portions 30 are in contact with each other; and the state of FIG. 6B where the two yarn holding portions 30 are separated and spaced apart from each other.

[0052] The handle 32 is a bar-like member extending in the front-back direction. An end portion of the handle 32 is coupled with the guide portion 35.

[0053] As will be described later, when the yarns Y are threaded onto the guide units 15, the yarn threading member 26 is moved frontward between the two winding units 10 as shown in FIG. 5, with the yarns Y to be wound in the two winding units 10 being held by the two yarn holding portions 30 of the yarn threading member 26.

(Yarn Threading Process)

[0054] The following will describe: a yarn threading process of threading yarns Y spun out from the spinning apparatus 2 onto the guides in the spun yarn take-up apparatus 1; and the operation of the spun yarn take-up apparatus 1 in this process, with reference to FIG. 7 to FIG. 12.

[0055] In the yarn threading process, an operator stands in front of the yarn winding device 5 to thread the yarns. First of all, the operator inputs a command for preparation for yarn threading through an unillustrated operation unit of the spun yarn take-up apparatus 1.

[0056] Receiving the command for the yarn threading preparation, the controller 6 controls the spun yarn take-up apparatus 1 to perform operation of yarn threading preparation described below. First, the godet roller 4 in the back position is moved downward by the up-down motor, to the front position near the godet roller 3. In addition, all the guide units 15 are moved to their yarn threading positions by the air cylinder, so that the guide units 15 are gathered near the front end and arranged in the gathered pattern.

[0057] After the yarn threading preparation operation by the spun yarn take-up apparatus 1 is completed, the operator uses a suction gun 40 to suck and hold yarns Y coming down from the spinning apparatus 2 located above. Note that the operator sucks all the yarns Y to be wound in the two winding units 10 by using the suction gun 40. For example, if 12 yarns are to be wound in each unit, 24 yarns are collectively sucked. The operator then moves the suction gun 40 to place the yarns Y onto the two godet rollers 3 and 4 arranged close to each other above the front end portion of the yarn winding device 5.

[0058] After placing the yarns Y onto the two godet rollers 3 and 4, the operator threads the yarns Y onto the guide units 15, respectively. The operator threads the yarns Y onto the guide units 15 using the yarn threading member 26. Before threading of the yarns Y onto the guide units 15, the yarn threading member 26 is detached from the guide rails 25. Holding the handle 32 of the de-

tached yarn threading member 26, the operator inserts the two yarn holding portions 30 of the yarn threading member 26 from the front into the portions of the yarns Y located between the godet roller 4 and the suction gun 40 in FIG. 7. Then, the yarns Y are inserted into the yarn separation grooves 33 of the two yarn holding portions 30 on one-to-one basis. As a result, the yarns Y are held by the yarn holding portions 30 in the separate state ("yarn holding step"). Because the yarns Y are sucked by the suction gun 40 in front of the yarns Y, the yarns Y are held by the yarn holding portions 30 under a tension. This prevents the yarns Y from being unintentionally released from their respective yarn separation grooves 33.

[0059] Then, as shown in FIG. 8, the operator attaches the yarn threading member 26 to the back end portions of the two guide rails 25. To be more specific, the operator engages the engaging portions 34 of the two yarn holding portions 30 of the yarn threading member 26 in the guide grooves 25a of the two guide rails 25, specifically in the end portions of the guide grooves 25a that are located backward of the guide units 15 ("engaging step"). After engaging the engaging portions 34 with the guide rails 25, the operator pulls the yarn threading member 26 toward the operator (frontward) with the use of the handle 32, as shown in FIG. 9. It should be reminded that the two yarn holding portions 30 are supported by the supporting portion 31 so as to be movable relative to each other in the left-right direction. This allows the two yarn holding portions 30 to move below the guide units 15 along their respective guide rails 25 inclined so that the distance between the rails increases frontward, while causing the yarn holding portions 30 to be distanced from each other in the left-right direction.

[0060] As each of the yarn holding portions 30 moves along the corresponding guide rail 25 in the direction inclined relative to the arrangement direction of the guide units 15, the yarns Y held by the yarn holding portion 30 in the separate state are sequentially and respectively guided to and threaded onto the guide units 15 aligned into a row, as shown in FIG. 10 ("yarn threading step"). Because the two yarn holding portions 30 of the yarn threading member 26 are moved along the two guide rails 25, the yarns Y are threaded in parallel onto the guide units 15 aligned in the two left and right rows.

[0061] After the yarn threading onto the guide units 15 is completed, the operator inputs a command for preparation for yarn winding through the operation unit of the spun yarn take-up apparatus 1. Receiving the command for winding preparation, the controller 6 controls the spun yarn take-up apparatus 1 to perform the winding preparation operation described below. First, as shown in FIG. 11, the godet roller 4 is moved backward and upward from the front position to the back position by the up-down motor. In addition, as shown in FIG. 12, the guide units 15 are moved by the air cylinder from the yarn threading positions to the winding positions, to be dispersed.

[0062] In this embodiment, the guide rails 25 of the two

winding units 10 are inclined relative to the arrangement direction of the guide units 15 (the axial direction of the bobbin holders 13) in opposite directions to each other. Meanwhile, each of the two yarn holding portions 30 of the yarn threading member 26 is configured to hold the yarns Y in the separate state which are to be wound in the corresponding yarn winding unit. Further, the two yarn holding portions 30 are supported so as to be movable relative to each other in the direction orthogonal to the arrangement direction of the guide units 15. That is, the supporting portion 31 supports the two yarn holding portions 30 so as to allow the yarn holding portions 30 to get close to and away from each other.

[0063] After the yarns Y are held by the two yarn holding portions 30, the yarn holding portions 30 are engaged with the guide rails 25 of the respective winding units 10 in a slidable manner. As the attached yarn threading member 26 is moved frontward, which is the direction to which the distance between the two guide rails 25 increases, the two yarn holding portions 30 move along the two guide rails 25 while being distanced from each other in the left-right direction. With this, the yarns Y held by each yarn holding portion 30 are threaded onto the guide units 15 of the corresponding winding unit 10. In the present embodiment, the yarns Y are threaded onto the guide units 15 of the two side-by-side winding units 10 in parallel merely by moving the yarn threading member 26 once frontward. Thus, the yarn threading process is simplified.

[0064] When a large number of guide units 15 are arranged in each row (i.e., when a large number of bobbins B are provided), the yarn threading member 26 has to be moved for a long distance in the front-back direction to thread the yarns. In other words, the operator standing in front of the device has to move the yarn threading member 26 to a position quite far from the operator. In this regard, the yarn threading member 26 of the present embodiment includes the handle 32 extending frontward from the supporting portion 31. Thus, the use of the handle 32 makes it is easier for the operator to move the yarn threading member 26 to the position far from the operator.

[0065] Further, in the present embodiment, each yarn holding portion 30 has, at its outer end portion in the left-right direction, engaging portions 34 configured to be engaged with the guide rail 25. This structure makes it easier for the two yarn holding portions 30 to move the left-right direction as the yarn threading member 26 is moved frontward with the engaging portions 34 engaged with the guide rails 25.

[0066] Furthermore, in the present embodiment, each of the guide units 15 is movable between: the winding position; and the yarn threading position for forming the gathered pattern in which the guide units 15 are gathered near the front end so that the guide units 15 are arranged at smaller intervals than those in the winding positions. That is, the guide units 15 are able to be gathered near the front end when threading yarns. This makes the

traveling distance of the yarn threading member 26 in the front-back direction shorter, to facilitate the work of yarn threading.

[0067] The following will describe modifications of the above-described embodiment. The members identical with those in the embodiment above will be given the same reference numerals and the descriptions thereof are not repeated.

1] The yarn threading member may be arranged as shown in FIG. 13A and FIG. 13B. Specifically, a supporting portion 51 of a yarn threading member 46 may include: a guide portion 55; and two slide portions 56 respectively provided for the two yarn holding portions 30. In this modification, the handle 32 is coupled with the guide portion 55. That is, the two yarn holding portions 30 are movable in the left-right direction relative to the guide portion 55 with which the handle 32 is coupled.

After the two yarn holding portions 30 are respectively engaged with the two guide rails 25, the yarn threading member 46 is pulled toward the operator by using the handle 32. Then, the two yarn holding portions 30 move along the two guide rails 25 in their respective inclined directions, while moving in the left-right direction relative to the guide portion 55.

2] The guide onto which each yarn Y is threaded by the yarn threading member 26 is not limited to that described in the above-described embodiment. For example, the upper guide 23 and the lower guide 24 are not essential. At least one of the upper guide 23 and the lower guide 24 may be omitted, for example, if the fulcrum guide has a shape or the like preventing the release of the yarn Y.

3] While in the above-described embodiment, the operator operates the yarn threading member 26 to thread the yarns Y onto the guide units respectively, the yarn threading member 26 may be operated by a yarn threading robot.

Claims

1. A yarn winding device (5) comprising:

- two yarn winding portions (10) each including (i) a bobbin holder (13) to which bobbins (B) are attached so that the bobbins (B) are arranged in an axial direction of the bobbin holder (13), (ii) yarn guides (21) arranged in the axial direction of the bobbin holder (13) so as to respectively correspond to the bobbins (B), and (iii) a guide rail (25) extending in a direction inclined relative to an arrangement direction of the yarn guides (21), the two yarn winding portions (10) being aligned in a direction orthogonal to the arrangement direction; and
- a yarn threading member (26) with which yarns

(Y) are threaded onto the yarn guides (21) of the two yarn winding portions (10), wherein:

the guide rails (25) of the two yarn winding portions (10) are inclined relative to the arrangement direction in opposite directions to each other; and
the yarn threading member (26) includes

two yarn holding portions (30) provided to respectively correspond to the two yarn winding portions (10), each of the yarn holding portions (30) configured to hold a half of the yarns (Y) in a separate state and to be engaged with the corresponding guide rail (25) in a slidable manner, and
a supporting portion (31) supporting the two yarn holding portions (30) so as to allow the yarn holding portions (30) to get close to and away from each other.

2. The yarn winding device (5) according to claim 1, wherein the yarn threading member (26) includes a handle (32) coupled with the supporting portion (31) and extending in the arrangement direction.

3. The yarn winding device (5) according to claim 1 or 2, wherein each of the yarn holding portions (30) includes an engaging portion (34) provided at an outer end portion of the yarn holding portion (30) that is farther from the other of the yarn holding portions (30), the engaging portion (34) being configured to be engaged with the corresponding guide rail (25).

4. The yarn winding device (5) according to any one of claims 1 to 3, wherein each of the yarn guides (21) is movable between: a winding position for forming a first pattern for winding of the yarns (Y) around the bobbins (B); and a yarn threading position for forming a second pattern in which the yarn guides (21) are gathered near an end of the device in the arrangement direction so that the yarn guides (21) are arranged at smaller intervals than those in the winding positions.

5. A yarn threading member (26) with which yarns (Y) are threaded onto yarn guides (21) in two yarn winding portions (10) each including (i) a bobbin holder (13) to which bobbins (B) are attached so that the bobbins (B) are arranged in an axial direction of the bobbin holder (13), (ii) the yarn guides (21) arranged in the axial direction of the bobbin holder (13) so as to respectively correspond to the bobbins (B), and (iii) a guide rail (25) extending in a direction inclined relative to an arrangement direction of the yarn guides (21), the guide rails (25) of the two yarn winding portions (10) being inclined relative to the arrangement direction in opposite directions to each

other, the yarn threading member (26) comprising:

two yarn holding portions (30) provided to respectively correspond to the two yarn winding portions (10), each of the yarn holding portions (30) configured to hold a half of the yarns (Y) in a separate state and to be engaged with the corresponding guide rail (25) in a slidable manner; and
a supporting portion (31) supporting the two yarn holding portions (30) so as to allow the yarn holding portions (30) to get close to and away from each other.

6. A method for threading yarns (Y), in the yarn winding device (5) recited in any one of claims 1 to 4, onto the guides of the two yarn winding portions (10) using the yarn threading member (26), the method comprising the steps of:

a yarn holding step of controlling the two yarn holding portions (30) of the yarn threading member (26) so as to hold the yarns (Y) in a separate state;

an engaging step of engaging each of the yarn holding portions (30) with a portion of the corresponding guide rail (25) to enable the yarn holding portion (30) to slide along the guide rail (25), the portion of the guide rail (25) being closer to one end of the guide rail (25) in the arrangement direction than the yarn guides (21); and

a yarn threading step of threading the yarns (Y) onto the yarn guides (21) of the two yarn winding portions (10) by moving the supporting portion (31) toward the other ends of the guide rails (25) in the arrangement direction to move the two yarn holding portions (30) along their respective guide rails (25).

Patentansprüche

1. Garnwicklungsvorrichtung (5), umfassend:

zwei Garnwicklungsabschnitte (10), jede einschließend (i) einen Spulenhalter (13), an dem Spulen (B) befestigt sind, sodass die Spulen (B) in einer Axialrichtung des Spulenhalters (13) angeordnet sind, (ii) Garnführungen (21), die in der Axialrichtung des Spulenhalters (13) angeordnet sind, um jeweils den Spulen (B) zu entsprechen, und (iii) eine Führungsschiene (25), die sich in einer relativ zu einer Anordnungsrichtung der Garnführungen (21) geneigten Richtung erstreckt, wobei die beiden Garnwicklungsabschnitte (10) in einer Richtung orthogonal zu der Anordnungsrichtung ausgerichtet sind; und ein Garneinfädelement (26), mit dem Garne

(Y) auf die Garnführungen (21) der beiden Garnwicklungsabschnitte (10) eingefädelt werden, wobei:

die Führungsschienen (25) der beiden Garnwicklungsabschnitte (10) relativ zu der Anordnungsrichtung in entgegengesetzten Richtungen zueinander geneigt sind; und das Garneinfädelement (26) einschließt

zwei Garnhalteabschnitte (30), die vorgesehen sind, um jeweils den beiden Garnwicklungsabschnitten (10) zu entsprechen, wobei jeder der Garnhalteabschnitte (30) so konfiguriert ist, eine Hälfte der Garne (Y) in einem separaten Zustand zu halten und mit der entsprechenden Führungsschiene (25) in einer gleitbaren Weise eingerastet zu sein; und einen Stützabschnitt (31), der die beiden Garnhalteabschnitte (30) stützt, um den Garnhalteabschnitten (30) zu erlauben, einander näher zu kommen und sich voneinander zu entfernen.

2. Garnwicklungsvorrichtung (5) nach Anspruch 1, wobei das Garneinfädelement (26) einen Griff (32) einschließt, der mit dem Stützabschnitt (31) gekoppelt ist und sich in der Anordnungsrichtung erstreckt.
3. Garnwicklungsvorrichtung (5) nach Anspruch 1 oder 2, wobei jeder der Garnhalteabschnitte (30) einen Einrastabschnitt (34) einschließt, der an einem äußeren Endabschnitt des Garnhalteabschnitts (30) vorgesehen ist, der weiter von dem anderen der Garnhalteabschnitte (30) entfernt ist, wobei der Einrastabschnitt (34) so konfiguriert ist, um mit der entsprechenden Führungsschiene (25) eingerastet zu werden.
4. Garnwicklungsvorrichtung (5) nach einem der Ansprüche 1 bis 3, wobei jede der Garnführungen (21) beweglich ist zwischen: einer Wickelposition zum Formen eines ersten Musters zum Wickeln der Garne (Y) um die Spulen (B); und einer Garneinfädelposition zum Formen eines zweiten Musters, wobei die Garnführungen (21) in der Nähe eines Endes der Vorrichtung in der Anordnungsrichtung versammelt sind, sodass die Garnführungen (21) in kleineren Intervallen als die in den Wickelpositionen angeordnet sind.
5. Garneinfädelement (26), mit dem Garne (Y) auf Garnführungen (21) in zwei Garnwicklungsabschnitten (10) eingefädelt werden, jeweils einschließend (i) einen Spulenhalter (13), an dem Spulen (B) befestigt sind, sodass die Spulen (B) in einer Axialrichtung des Spulenhalters (13) angeordnet sind, (ii) die Garnführungen (21), die in der Axialrichtung des Spulenhalters (13) angeordnet sind, um jeweils den

Spulen (B) zu entsprechen, und (iii) eine Führungsschiene (25), die sich in einer relativ zu einer Anordnungsrichtung der Garnführungen (21) geneigten Richtung erstreckt, wobei die Führungsschienen (25) der beiden Garnwicklungsabschnitte (10) in einander entgegengesetzten Richtungen relativ zu der Anordnungsrichtung geneigt sind, wobei das Garneinfädelement (26) umfasst:

zwei Garnhalteabschnitte (30), die vorgesehen sind, um jeweils den beiden Garnwicklungsabschnitten (10) zu entsprechen, wobei jeder der Garnhalteabschnitte (30) so konfiguriert ist, eine Hälfte der Garne (Y) in einem separaten Zustand zu halten und mit der entsprechenden Führungsschiene (25) in einer gleitbaren Weise eingerastet zu sein; und einen Stützabschnitt (31), der die beiden Garnhalteabschnitte (30) stützt, um den Garnhalteabschnitten (30) zu erlauben, einander näher zu kommen und sich voneinander zu entfernen.

6. Verfahren zum Einfädeln von Garnen (Y) in die Garnwicklungsvorrichtung (5) nach einem der Ansprüche 1 bis 4, auf die Führungen der beiden Garnwicklungsabschnitte (10) unter Verwenden des Garneinfädelements (26), wobei das Verfahren die Schritte umfasst:

einen Garnhalteschritt zum Steuern der beiden Garnhalteabschnitte (30) des Garneinfädelements (26), um die Garne (Y) in einem separaten Zustand zu halten;
einen Einrastschritt zum Einrasten jedes der Garnhalteabschnitte (30) mit einem Abschnitt der entsprechenden Führungsschiene (25), um dem Garnhalteabschnitt (30) zu erlauben, entlang der Führungsschiene (25) zu gleiten, wobei der Abschnitt der Führungsschiene (25) näher zu einem Ende der Führungsschiene (25) in der Anordnungsrichtung als die Garnführungen (21) ist; und
einen Garneinfädelschritt zum Einfädeln der Garne (Y) auf die Garnführungen (21) der beiden Garnwicklungsabschnitte (10) durch Bewegen des Stützabschnitts (31) zu den anderen Enden der Führungsschienen (25) in der Anordnungsrichtung, um die beiden Garnhalteabschnitte (30) entlang ihrer entsprechenden Führungsschienen (25) zu bewegen.

Revendications

1. Dispositif de bobinage de fil (5) comprenant :

deux parties de bobinage de fil (10) incluant chacune (i) un porte-bobine (13) auquel des bobines

(B) sont attachées de sorte que les bobines (B) soient agencées dans une direction axiale du porte-bobine (13), (ii) des guide-fil (21) agencés dans la direction axiale du porte-bobine (13) de manière à correspondre respectivement aux bobines (B), et (iii) un rail de guidage (25) s'étendant dans une direction inclinée par rapport à une direction d'agencement des guide-fil (21), les deux parties de bobinage de fil (10) étant alignées dans une direction orthogonale à la direction d'agencement ; et un élément d'enfilage de fil (26) avec lequel des fils (Y) sont enfilés sur les guide-fil (21) des deux parties de bobinage de fil (10), dans lequel :

les rails de guidage (25) des deux parties de bobinage de fil (10) sont inclinés par rapport à la direction d'agencement dans des directions opposées l'une à l'autre ; et l'élément d'enfilage de fil (26) inclut

deux parties de maintien de fil (30) fournies pour correspondre respectivement aux deux parties de bobinage de fil (10), chacune des parties de maintien de fil (30) étant configurée pour maintenir une moitié des fils (Y) dans un état séparé et pour être mise en prise avec le rail de guidage (25) correspondant d'une manière coulissante, et une partie de support (31) supportant les deux parties de maintien de fil (30) de manière à permettre aux parties de maintien de fil (30) de se rapprocher et de s'éloigner l'une de l'autre.

2. Dispositif de bobinage de fil (5) selon la revendication 1, dans lequel l'élément d'enfilage de fil (26) inclut un manche (32) couplé à la partie de support (31) et s'étendant dans la direction d'agencement.
3. Dispositif de bobinage de fil (5) selon la revendication 1 ou 2, dans lequel chacune des parties de maintien de fil (30) inclut une partie de mise en prise (34) fournie à une partie d'extrémité extérieure de la partie de maintien de fil (30) qui est plus éloignée de l'autre des parties de maintien de fil (30), la partie de mise en prise (34) étant configurée pour être mise en prise avec le rail de guidage (25) correspondant.
4. Dispositif de bobinage de fil (5) selon l'une quelconque des revendications 1 à 3, dans lequel chacun des guide-fil (21) est déplaçable entre : une position de bobinage pour former un premier motif pour le bobinage des fils (Y) autour des bobines (B) ; et une position d'enfilage de fil pour former un second motif dans lequel les guide-fil (21) sont regroupés à proximité d'une extrémité du dispositif dans la direction d'agencement de sorte que les guide-fil (21) soient agencés à des intervalles plus petits que ceux

dans les positions de bobinage.

5. Elément d'enfilage de fil (26) avec lequel les fils (Y) sont enfilés sur des guide-fil (21) dans deux parties de bobinage de fil (10) incluant chacune (i) un porte-bobine (13) auquel des bobines (B) sont attachées de sorte que les bobines (B) soient agencées dans une direction axiale du porte-bobine (13), (ii) les guide-fil (21) agencés dans la direction axiale du porte-bobine (13) de manière à correspondre respectivement aux bobines (B), et (iii) un rail de guidage (25) s'étendant dans une direction inclinée par rapport à une direction d'agencement des guide-fil (21), les rails de guidage (25) des deux parties de bobinage de fil (10) étant inclinés par rapport à la direction d'agencement dans des directions opposées l'une à l'autre, l'élément d'enfilage de fil (26) comprenant :

deux parties de maintien de fil (30) fournies pour correspondre respectivement aux deux parties de bobinage de fil (10), chacune des parties de maintien de fil (30) étant configurée pour maintenir une moitié des fils (Y) dans un état séparé et pour être mise en prise avec le rail de guidage (25) correspondant d'une manière coulissante ; et

une partie de support (31) supportant les deux parties de maintien de fil (30) de manière à permettre aux parties de maintien de fil (30) de se rapprocher et de s'éloigner l'une de l'autre.

6. Procédé d'enfilage de fils (Y), dans le dispositif de bobinage de fil (5) décrit dans l'une quelconque des revendications 1 à 4, sur les guides des deux parties de bobinage de fil (10) en utilisant l'élément d'enfilage de fil (26), le procédé comprenant les étapes de :

une étape de maintien de fil consistant à commander des deux parties de maintien de fil (30) de l'élément d'enfilage de fil (26) de manière à maintenir les fils (Y) dans un état séparé ; une étape de mise en prise consistant à mettre en prise de chacune des parties de maintien de fil (30) avec une partie du rail de guidage (25) correspondant pour permettre à la partie de maintien de fil (30) de coulisser le long du rail de guidage (25), la partie du rail de guidage (25) étant plus proche d'une extrémité du rail de guidage (25) dans la direction d'agencement que les guide-fil (21) ; et

une étape d'enfilage de fil consistant à enfiler des fils (Y) sur les guide-fil (21) des deux parties de bobinage de fil (10) en déplaçant la partie de support (31) vers les autres extrémités des rails de guidage (25) dans la direction d'agencement pour déplacer les deux parties de maintien de fil (30) le long de leurs rails de guidage (25) respectifs.

FIG. 1

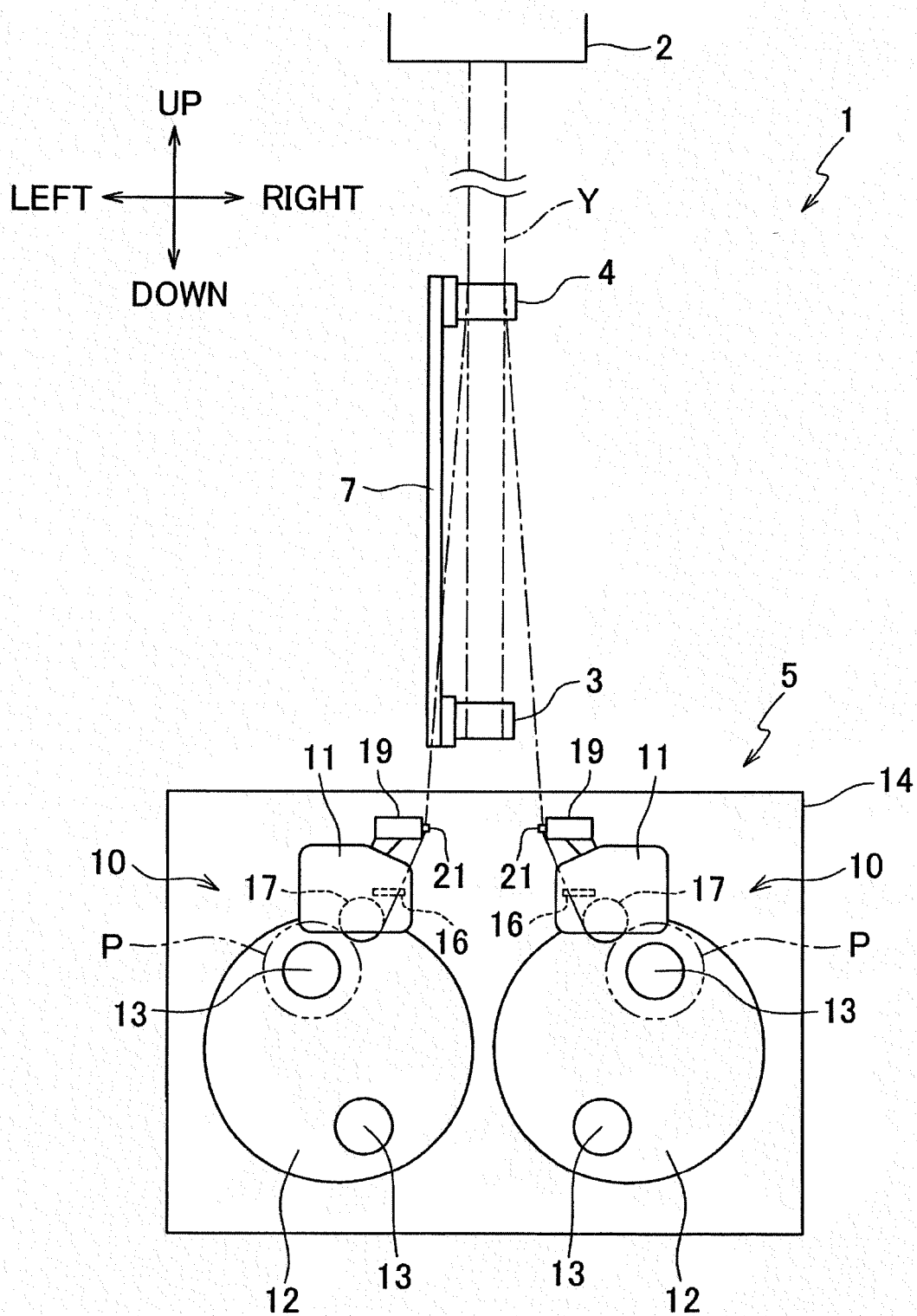


FIG.2

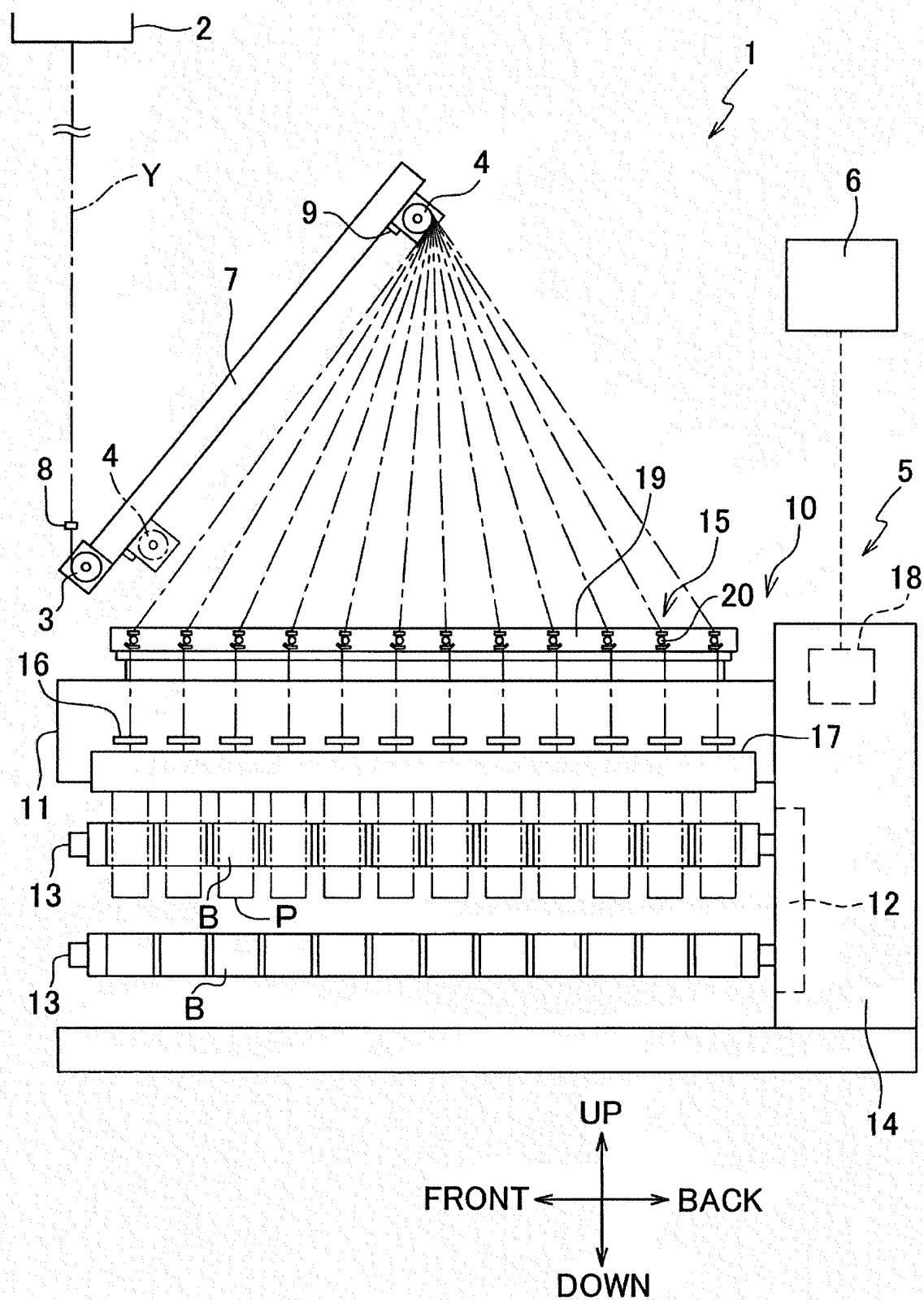


FIG.3

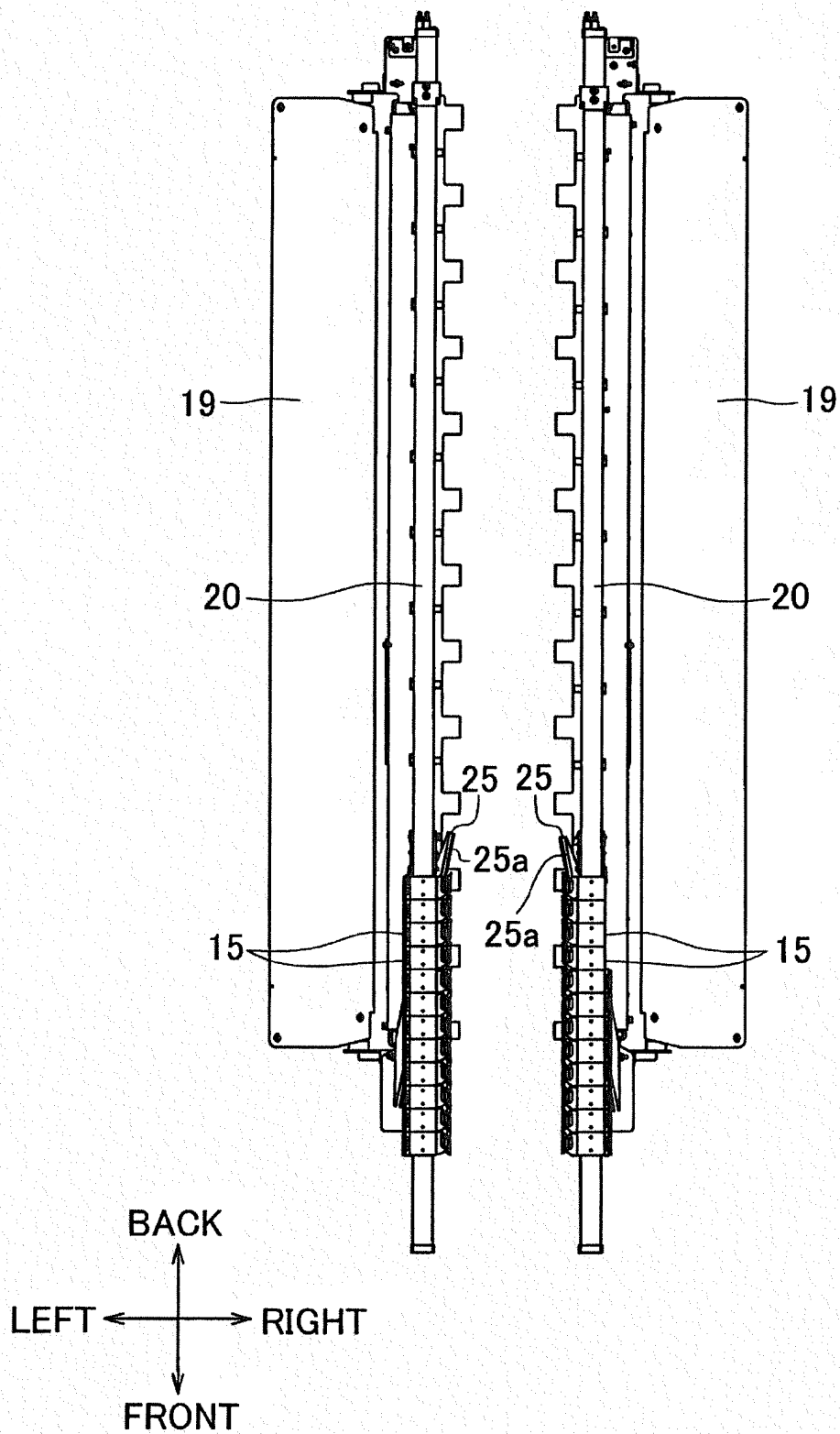


FIG.4A

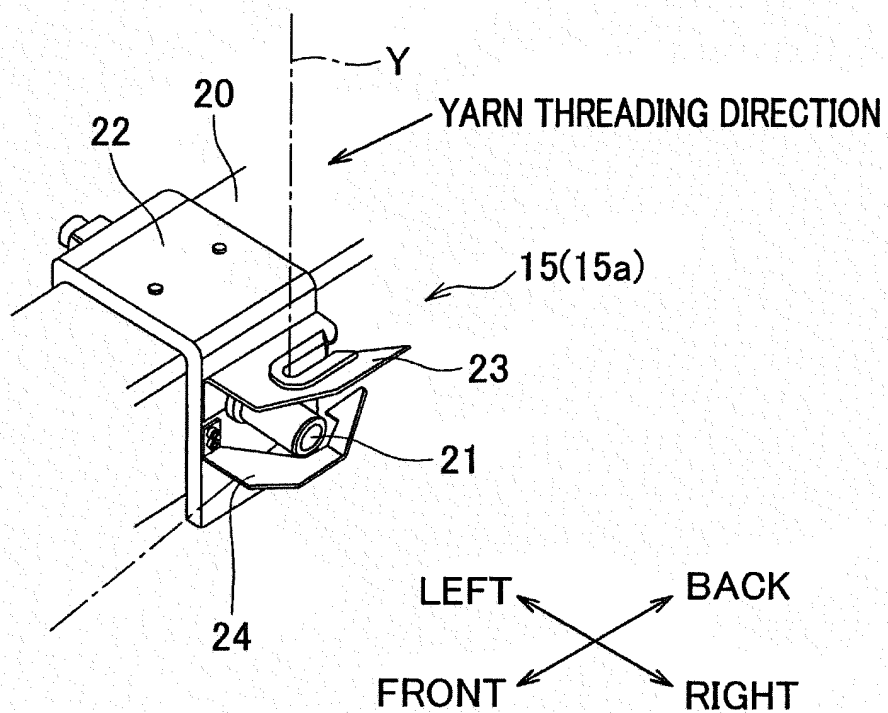


FIG.4B

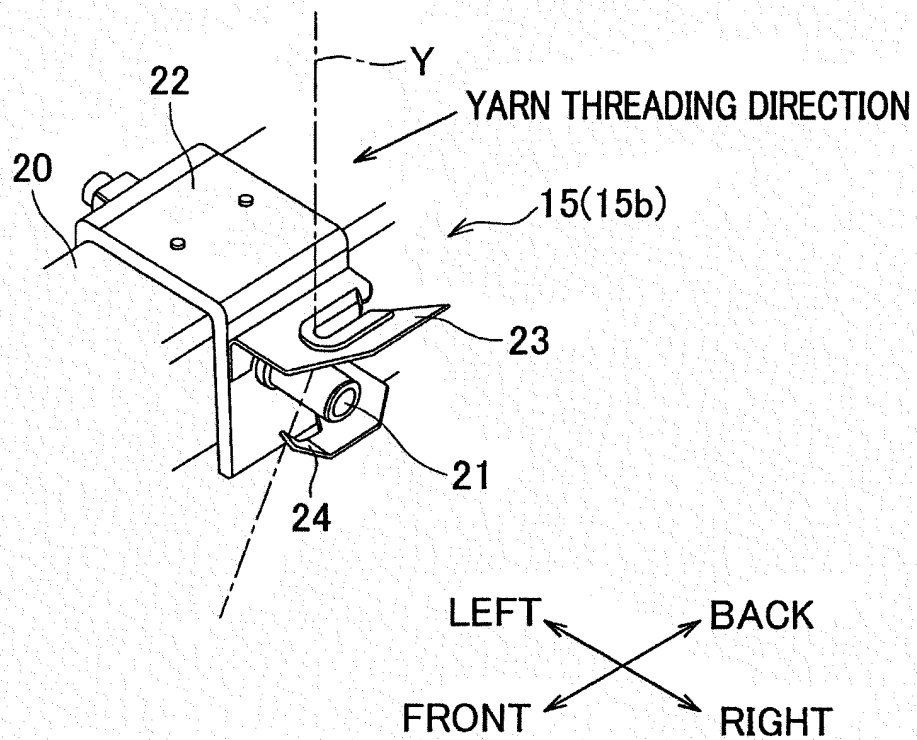


FIG.5

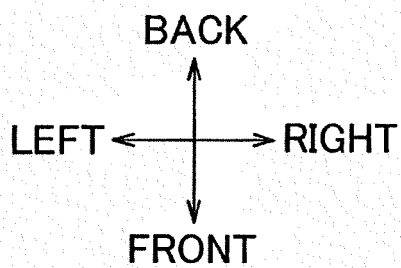
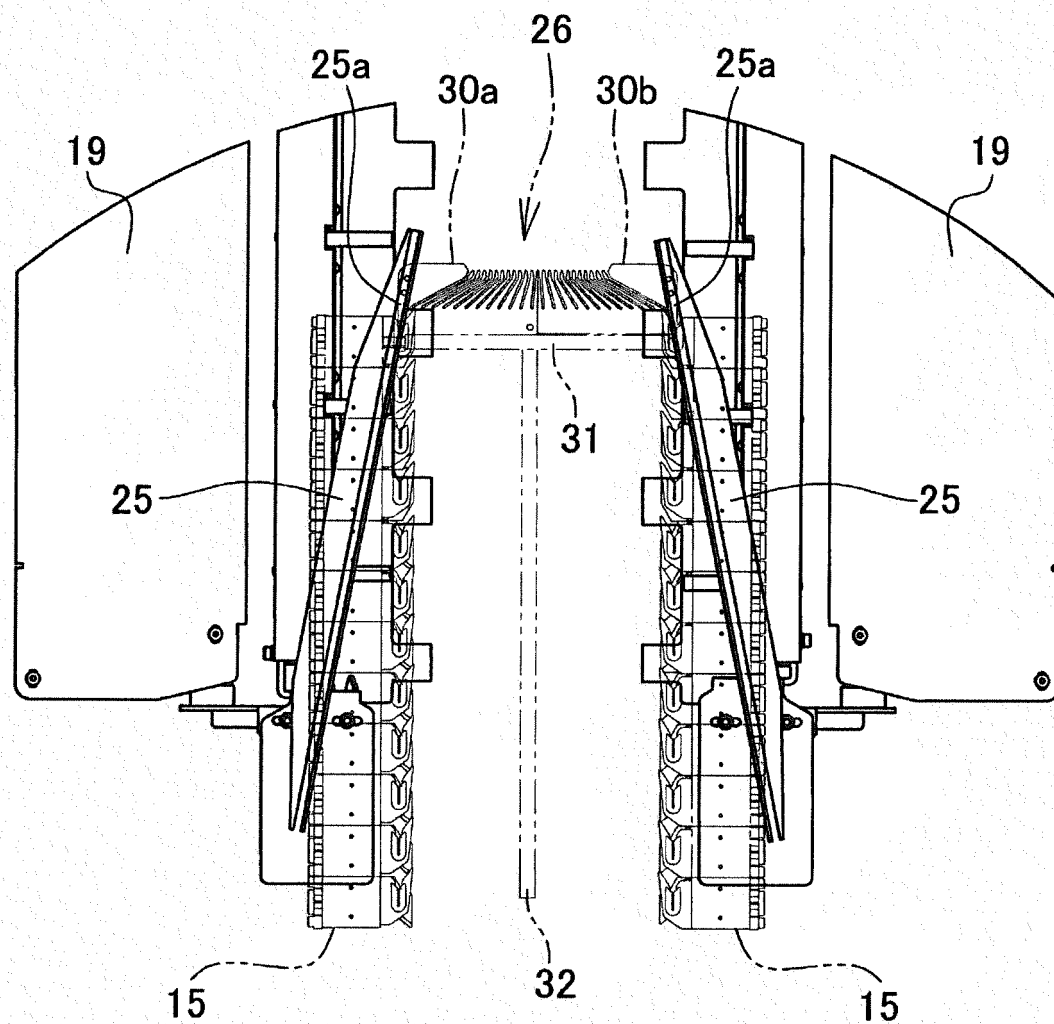


FIG.6A

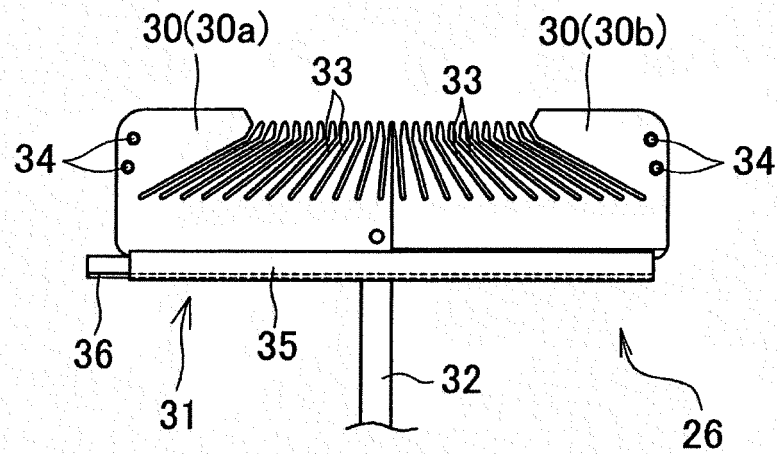


FIG.6B

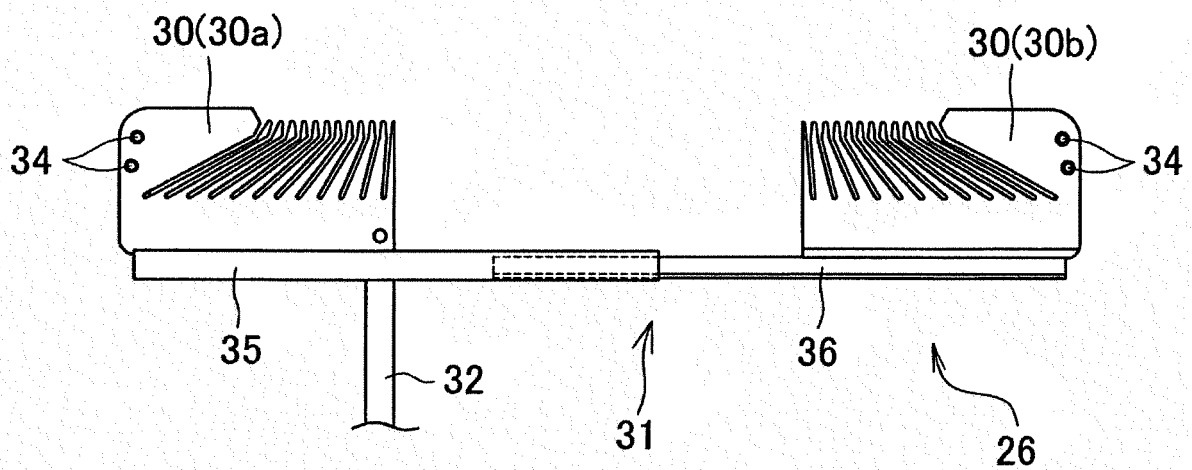


FIG.7

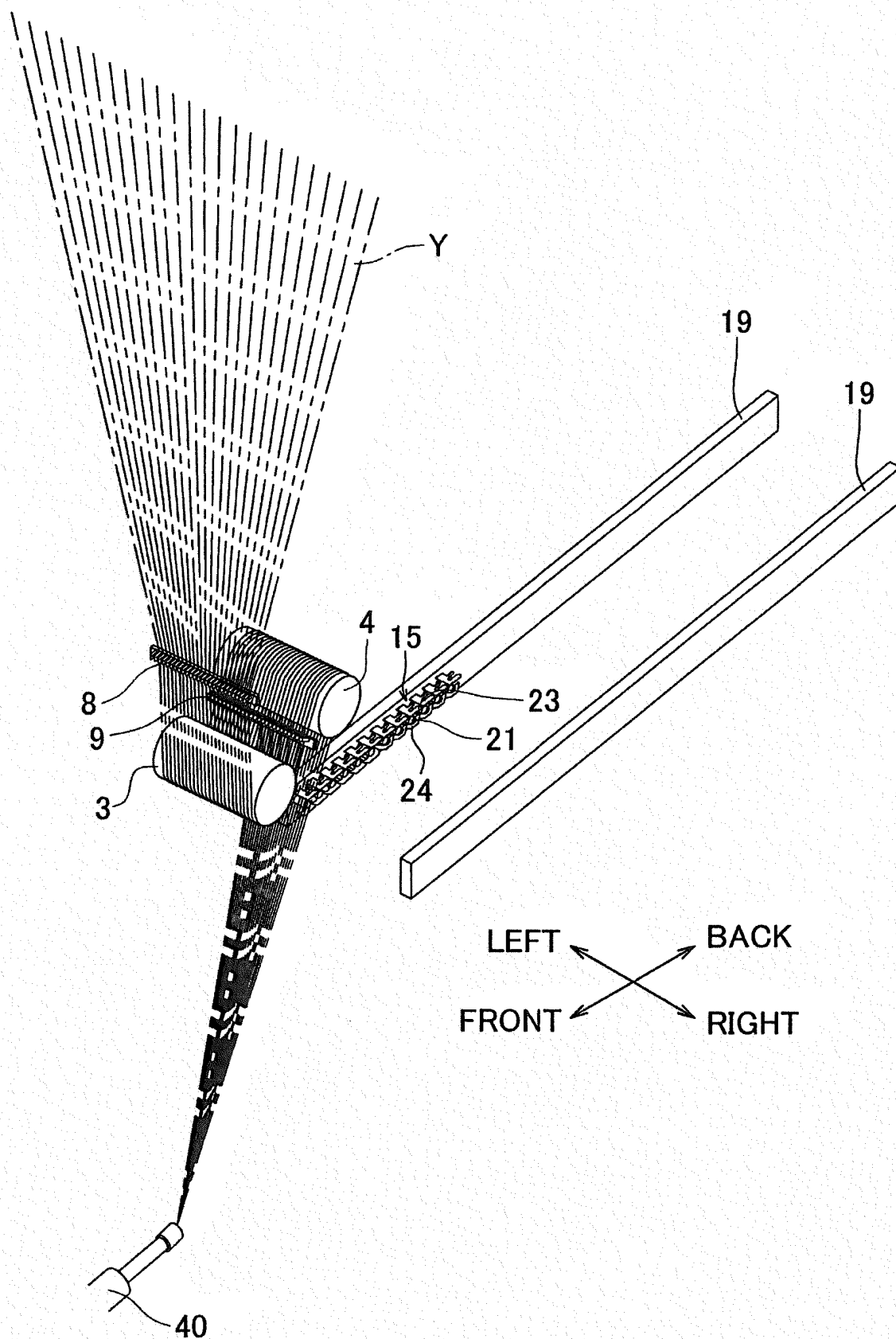


FIG.8

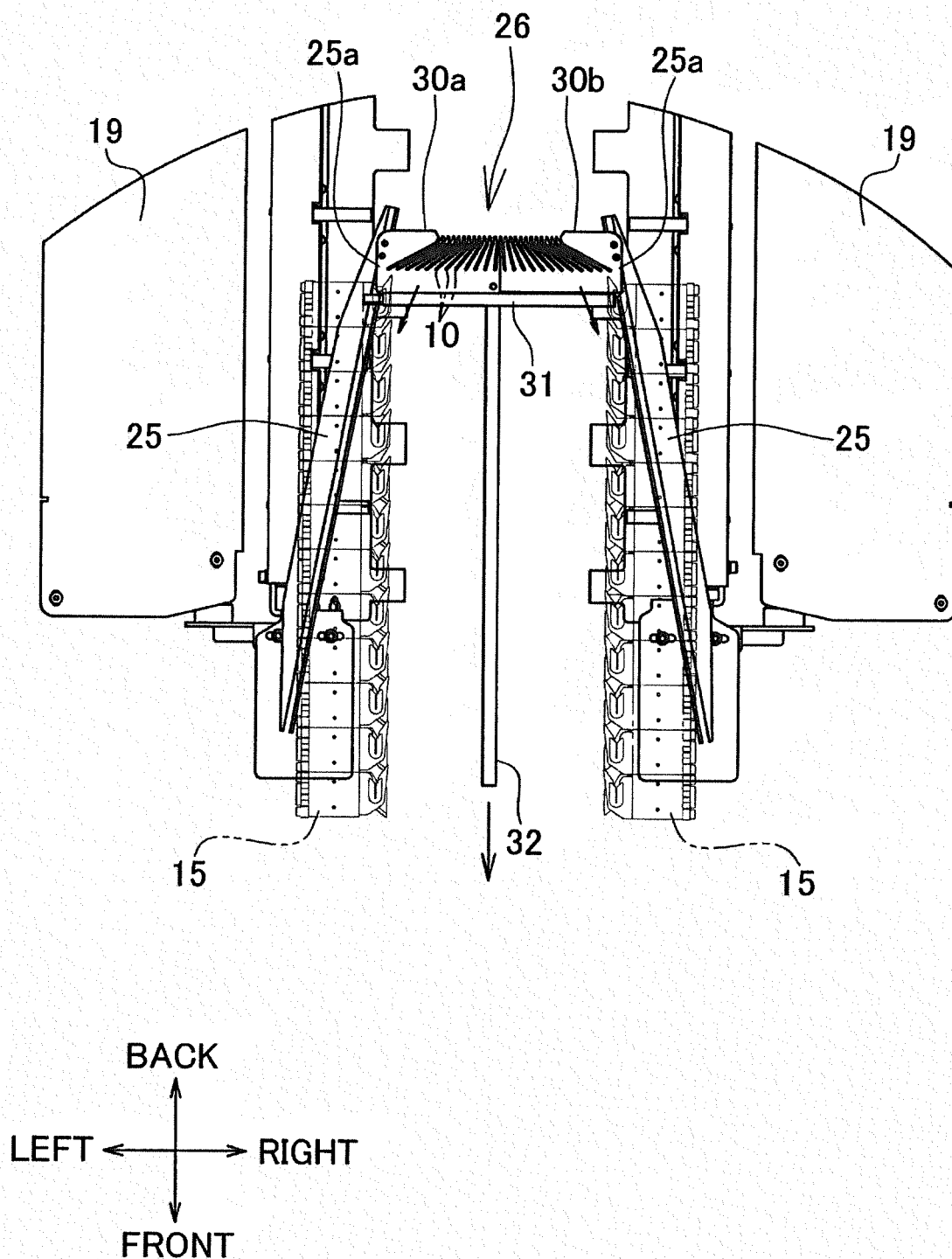


FIG.9

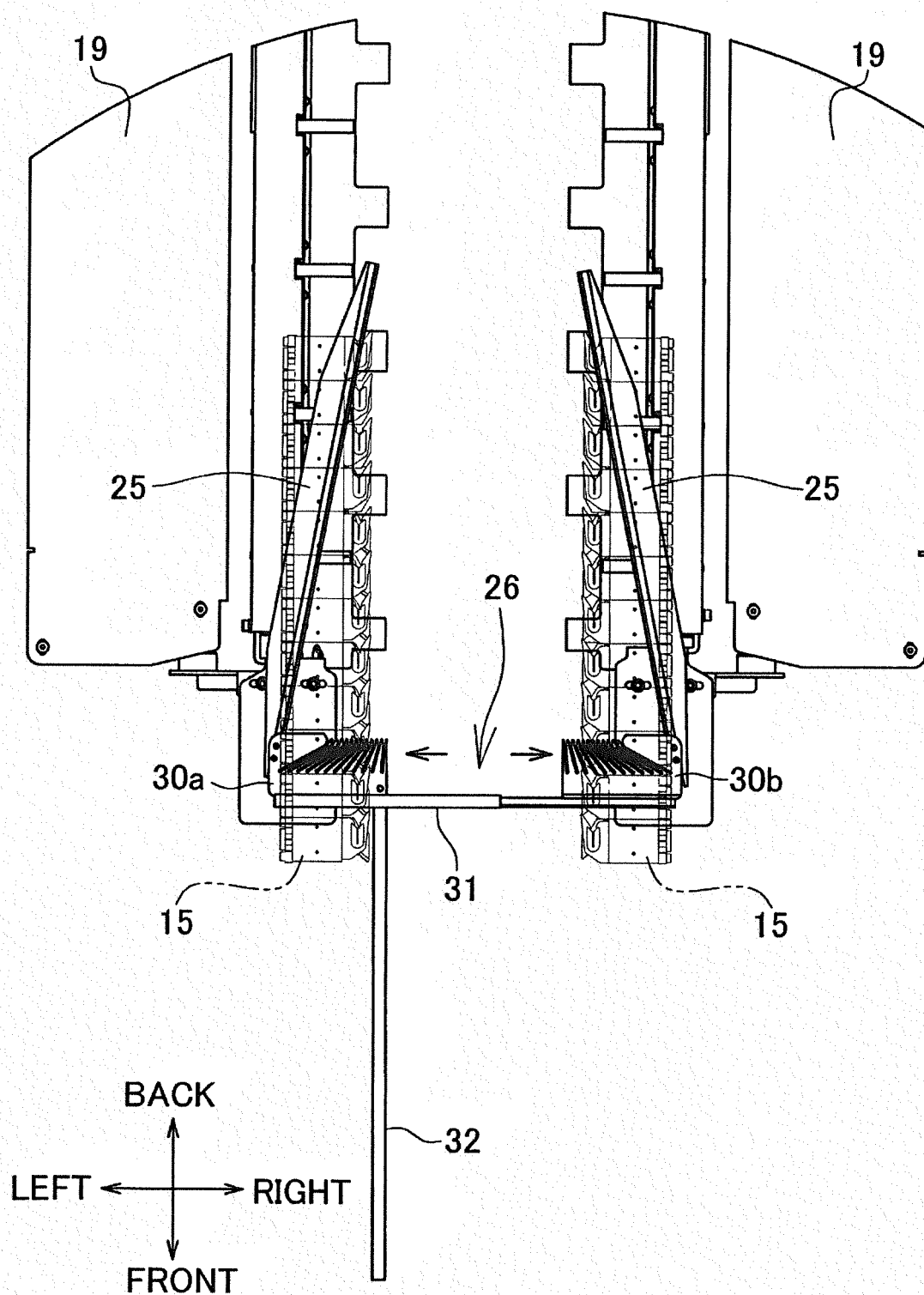


FIG.10

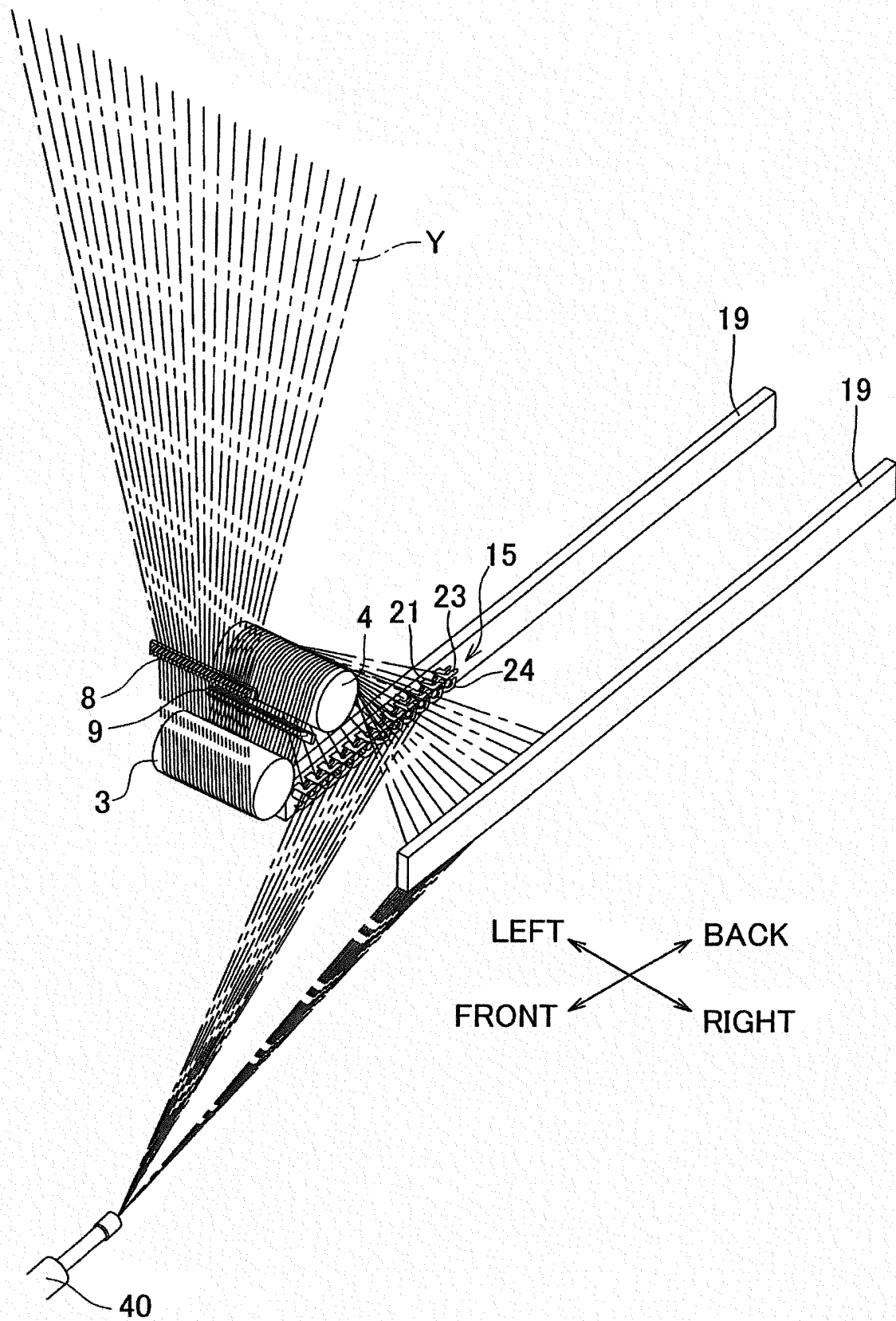


FIG.11

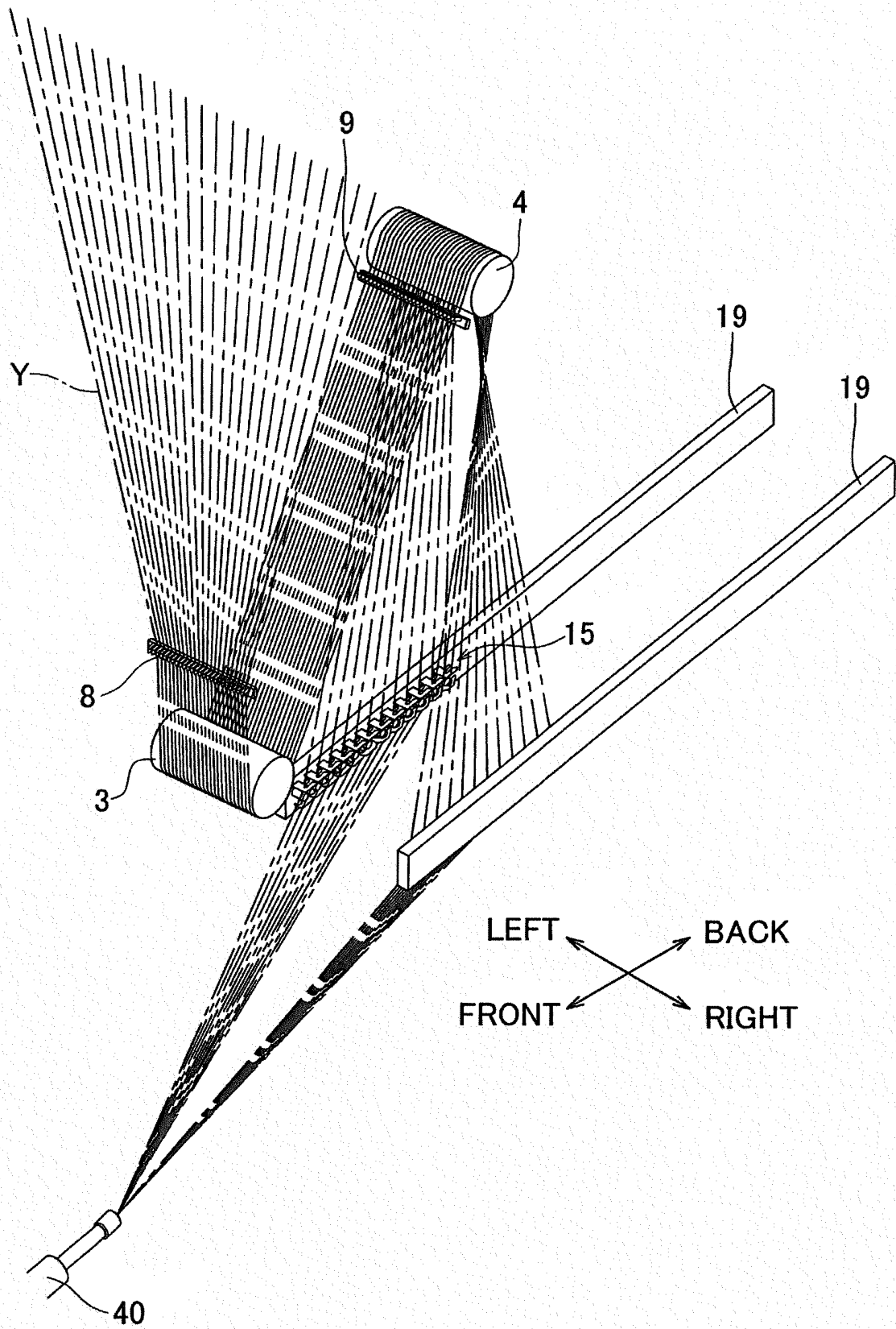


FIG.12

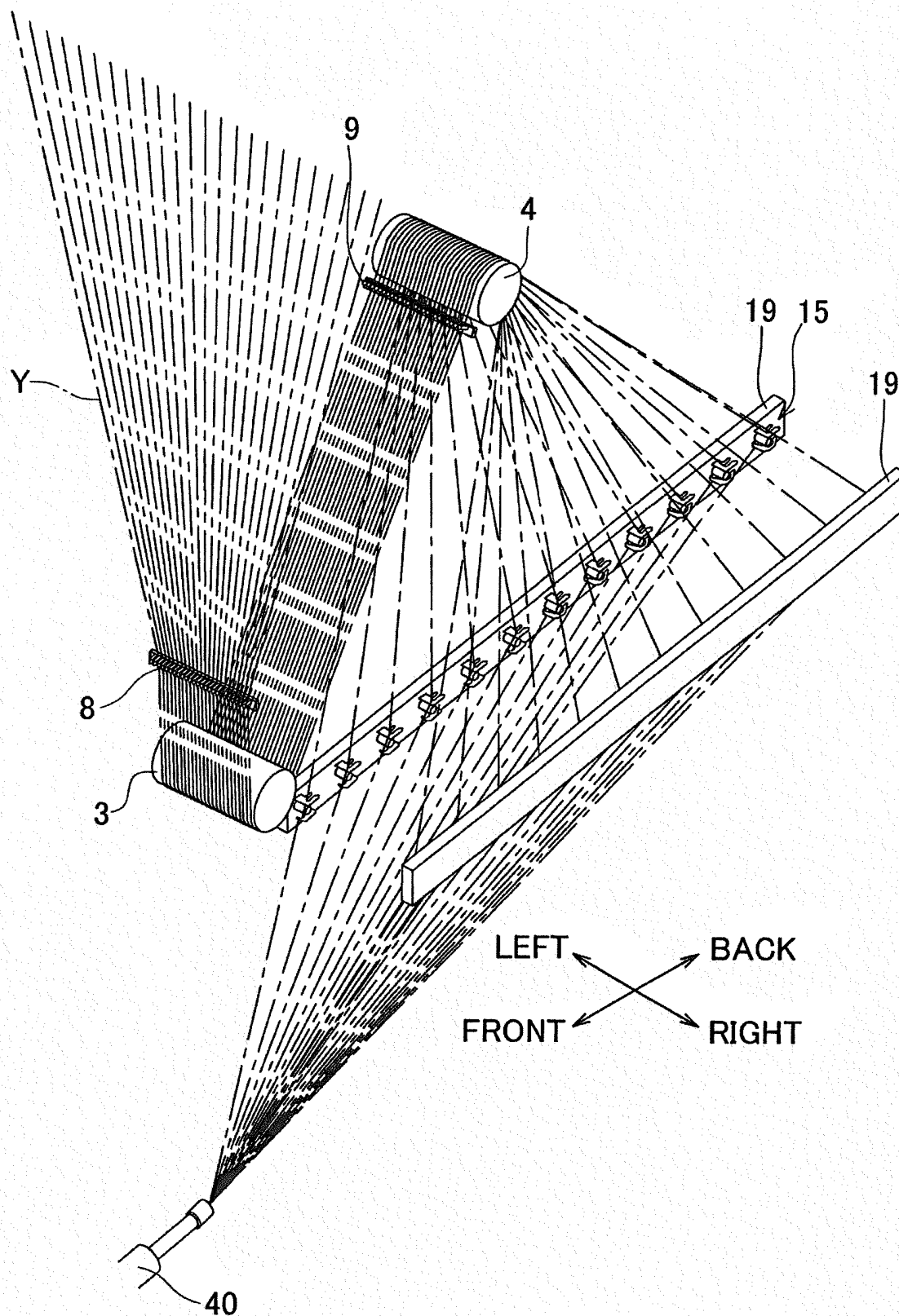


FIG.13A

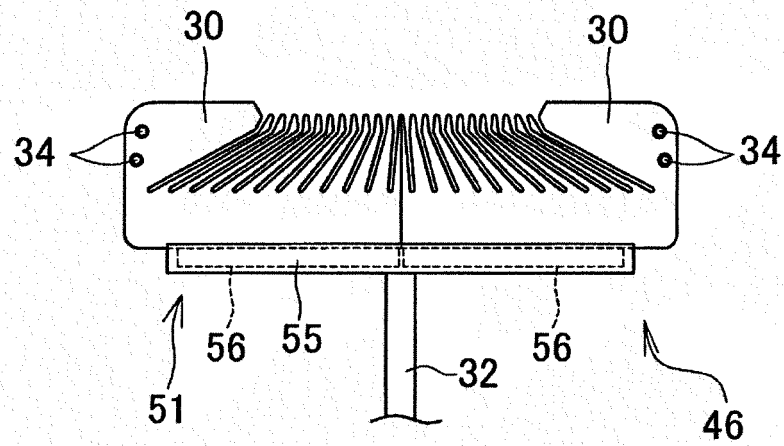
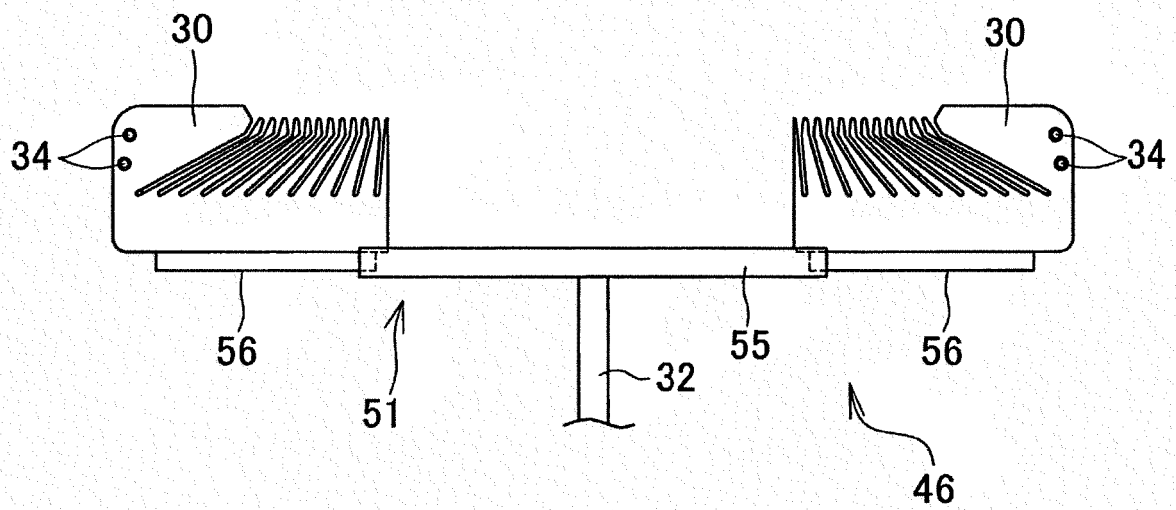


FIG.13B



REFERENCES CITED IN THE DESCRIPTION

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- JP 4074545 B [0006]