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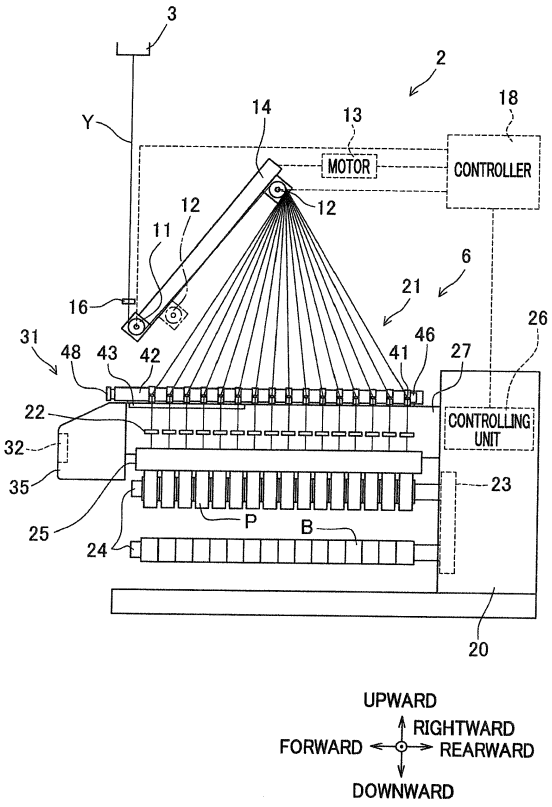
(54) YARN WINDER, SPUN YARN TAKE-UP APPARATUS, AND A METHOD OF YARN THREADING IN YARN WINDER

(57) Yarn threading onto fulcrum guides is further facilitated. A yarn winder 6 includes: a bobbin holder 24 which extends in a front-rear direction, bobbins B on which yarns Y are wound, respectively, being attached to the bobbin holder 24 to be lined up in the front-rear direction; traverse guides 22 which are provided above the bobbin holder 24; fulcrum guides 41 which are lined up in the front-rear direction and function as fulcrums for traversal of the yarns Y; and a guide unit 21 which is provided above the traverse guides 22 and includes fulcrum guides 41 and a guide supporter 42, the fulcrum guides 41 being lined up in the front-rear direction and functioning as fulcrums of traversal of the yarns Y, and the guide supporter 42 extending in the front-rear direction and supporting the fulcrum guides 41. The fulcrum guides 41 are gatherable to a front end portion of the guide supporter 42, and the guide unit 21 is movable between a yarn winding position where the yarns Y are wound onto the respective bobbins B and a yarn threading position which is at least on the front side of the yarn winding position.

FIG.2



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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a yarn winder, a spun yarn take-up apparatus, and a yarn threading method in the yarn winder.

[0002] Patent Literature 1 (Japanese Unexamined Patent Publication No. 2015-164875) recites a yarn winder which is configured to wind spun yarns. To be more specific, the yarn winder includes members such as a bobbin holder to which bobbins are attached to line up, traverse guides provided above the bobbin holder, fulcrum guides provided above the traverse guides and along the axis of the bobbin holder (i.e., in the front-rear direction), and a guide driving unit. The fulcrum guides are attached to a guide member which extends in the front-rear direction. The fulcrum guides are moved by the guide driving unit along the guide member in the front-rear direction.

[0003] When the yarns are wound, the fulcrum guides are provided directly above the respective traverse guides and function as fulcrums when the yarns are traversed by the traverse guides. In this regard, in this yarn winding state, the fulcrum guides on the far side are significantly far from the operator on the front side (near side). When the yarns are threaded onto the respective fulcrum guides, the fulcrum guides are gathered to a front end portion of the bobbin holder by the guide driving unit. In other words, the fulcrum guides are gathered to a position which is near the operator, and this facilitates a yarn threading operation by the operator.

SUMMARY OF THE INVENTION

[0004] In order to improve the production efficiency, the number of packages which are simultaneously formed tends to be large these days, as the number of bobbins attachable to the bobbin holder is arranged to be large. When the number of bobbins is large, the number of the fulcrum guides corresponding to the bobbins is large, too. In the yarn winder of Patent Literature 1, the position of the guide member to which the fulcrum guides are attached is fixed. On this account, when the number of the fulcrum guides is large, the fulcrum guides on the far side are far from the operator even after the fulcrum guides are gathered to the near side, and this hinders the yarn threading operation.

[0005] An object of the present invention is to further facilitate the yarn threading onto the fulcrum guides.

[0006] According to the first aspect of the invention, a yarn winder includes: a bobbin holder which extends in a predetermined direction, bobbins on which yarns are wound, respectively, being attached to the bobbin holder to be lined up in the predetermined direction; traverse guides which are provided above the bobbin holder and traverses the yarns; and a guide unit which is provided above the traverse guides and includes fulcrum guides and a guide supporter, the fulcrum guides being lined up in the predetermined direction and functioning as fulcrums of traversal of the yarns, and the guide supporter extending in the predetermined direction and supporting the fulcrum guides, the fulcrum guides being gatherable to an end portion of the guide supporter, the end portion being on one side in the predetermined direction, and the guide unit being movable between a yarn winding position where the yarns are wound onto the respective bobbins and a yarn threading position which is at least on the one side in the predetermined direction of the yarn winding position.

[0007] In the present invention, first of all, the fulcrum guides are gatherable to one end side in the predetermined direction of the bobbin holder. This facilitates the yarn threading operation from one side in the predetermined direction. Furthermore, the entirety of the guide unit is drawn to the yarn threading position which is on the one side in the predetermined direction of the yarn winding position. This further facilitates the yarn threading operation from the one side in the predetermined direction. The yarn threading onto the fulcrum guides is therefore further facilitated.

[0008] According to the second aspect of the invention, the yarn winder of the first aspect is arranged such that the yarn threading position is on the one side in the predetermined direction of and above the yarn winding position.

[0009] According to the present invention, the guide unit is movable in one direction and upward in the predetermined direction, i.e., obliquely upward in the predetermined direction. To put it differently, as the guide unit moves from the yarn winding position to the yarn threading position, the fulcrum guides move away from the traverse guides in the up-down direction and the distance between the fulcrum guides and the traverse guides increases. The yarn threading operation is therefore further facilitated as the working space at the time of the yarn threading operation is enlarged.

[0010] According to the third aspect of the invention, the yarn winder of the second aspect further includes: a frame which extends in the predetermined direction along the guide unit and supports the guide unit to be movable in a relative manner in the predetermined direction; and a head portion which is attached to an end portion of the frame, the end portion being on the one side in the predetermined direction.

[0011] When the head portion is provided on one side of the guide unit in the predetermined direction, the guide unit may not be easily drawn to the one side on account of interference with or obstruction by the head portion. Even in such a case, according to the present invention, the interference or obstruction of the guide unit by the head portion is avoided and the guide unit is easily drawn to the one side, because the guide unit is movable upward.

[0012] According to the fourth aspect of the invention, the yarn winder of the third aspect is arranged such that,

no matter whether the guide unit is at the yarn winding position or at the yarn threading position, an end portion of the guide unit, which is on the one side in the predetermined direction, is on the other side in the predetermined direction of the end portion of the head portion, which is on the one side in the predetermined direction.

[0013] In the present invention, when the guide unit is at the yarn threading position, the guide unit does not protrude to the one side in the predetermined direction as compared to the head portion. This prevents the space for the yarn threading operation from being narrow on the one side in the predetermined direction.

[0014] According to the fifth aspect of the invention, the yarn winder of any one of the first to fourth aspects is arranged such that the bobbin holder is cantilevered by a base which is provided on the other side in the predetermined direction.

[0015] According to the present invention, an end portion of the bobbin holder on the other side in the predetermined direction is cantilevered by the base. The one side in the predetermined direction is the leading end side of the bobbin holder, i.e., is the side on which the bobbins are attached or detached. To put it differently, as the guide unit moves from the yarn winding position to the yarn threading position, the fulcrum guides become further close to the operator side. This facilitates the yarn threading operation.

[0016] According to the sixth aspect of the invention, the yarn winder of any one of the first to fifth aspects is arranged such that the guide unit includes an assisting member guide unit which guides a yarn threading assisting member which retains the yarns when the yarns are threaded onto the fulcrum guides.

[0017] The yarn threading assisting member retains the yarns and moves the yarns to the fulcrum guides to thread the respective yarns onto the respective fulcrum guides. As this member is moved obliquely with respect to the direction in which the fulcrum guides are lined up, the yarns are easily threaded onto the respective fulcrum guides. The assisting member guide unit is provided to correctly guide the yarn threading assisting member.

[0018] In regard to the above, when the yarn winder is arranged so that only the fulcrum guides are moved and the assisting member guide unit does not follow the fulcrum guides, the yarn threading assisting member is not guided at the time of the yarn threading operation. Because the guide unit is provided with the assisting member guide unit in the present invention, the assisting member guide unit is movable to the yarn threading position together with the fulcrum guides. This facilitates the yarn threading operation.

[0019] According to the seventh aspect of the invention, a yarn winder includes: a bobbin holder which extends in a predetermined direction, bobbins on which yarns are wound, respectively, being attached to the bobbin holder to be lined up in the predetermined direction; traverse guides which are provided above the bobbin holder and traverses the yarns; and a guide unit which is provided above the traverse guides and includes fulcrum guides which are lined up in the predetermined direction and function as fulcrums of traversal of the yarns, the guide unit being movable between a yarn winding position where the yarns are wound onto the respective bobbins and a yarn threading position which is positioned above the yarn winding position.

[0020] When the interval between the guide unit and the traverse guides is short in the up-down direction, the yarn threading operation to the fulcrum guides may be obstructed due to reasons such as interference with the guide unit to the traverse guides. In the present invention, the guide unit including the fulcrum guides is movable between the yarn winding position and the yarn threading position above the yarn winding position. As the guide unit is moved from the yarn winding position to the yarn threading position, the interval between the fulcrum guides and the traverse guides in the up-down direction is increased, with the result that the working space for the yarn threading operation is enlarged. The yarn threading operation is therefore further facilitated.

[0021] According to the eighth aspect of the invention, the yarn winder of the seventh aspect is arranged such that the yarn threading position is on one side in the predetermined direction of and above the yarn winding position.

[0022] In the present invention, when the guide unit moves from the yarn winding position to the yarn threading position. the yarn threading operation from the one side can be easily done because the movement to the one side in the predetermined direction is possible.

[0023] According to the ninth aspect of the invention, a spun yarn take-up apparatus includes: a godet roller on which yarns spun out from a spinning apparatus are wound to be lined up in an axial direction of the godet roller; and a yarn winder which is provided below the godet roller and is configured to wind the yarns, the yarn winder including: a bobbin holder which extends in a predetermined direction which intersects with the axial direction of the godet roller, bobbins on which the yarns are wound, respectively, being attached to the bobbin holder to be lined up in the predetermined direction; traverse guides which are provided above the bobbin holder and traverses the yarns; and a guide unit which is provided above the traverse guides and includes fulcrum guides which are lined up in the predetermined direction and function as fulcrums of traversal of the yarns, the godet roller being movable between a yarn winding position of a roller where the yarns are wound onto the bobbins and a yarn threading position of a roller, which is close to an end portion of the yarn winder as compared to the yarn winding position, the end portion being on one side in the predetermined direction, the fulcrum guides being gatherable to an end portion of the guide supporter, the end portion being on the one side in the predetermined direction, and the guide unit being movable between a yarn winding position of a unit where the yarns are wound onto the respective bobbins and a yarn thread-

ing position of a unit which is at least on the one side in the predetermined direction of the yarn winding position.

[0024] In the present invention, the yarn threading operation from the one side in the predetermined direction is further facilitated as in the first aspect of the invention. The yarn threading onto the fulcrum guides is therefore further facilitated.

[0025] According to the tenth aspect of the invention, a spun yarn take-up apparatus includes: a godet roller on which yarns spun out from a spinning apparatus are wound to be lined up in an axial direction of the godet roller; and a yarn winder which is provided below the godet roller and is configured to wind the yarns, the yarn winder including: a bobbin holder which extends in a predetermined direction which intersects with the axial direction of the godet roller, bobbins on which the yarns are wound, respectively, being attached to the bobbin holder to be lined up in the predetermined direction; traverse guides which are provided above the bobbin holder and traverses the yarns; and a guide unit which is provided above the traverse guides and includes fulcrum guides which are lined up in the predetermined direction and function as fulcrums of traversal of the yarns, the godet roller being movable between a yarn winding position of a roller where the yarns are wound onto the bobbins and a yarn threading position of a roller which is close to the yarn winder in an up-down direction as compared to the yarn winding position, and the guide unit being movable between a yarn winding position of a unit where the yarns are wound onto the respective bobbins and a yarn threading position of the unit, which is positioned above the yarn winding position.

[0026] According to the present invention, the working space for the yarn threading operation is enlarged as in the seventh aspect of the invention. The yarn threading operation is therefore further facilitated.

[0027] According to the eleventh aspect of the invention, a yarn threading method in the yarn winder according to the first aspect of the invention includes the steps of: (i) gathering the fulcrum guides one end portion in the predetermined direction of the guide supporter; (ii) moving the guide unit from a yarn winding position where the yarns are wound onto the respective bobbins to a yarn threading position which is at least on one side in the predetermined direction of the yarn winding position; and after the steps (i) and (ii), threading the yarns onto the fulcrum guides, respectively.

[0028] In the present invention, after the guide gathering process of gathering the fulcrum guides to the one side in the predetermined direction and the unit drawing process of moving the guide unit to at least the one side in the predetermined direction of the yarn winding position, the yarn threading operation is carried out. This facilitates the yarn threading operation from the one side.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029]

FIG. 1 is a schematic diagram of a spun yarn winding system including a yarn winder of an embodiment.

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

FIGs. 3(a) and 3(b) are perspective views of a guide unit and its surroundings.

Each of FIGs. 4(a), 4(b), and 4(c) illustrates the movement of the guide unit.

FIG. 5 shows an operation to thread yarns into grooves of a yarn threading assisting tool.

FIG. 6 shows a yarn threading operation by using the yarn threading assisting tool.

FIG. 7 is a side view of a spun yarn take-up apparatus of a modification.

Each of FIGs. 8(a) and 8(b) illustrates an operation of a guide unit.

Each of FIGs. 9(a) and 9(b) illustrates an operation of a guide unit of another modification.

Each of FIGs. 10(a) and 10(b) illustrates an operation of a guide unit of a still another modification.

Each of FIGs. 11(a) and 11(b) illustrates an operation of a guide unit of an yet another modification.

FIG. 12 is a side view of a take-up apparatus and its surroundings of a further modification.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0030] The following will describe an embodiment of the present invention with reference to FIG. 1 to FIG. 6.

(Outline of Spun Yarn Winding System)

[0031] FIG. 1 is a schematic view showing a spun yarn winding system 1 including a yarn winder 6 (detailed later) of the present embodiment, which is viewed from the front side. The spun yarn winding system 1 includes spun yarn take-up apparatuses 2. Hereinafter, the direction in which the spun yarn take-up apparatuses 2 are lined up will be referred to as a left-right direction, as shown in FIG. 1. Furthermore, the direction orthogonal to the plane of FIG. 1 will be referred to as a front-rear direction (a predetermined direction in the present invention) and the direction orthogonal to the left-right direction and the front-rear direction will be referred to as an up-down direction.

[0032] The spun yarn take-up apparatuses 2 are lined up in the left-right direction and each of the spun yarn take-up apparatuses 2 takes up yarns Y spun out from a spinning unit 3 of a spinning apparatus provided above the spun yarn take-up apparatus 2, and form packages P by winding the yarns Y onto bobbins B. In order to downsize the entire spun yarn winding system 1 as much as possible, the intervals between the spun yarn take-up apparatuses 2 are minimized.

(Spun Yarn Take-Up Apparatus)

[0033] Now, the structure of the spun yarn take-up ap-

paratus 2 will be described with reference to FIG. 2. FIG. 2 is a side view of the spun yarn take-up apparatus 2. The spun yarn take-up apparatus 2 includes a first godet roller 11, a second godet roller 12 (this roller is equivalent to godet rollers of the present invention), a yarn regulating guide 16 for taking up the yarns Y spun out from the spinning unit 3 of the spinning apparatus (see FIG. 1), a controller 18 configured to control the spun yarn take-up apparatus 2, and a yarn winder 6 configured to form packages P by winding the taken-up yarns Y onto bobbins B.

[0034] The first godet roller 11 is a roller having an axis substantially in parallel to the left-right direction and is provided above a front end portion of the yarn winder 6. The first godet roller 11 is rotationally driven by a motor which is not illustrated. The second godet roller 12 is a roller having an axis substantially in parallel to the left-right direction and is provided above and rearward of the first godet roller 11. The second godet roller 12 is rotationally driven by a motor which is not illustrated.

[0035] The second godet roller 12 is movably supported by a guide rail 14. The guide rail 14 extends obliquely upward and rearward. The second godet roller 12 is, for example, arranged to be movable along the guide rail 14 by members such as a motor 13, a pulley pair (not illustrated), and a belt (not illustrated). The motor 13 is electrically connected to the controller 18. With this, the second godet roller 12 is movable between a position where winding of the yarns Y (hereinafter, this position may be referred to as a yarn winding position of the roller) and a position which is close to the first godet roller 11 and where the yarn threading operation is carried out (hereinafter, this position may be referred to as a yarn threading position of the roller). In FIG. 2, the position of the second godet roller 12 when the yarns Y are wound (the yarn winding position of the roller) is indicated by full lines, whereas the position of the second godet roller 12 when the yarn threading operation is performed (the yarn threading position of the roller) is indicated by dashed lines. The yarn threading position of the roller is forward of and below the yarn winding position of the roller.

[0036] The yarn regulating guide 16 is provided above the first godet roller 11. The yarn regulating guide 16 is, for example, a known yarn guide with a comb teeth shape. When the yarns Y are threaded thereon, the yarn regulating guide 16 regulates the interval between neighboring yarns Y to a predetermined value.

(Electric Architecture)

[0037] Now, an electric architecture of the spun yarn take-up apparatus 2 will be described. The controller 18 configured to control the spun yarn take-up apparatus 2 controls a motor (not illustrated) for rotationally driving the first godet roller 11, a motor (not illustrated) for rotationally driving the second godet roller 12, and a motor 13 for moving the second godet roller 12. The controller 18 is electrically connected to a controlling unit 26 of the later-described yarn winder 6 and communicates with the controlling unit 26.

(Yarn Winder)

[0038] Now, the yarn winder 6 will be described. The yarn winder 6 is provided below the first godet roller 11, the second godet roller 12, and the yarn regulating guide 16. The yarn winder 6 includes members such as: a base 20; a guide unit 21; traverse guides 22; a turret 23; two bobbin holders 24; a contact roller 25; and a controlling unit 26.

[0039] The base 20 is provided to vertically extend at a rear portion of the yarn winder 6. The base 20 supports members such as the turret 23, the contact roller 25, and a later-described frame 27.

[0040] The guide unit 21 distributes the yarns Y supplied from the second godet roller 12 to the traverse guides 22, respectively. The yarns Y are threaded onto the guide unit 21. The guide unit 21 includes members such as fulcrum guides 41 which function as fulcrums when the yarns are traversed. The guide unit 21 will be detailed later.

[0041] The traverse guides 22 are respectively provided for the yarns Y, and are lined up in the front-rear direction. The traverse guides 22 are driven by a common traverse motor (not illustrated) and reciprocate in the front-rear direction. With this, the yarns Y threaded onto the traverse guides 22 are traversed about the fulcrum guides 41.

[0042] The turret 23 is a disc-shaped member having an axis substantially in parallel to the front-rear direction, and is rotatably supported by the base 20. The turret 23 is rotationally driven by a turret motor which is not illustrated.

[0043] To each of the two bobbin holders 24, bobbins B are attached.

[0044] Each of the two bobbin holders 24 is rotatably supported at an upper end portion or a lower end portion of the turret 23 supported by the base 20, and extends forward (in one of predetermined directions of the present invention) from the turret 23. To put it differently, the two bobbin holders 24 are cantilevered by the base 20 which is provided behind (on the side of the other one of the predetermined directions of the present invention) the bobbin holders 24. The axes of the two bobbin holders 24 are substantially in parallel to the front-rear direction.

[0045] Bobbins B are attached to each bobbin holder 24. The bobbins B are respectively provided for the yarns Y and lined up in the front-rear direction. The number of the bobbins B attached to one bobbin holder is, for example, 16. The two bobbin holders 24 are rotationally driven by their respective winding motors (not illustrated).

[0046] The contact roller 25 is a roller having an axis substantially in parallel to the front-rear direction and is provided immediately above the upper bobbin holder 24. The contact roller 25 is configured to make contact with the surfaces of the packages P supported by the upper bobbin holder 24. With this, the contact roller 25 applies

a contact pressure to the surfaces of the unfinished packages P, to adjust the shape of the packages P.

[0047] The frame 27 is a column-shaped member provided for supporting the guide unit 21 and the like. The frame 27 is attached to an upper part of the base 20 to extend forward from the base 20, and is above the contact roller 25. At an upper part of the frame 27, the guide unit 21 is supported. To a front end portion of the frame 27, a head portion 31 is attached. The head portion 31 is provided forward of a part of the guide unit 21 (which part is, for example, a later-described guide rail 43). At the head portion 31, members such as motors (not illustrated) and an operation unit 32 including unillustrated operation switches allowing the operator to perform operations are provided. The operation unit 32 is electrically connected to the controlling unit 26. An external part of the head portion 31 is covered with a head cover 35 for the purpose of, for example, safety of the operator.

[0048] The controlling unit 26 includes members such as a turret motor (not illustrated), a traverse motor (not illustrated), and solenoid valves 49 and 55 which will be described later. The controlling unit 26 is electrically connected to the operation unit 32. As the operator operates the operation unit 32, the controlling unit 26 causes each component of the yarn winder 6 to perform a predetermined action. The controlling unit 26 is electrically connected to the controller 18.

[0049] In the yarn winder 6 structured as described above, when the upper bobbin holder 24 is rotationally driven, the yarns Y traversed by the traverse guides 22 are wound onto the bobbins B, with the result that the packages P are formed. When the formation of the packages P is completed, the turret 23 rotates to switch over the upper and lower positions of the two bobbin holders 24. As a result, the bobbin holder 24 having been at the lower position is moved to the upper position, which allows the yarns Y to be wound onto the bobbins B attached to the bobbin holder 24 having been moved to the upper position, to form packages P. The bobbin holder 24 to which the fully-formed packages P are attached is moved to the lower position, and the packages P are collected by, for example, an unillustrated package collector.

[0050] Before the yarns Y are newly wound onto the bobbins B having been moved to the upper position, a later-described yarn threading operation is carried out for the fulcrum guides 41. In this regard, because the spun yarn take-up apparatuses 2 are provided at the narrowest possible intervals in the left-right direction, it is difficult for the operator to, for example, stand between two spun yarn take-up apparatuses 2 to perform the operation. The yarn threading operation is therefore predominantly carried out from the front side.

[0051] In connection with the above, in order to improve the production efficiency, the number of the packages P which are simultaneously formed tends to be large these days, as the number of bobbins B attachable to each bobbin holder 24 is arranged to be large. When the number of bobbins B is large, the number of the fulcrum guides 41 corresponding to the bobbins B is large, too. Furthermore, the interval between the fulcrum guides 41 and the traverse guides 22 in the up-down direction may be narrow. For example, when the number of the bobbins B is increased while the size of the bobbin holder 24 is unchanged in the front-rear direction as compared to the conventional ones, the width of each bobbin B and the traversal width of the yarn Y are shortened. As a result, in order to adjust the maximum angle between the locus of the traversal and the yarn Y to be more or less identical with the maximum angle in the conventional cases (i.e., in order to maintain the tension of the wound yarn Y at the end portions of the package P to be more or less identical with the tension in the conventional cases), it is necessary to shorten the distance between the fulcrum guides 41 and the traverse guides 22 in the up-down direction. Furthermore, because this requires the fulcrum guides 41 to be provided at lower positions than the conventional cases, the guide unit 21 tends to overlap the head portion 31 in the front-rear direction. For these reasons, the later-described yarn threading operation may be impeded. Under this circumstance, the guide unit 21 is arranged as described below in the present embodiment.

(Guide Unit)

[0052] The structure of the guide unit 21 will be described with reference to FIG. 2 and FIGs. 3(a) and 3(b). FIGs. 3(a) and 3(b) are perspective views of the guide unit 21 and its surroundings. FIG. 3(a) shows the position of the guide unit 21 when the yarns Y are being wound onto the bobbins B. FIG. 3(b) shows the position of the guide unit 21 when the yarn threading operation is carried out.

[0053] The guide unit 21 includes the fulcrum guides 41, a guide supporter 42, and a guide rail 43 (equivalent to an assisting member guide unit of the present invention). As described above, the yarns Y are wound onto the respective fulcrum guides 41, and the fulcrum guides 41 function as fulcrums of the traversal of the respective yarns Y. The fulcrum guides 41 are attached to the guide supporter 42 to be movable in a relative manner, and are lined up in the front-rear direction. Two neighboring fulcrum guides 41 are connected to each other by an unillustrated belt. To the rearmost fulcrum guide 41, a slider 46 is connected.

[0054] The guide supporter 42 is a column-shaped member extending in the front-rear direction, which is provided to support the fulcrum guides 41 to be movable in a relative manner. The guide supporter 42 is supported by the frame 27 via a later-described link mechanism 44. Into the guide supporter 42, an air cylinder 48 is inserted. The air cylinder 48 is connected to the slider 46. As the air cylinder 48 is driven, the slider 46 moves in the front-rear direction. Supply and discharge of air are switched, for example, by a solenoid valve 49. In accordance with the movement of the slider 46, the fulcrum guides 41

move in the front-rear direction along the guide supporter.

[0055] When the yarns Y are being wound onto the bobbins B, the fulcrum guides 41 are provided at predetermined intervals in the front-rear direction, as shown in FIG. 3(a). In the meanwhile, before the later-described yarn threading operation, the slider 46 moves forward as the air cylinder 48 is driven, with the result that the fulcrum guides 41 move forward along the guide supporter 42 to narrow the intervals, as shown in FIG. 3(b). As such, the fulcrum guides 41 can be gathered at the front end portion.

[0056] The guide rail 43 is a substantially rectangular plate for guiding a yarn threading assisting tool 61 (a yarn threading assisting member of the present invention; see FIG. 3(b), FIG. 5, and FIG. 6) which is used in the yarn threading operation. In the yarn threading operation, the yarn threading assisting tool 61 retains the yarns Y in the respective grooves 62 and moves the yarns Y to the fulcrum guides 41 to thread the respective yarns Y onto the respective fulcrum guides 41. The guide rail 43 is attached to the lower side of the front end portion of the guide supporter 42, and is provided so that the longitudinal direction of the guide rail 43 is along the front-rear direction. At the front end portion of the guide rail 43, an unillustrated rotation fulcrum is provided. The guide rail 43 is rotatable about this rotation fulcrum. The posture of the guide rail 43 is switchable, by an unillustrated posture switcher, between a retreat posture and a guide posture. When the yarns Y are being wound onto the bobbins B, the guide rail 43 takes the retreat posture so that the longitudinal direction of the rail is substantially in parallel to the front-rear direction and the rail is retreated to a position below the guide supporter 42, in order to avoid interference with the yarns Y (see FIG. 3 (a)). Before the yarn threading operation, the guide rail 43 rotates to tilt in the left-right direction with respect to the front-rear direction (i.e., with respect to the longitudinal direction of the guide supporter 42). In this way, when the yarn threading operation is carried out, the guide rail 43 takes the guide posture so that the guide rail 43 is tilted to guide the yarn threading assisting tool 61 (see FIG. 3(b) and FIG. 6).

[0057] In this connection, each fulcrum guide 41 has a certain width in the front-rear direction. On this account, when the number of the fulcrum guides 41 is large, even if the fulcrum guides 41 are gathered to a front-side position (see the full lines in FIG. 3(b)), the rearmost fulcrum guide 41 is still far from the operator, and the yarn threading operation for that fulcrum guide is difficult. Furthermore, when the yarns Y are being wound onto the bobbins B, the guide rail 43 is right behind the head portion 31 (see FIG. 2). For this reason, even if the guide rail 43 takes the guide posture (see the full lines in FIG. 3(b)), the yarn threading operation may not be smoothly done because, for example, the head portion 31 hinders the operation.

[0058] In addition to the above, when the interval between the fulcrum guides 41 and the traverse guides 22 in the up-down direction is narrow, the working space below the fulcrum guides 41 is small, with the result that the yarn threading operation may be hindered because, for example, a hand of the operator, a tool for yarn threading, or the like interferes with the guide unit 21, the traverse guides 22, or the like.

[0059] In consideration of the above, the guide unit 21 is supported by the frame 27 via the link mechanism 44 which is described below. The link mechanism 44 is provided between the guide unit 21 and the frame 27 to move the guide unit 21 between two positions, i.e., the yarn winding position (a yarn winding position of a unit in the present invention) and the yarn threading position (a yarn threading position of a unit in the present invention), relative to the frame 27. As shown in FIG. 3(a) and 3(b), main components of the link mechanism 44 are an air cylinder 51 and links 52 and 53.

[0060] The air cylinder 51 is attached to a right side face of a rear part of the frame 27. The air cylinder 51 houses an unillustrated piston which moves in the front-rear direction as air is supplied and discharged. The supply and discharge of the air are switched, for example, by a solenoid valve 55. From the piston, a piston rod 54 extends rearward and upward. The air cylinder 51 is, on the base end side, rotatably connected to the frame 27 via a joint 51a.

[0061] The link 52 is an L-shaped flat plate. One end portion of the link 52 is rotatably connected to a leading end portion of the piston rod 54 via a joint 52a. The other end portion is rotatably connected to a rear end portion of the guide supporter 42 via a joint 52b. A bended portion between one end portion and the other end portion of the link 52 is rotatably connected, via a joint 52c, the upper side of the rear end portion of the frame 27. The link 53 is an L-shaped flat plate similar to the link 52. One end portion of the link 53 is not connected to any member. The other end portion of the link 53 is rotatably connected to a front end portion of the guide supporter 42 via a joint 53b. A bended portion between one end portion and the other end portion of the link 53 is rotatably connected, via a joint 53c, the upper side of the front end portion of the frame 27. With these arrangements, the guide supporter 42 is supported by the frame 27 via the links 52 and 53 to be substantially in parallel to the front-rear direction.

[0062] In the link mechanism 44 structured as described above, when no air is supplied to the air cylinder 51, the guide unit 21 is at the yarn winding position where the yarns Y are wound onto the bobbins B, as shown in FIG. 3(a). As the air is supplied to the air cylinder 51, the unillustrated piston and the piston rod 54 move rearward. In response to this, the link 52 connected to the leading end portion of the piston rod 54 rotates about the joint 52c. As the link 52 rotates, the guide supporter 42 connected to the other end portion of the link 52 via the joint 52b moves to a position forward of and above the yarn winding position (as indicated by two-dot chain lines in FIG. 3(b)). Because the link 53 rotates in the same man-

ner as the link 52 in accordance with the movement of the guide supporter 42, the posture of the guide supporter 42 is maintained to be in parallel to the front-rear direction. As such, the entirety of the guide unit 21 is movable between the yarn winding position and the yarn threading position which is forward of and above the yarn winding position. When the guide unit 21 is at the yarn threading position, the front end portion of the guide unit 21 is positioned rearward of the front end portion of the head portion 31 (i.e., the front end portion of the yarn winder 6).

(Yarn Threading)

[0063] Now, a yarn threading operation in the spun yarn take-up apparatus 2 structured as described above will be described with reference to FIG. 4 to FIG. 6. Each of FIGs. 4(a), 4(b), and 4(c) illustrates the movement of the guide unit 21. FIG. 5 shows an operation to thread, onto the yarn threading assisting tool 61, yarns Y threaded on the second godet roller 12. FIG. 6 shows a yarn threading operation performed by using the yarn threading assisting tool 61.

[0064] To begin with, as shown in FIG. 4(a), the yarns Y are wound onto the bobbins B so that the packages P are formed. In this state, the second godet roller 12 is at the yarn winding position of the roller. Furthermore, the fulcrum guides 41 are remote from one another and the guide unit 21 is at the yarn winding position.

[0065] Subsequently, when, for example, the formation of the packages P is completed, the yarn threading onto the fulcrum guides 41 is performed for preparation of winding of the yarns Y onto new empty bobbins B. To begin with, prior to the yarn threading operation, the controller 18 and the controlling unit 26 perform preparation for the yarn threading operation, when the operator operates the operation unit 32. To put it differently, as shown in FIG. 4(b), the controller 18 (see FIG. 2) controls the motor 13 so that the second godet roller 12 is moved from the yarn winding position of the roller to the yarn threading position of the roller to be close to the first godet roller 11. In this regard, the second godet roller 12 becomes close to the yarn winder 6 in the up-down direction and close to the front end portion of the yarn winder 6 in the front-rear direction. Furthermore, the controlling unit 26 controls the solenoid valve 49 (see fig. 3) so that the air cylinder 48 (see FIG. 3) is operated and the fulcrum guides 41 are gathered to the front end portion (guide gathering process).

[0066] In addition to the above, at this stage, the controlling unit 26 controls an unillustrated guide switching unit to switch the posture of the guide rail 43 from the retreat posture to the guide posture (see FIG. 3(b)). Furthermore, as shown in FIG. 4(c), the controlling unit 26 controls an electromagnetic valve 55 (see FIG. 3) to drive the air cylinder 51, so that the guide unit 21 is moved to the yarn threading position which is forward of and above the yarn winding position (unit drawing process). As a result, the guide unit 21 is drawn obliquely forward and upward without interfering with the head portion 31, and the fulcrum guides 41 become close to the operator and the second godet roller 12 at the yarn threading position. At this stage, all fulcrum guides 41 become close to the second godet roller 12 in the up-down direction. Furthermore, among the fulcrum guides 41, fulcrum guides on the rear side (at least the rearmost fulcrum guide) become close to the second godet roller 12 in the front-rear direction, too. In addition, the interval between the fulcrum guides 41 and the traverse guides in the up-down direction is widened, with the result that the working space is widened.

[0067] After the guide gathering process and the unit drawing process described above, as shown in FIG. 4(c), the operator places the yarns Y onto the first godet roller 11 and then onto the second godet roller 12 so that the yarns Y are lined up in the left-right direction, while the operator sucks and retains, by a suction gun 63, the yarns Y coming down from above. Furthermore, the operator threads the respective yarns Y onto the fulcrum guides 41 (a yarn threading step of the present invention). To be more specific, as shown in FIG. 5, the operator moves the yarn threading assisting tool 61 from the front side to the back side of parts of the yarns Y which are between the second godet roller 12 and the suction gun 63 (as indicated by an arrow), so as to thread the yarns Y into the respective grooves 62 of the yarn threading assisting tool 61. As a result, the yarn threading assisting tool 61 retains the yarns Y which are distributed in the respective grooves 62. The intervals of the yarns Y which are sucked from the second godet roller 12 toward the suction gun 63 increase in length toward the second godet roller 12. In contrast, either the intervals of the yarns Y decrease in length toward the suction gun 63 or the yarns Y close to the suction gun 63 are in contact with one another and entangled with one another. Because it is difficult to properly distribute the yarns Y to the grooves 62 of the yarn threading assisting tool 61 when the intervals of the yarns Y are narrow (as indicated by the yarn threading assisting tool 61 depicted by the two-dot chain lines), the distribution of the yarns Y by the yarn threading assisting tool 61 is carried out at a position relatively close to the second godet roller 12.

[0068] The operator then moves the yarn threading assisting tool 61 retaining the distributed yarns Y from the rear side to the front side along the guide rail 43, as shown in FIG. 6. As a result, the yarns Y are threaded onto the respective fulcrum guides 41. In this way, in the present embodiment, the yarn threading operation is carried out in the state in which the second godet roller 12 is at the yarn threading position of the roller, the fulcrum guides 41 are gathered to the front side, and the guide unit 21 is close to the second godet roller 12. In other words, the second godet roller 12 is significantly close to the fulcrum guides 41 when the yarn threading operation is carried out. On this account, the moving distance of the yarns Y, which is required to distribute the yarns Y and thread the yarns Y onto the fulcrum guides 41 after the yarns Y

are placed onto the second godet roller 12, is short, and hence the time required for the yarn threading is short. For further details of the yarn threading operation, see Patent Literature 1 (Japanese Unexamined Patent Publication No. 2015-164875).

[0069] As described above, the fulcrum guides 41 provided above the traverse guides 22 are gathered to the front end side of the bobbin holder 24. Furthermore, the entirety of the guide unit 21 is drawn to the yarn threading position which is forward of the yarn winding position. These arrangements further facilitate the yarn threading operation from the front side. The yarn threading onto the fulcrum guides 41 is therefore further facilitated.

[0070] In addition to the above, the guide unit 21 is movable forward and upward, i.e., obliquely upward and forward. To put it differently, as the guide unit 21 moves from the yarn winding position to the yarn threading position, the fulcrum guides 41 move away from the traverse guides 22 in the up-down direction and the distance between the fulcrum guides 41 and the traverse guides 22 increases. On this account, even in cases where the distance between the fulcrum guides 41 and the traverse guides 22 is narrow at the time of the yarn winding and the yarn threading may not be efficiently done, it is possible to widen the working space during the yarn threading operation and to restrain interferences between a hand of the operator, the yarn threading assisting tool 61, or the like and the guide unit 21, the traverse guides 22, or the like. The yarn threading operation is therefore further facilitated.

[0071] When the distance between the fulcrum guides 41 and the traverse guides 22 is narrow, the maintenance of the traverse guides 22 may not be efficiently done, either. In this regard, the maintenance can be efficiently done as the guide unit 21 is movable from the yarn winding position to the yarn threading position. That is to say, because the distance between the guide unit 21 and the traverse guides 22 in the up-down direction is long when the guide unit 21 is at the yarn threading position, the working space is wide and the maintenance of the traverse guides 22 can be efficiently done.

[0072] In the present embodiment, the guide unit 21 is movable upward. On this account, even when the head portion interferes with the guide unit 21 or is likely to obstruct the movement of the guide unit 21, the interference or obstruction of the guide unit 21 by the head portion 31 is avoided and the forward movement of the guide unit 21 is ensured.

[0073] In addition to the above, when the guide unit 21 is at the yarn threading position, the guide unit 21 does not protrude forward as compared to the head portion 31. This prevents the space for the yarn threading operation from being narrow on the front side. Furthermore, because the guide unit does not protrude forward as compared to the head portion 31, the degree of freedom in the layout of the yarn winder 6 is increased.

[0074] In addition to the above, the rear end portion of the bobbin holder 24 is cantilevered by the base 20. The front side is the leading end side of the bobbin holder 24, i.e., is the side on which the bobbins B are attached or detached. To put it differently, as the guide unit 21 moves from the yarn winding position to the yarn threading position, the fulcrum guides 41 become further close to the operator side. This facilitates the yarn threading operation.

[0075] In addition to the above, the guide unit 21 is provided with the guide rail 43 by which the yarn threading assisting tool 61 is guided. In other words, the guide rail 43 is movable to the yarn threading position together with the guide unit 21. This facilitates the yarn threading operation.

[0076] When an attachment such as the guide rail 43 is attached to the guide unit 21, the guide unit 21 tends to interfere with a member such as the head portion 31, as in the present embodiment. In such a case, moving the guide unit 21 obliquely forward and upward is particularly effective.

[0077] In addition to the above, after the guide gathering process of gathering the fulcrum guides 41 to the front side and the unit drawing process of moving the guide unit 21 to be forward of at least the yarn winding position, the yarn threading operation is carried out. This facilitates the yarn threading operation from the front side.

[0078] The following will describe modifications of the above-described embodiment. The members identical with those in the embodiment above will be denoted by the same reference numerals and the explanations thereof are not repeated.

(1) While in the embodiment above the yarn threading position of the guide unit 21 is forward of and above the yarn winding position of the guide unit 21, the yarn threading position may be forward of and either obliquely leftward of and above or obliquely rightward of and above the yarn winding position.

(2) The yarn threading position of the guide unit 21 may not be forward of and above the yarn winding position of the guide unit 21. The yarn threading position may be, for example, forward of and either leftward of or rightward of the yarn winding position of the guide unit 21. In other words, an arrangement different from the above may be employed as long as the guide unit 21 can be drawn to the front side.

(3) The distances between the yarn winding position of the guide unit 21 and the yarn threading position of the guide unit 21 in the front-rear direction and the up-down direction are changeable at will by, for example, replacing the links 52 and 53 of the link mechanism 44 with other links having different sizes and bending angles.

(4) While in the embodiment above the guide unit 21 is moved by the link mechanism 44, the disclosure is not limited to this arrangement. For example, a motor, a cylinder, or the like may be used as a driving source for moving the guide unit 21.

(5) While in the embodiment above the fulcrum

guides 41 are gathered to the front side before the yarn threading operation, the disclosure is not limited to this arrangement. As shown in FIG. 7 and FIG. 8, a guide unit 21a may not include the air cylinder 48 and the like, and the guide unit 21 may be movable between the yarn winding position (see FIG. 8(a)) and the yarn threading position (see FIG. 8(b)) forward of and above the yarn winding position, while the fulcrum guides 41 are not gathered to the front side. Also in this case, the fulcrum guides 41 move to the front side as the guide unit 21a moves from the yarn winding position to the yarn threading position, with the result that the yarn threading operation from the front side is facilitated. Furthermore, the distance between the fulcrum guides 41 and the traverse guides 22 in the up-down direction is elongated and the working space during the yarn threading operation is enlarged, with the result that the interference of a hand of the operator, or the like with the guide unit 21a, the traverse guides 22, or the like is less likely to occur. Furthermore, as the guide unit 21a moves from the yarn winding position to the yarn threading position, all fulcrum guides 41 become close to the second godet roller 12 in the up-down direction. As the second godet roller 12 is close to the fulcrum guides 41, the moving distance of the yarns Y required for the distribution of the yarns Y and yarn threading onto the fulcrum guides 41 is short. The yarn threading operation is therefore further facilitated. It is noted that, also in this modification, the yarn threading position may be forward of and either obliquely leftward of and above or obliquely rightward and above the yarn winding position.

(6) While in the modification (5) above the guide unit 21a is movable forward and upward, the disclosure is not limited to this arrangement. In other words, the yarn threading position may be above the yarn winding position. For example, as shown in FIG. 9, end portions in the front-rear direction of a guide unit 64 are supported from below by air cylinders 65 and 66, respectively. A piston rod 67 of the air cylinder 65 and a piston rod 68 of the air cylinder 66 extend upward. At the time of the yarn threading operation, the guide unit 64 move upward as the piston rods 67 and 68 move upward. With this arrangement, the guide unit 64 is movable between a yarn winding position (see FIG. 9(a)) and a yarn threading position (see FIG. 9(b)) above the yarn winding position. Also in this case, the distance between the fulcrum guides 41 and the traverse guides 22 in the up-down direction is increased and the working space during the yarn threading operation is enlarged, with the result that the interference of a hand of the operator, or the like with the guide unit 64, the traverse guides 22, or the like is less likely to occur. The yarn threading operation is therefore further facilitated. It is noted that the terms "above" and "upward" in this modification are not limited to "vertically above" and "vertically upward".

(7) In the guide unit 64 of the modification (6) above, the fulcrum guides 41 may be gathered to the front side. To put it differently, as shown in FIG. 10, a guide unit 64a may include an air cylinder 48 and a slider 46 (see FIG. 10(a)), and the air cylinder 48 may be driven before the yarn threading operation so that fulcrum guides 41 are gathered to the front side (see FIG. 10(b)). This further facilitates the yarn threading operation.

(8) While in the embodiment above the yarn winder 6 includes the head portion 31, the disclosure is not limited to this arrangement. That is to say, even if the head portion 31 is not provided forward of the guide unit 21, the distance between the fulcrum guides 41 and the traverse guides 22 in the up-down direction can be increased by moving the guide unit 21 to a position forward of and above the winding position. In this way, the working space at the time of the yarn winding is enlarged and the yarn threading operation is further facilitated.

(9) In the arrangement in which the fulcrum guides 41 can be gathered to the front side, the guide unit may be allowed to move only forward. That is to say, for example, as shown in FIG. 11, no head portion is attached to a front end portion of a frame 27 and a guide unit 70 is allowed to move only forward. Although any arrangement may be adopted for moving the guide unit 70 forward, the guide unit 70 may be arranged such that an air cylinder 71 is provided behind the guide unit 70 instead of a link mechanism and the guide unit 70 is movably supported by an unillustrated guide rail which extends in the front-rear direction. The leading end portion of a piston rod 72 of the air cylinder 71 is attached to a rear end portion of the guide unit 70, and moves in the front-rear direction in accordance with the supply and discharge of air. With this arrangement, the guide unit 70 is movable between a yarn winding position (see FIG. 11(a)) and a yarn threading position (see FIG. 11(b)) forward of the yarn winding position.

(10) While in the embodiment above the unit drawing process is executed after the guide gathering process, the disclosure is not limited to this arrangement. The guide gathering process may be executed after the unit drawing process, or the unit drawing process may be executed while the guide gathering process is being executed.

(11) While in the embodiment above the controlling unit 26 executes the guide gathering process and the unit drawing process, the fulcrum guides 41 and the guide unit 21 may be manually moved by the operator.

(12) While in the embodiment above the second godet roller 12 is movable between the yarn winding position of the roller and the yarn threading position of the roller by the motor 13 or the like, the disclosure is not limited to this arrangement. As a roller moving

mechanism for moving the second godet roller 12, for example, an air cylinder (not illustrated) may be used as a driving source. Alternatively, a ball screw mechanism (not illustrated) or the like may be used as the roller moving mechanism. Alternatively, the second godet roller 12 may be manually moved by the operator.

(13) While in the embodiment above the operator performs the yarn threading operation, the disclosure is not limited to this arrangement. For example, as shown in FIG. 12, the yarn threading operation may be performed by a yarn threading robot 80 which is provided forward of and above the spun yarn take-up apparatus 2. This yarn threading robot 80 hangs down from an unillustrated rail extending in the left-right direction and is arranged to be movable in the left-right direction. The yarn threading robot 80 includes: an arm member 81 which is arranged to be three-dimensionally movable on account of arms 82 and a joint 83; and a yarn threading unit 84 provided at a leading end portion of the arm member 81. The yarn threading unit 84 includes a suction 85 configured to suck yarns and a yarn separation guide 86 which is similar in shape to the yarn threading assisting tool 61 (see FIG. 3(b), FIG. 5, and FIG. 6). In this case, the yarn separation guide 86 is equivalent to the yarn threading assisting member of the present invention. This yarn threading robot 80 may thread yarns Y onto fulcrum guides 41 from the front side.

(14) The guide unit 21 may not have the guide rail 43 by which the yarn threading assisting tool 61 or the like is guided. Also in this case, the yarn threading operation is easily done as the guide unit 21 is movable. It is therefore possible to perform yarn threading by obliquely moving the yarn threading assisting tool 61 retaining the yarns Y with respect to the fulcrum guides 41. Alternatively, the yarns Y may be threaded onto the fulcrum guides 41 one by one without using the yarn threading assisting tool 61.

(15) The bobbin holder 24 may not be cantilevered.

(16) The yarn winder 6 may wind yarns which are not spun yarns.

Claims

1. A yarn winder comprising:

a bobbin holder which extends in a predetermined direction, bobbins on which yarns are wound, respectively, being attached to the bobbin holder to be lined up in the predetermined direction;

traverse guides which are provided above the bobbin holder and traverses the yarns; and

a guide unit which is provided above the traverse guides and includes fulcrum guides and a guide supporter, the fulcrum guides being lined up in the predetermined direction and functioning as fulcrums of traversal of the yarns, and the guide supporter extending in the predetermined direction and supporting the fulcrum guides,

the fulcrum guides being gatherable to an end portion of the guide supporter, the end portion being on one side in the predetermined direction, and

the guide unit being movable between a yarn winding position where the yarns are wound onto the respective bobbins and a yarn threading position which is at least on the one side in the predetermined direction of the yarn winding position.

2. The yarn winder according to claim 1, wherein, the yarn threading position is on the one side in the predetermined direction of and above the yarn winding position.

3. The yarn winder according to claim 2, further comprising:

a frame which extends in the predetermined direction along the guide unit and supports the guide unit to be movable in a relative manner in the predetermined direction; and

a head portion which is attached to an end portion of the frame, the end portion being on the one side in the predetermined direction.

4. The yarn winder according to claim 3, wherein, no matter whether the guide unit is at the yarn winding position or at the yarn threading position,

an end portion of the guide unit, which is on the one side in the predetermined direction, is on the other side in the predetermined direction of the end portion of the head portion, which is on the one side in the predetermined direction.

5. The yarn winder according to any one of claims 1 to 4, wherein, the bobbin holder is cantilevered by a base which is provided on the other side in the predetermined direction.

6. The yarn winder according to any one of claims 1 to 5, wherein, the guide unit includes an assisting member guide unit which guides a yarn threading assisting member which retains the yarns when the yarns are threaded onto the fulcrum guides.

7. A yarn winder comprising:

a bobbin holder which extends in a predetermined direction, bobbins on which yarns are wound, respectively, being attached to the bobbin holder to be lined up in the predetermined

direction;
traverse guides which are provided above the bobbin holder and traverses the yarns; and
a guide unit which is provided above the traverse guides and includes fulcrum guides which are lined up in the predetermined direction and function as fulcrums of traversal of the yarns,
the guide unit being movable between a yarn winding position where the yarns are wound onto the respective bobbins and a yarn threading position which is positioned above the yarn winding position.

8. The yarn winder according to claim 7, wherein, the yarn threading position is on one side in the predetermined direction of and above the yarn winding position.

9. A spun yarn take-up apparatus comprising:

a godet roller on which yarns spun out from a spinning apparatus are wound to be lined up in an axial direction of the godet roller; and
a yarn winder which is provided below the godet roller and is configured to wind the yarns,
the yarn winder including:

a bobbin holder which extends in a predetermined direction which intersects with the axial direction of the godet roller, bobbins on which the yarns are wound, respectively, being attached to the bobbin holder to be lined up in the predetermined direction;
traverse guides which are provided above the bobbin holder and traverses the yarns; and
a guide unit which is provided above the traverse guides and includes fulcrum guides which are lined up in the predetermined direction and function as fulcrums of traversal of the yarns,

the godet roller being movable between a yarn winding position of a roller where the yarns are wound onto the bobbins and a yarn threading position of a roller, which is close to an end portion of the yarn winder as compared to the yarn winding position, the end portion being on one side in the predetermined direction,
the fulcrum guides being gatherable to an end portion of the guide supporter, the end portion being on the one side in the predetermined direction, and
the guide unit being movable between a yarn winding position of a unit where the yarns are wound onto the respective bobbins and a yarn threading position of a unit which is at least on the one side in the predetermined direction of the yarn winding position.

10. A yarn take-up apparatus comprising:

a godet roller on which yarns spun out from a spinning apparatus are wound to be lined up in an axial direction of the godet roller; and
a yarn winder which is provided below the godet roller and is configured to wind the yarns,
the yarn winder including:

a bobbin holder which extends in a predetermined direction which intersects with the axial direction of the godet roller, bobbins on which the yarns are wound, respectively, being attached to the bobbin holder to be lined up in the predetermined direction;
traverse guides which are provided above the bobbin holder and traverses the yarns; and
a guide unit which is provided above the traverse guides and includes fulcrum guides which are lined up in the predetermined direction and function as fulcrums of traversal of the yarns,

the godet roller being movable between a yarn winding position of a roller where the yarns are wound onto the bobbins and a yarn threading position of a roller which is close to the yarn winder in an up-down direction as compared to the yarn winding position, and
the guide unit being movable between a yarn winding position of a unit where the yarns are wound onto the respective bobbins and a yarn threading position of the unit, which is positioned above the yarn winding position.

11. A yarn threading method in the yarn winder according to claim 1, comprising the steps of:

(i) gathering the fulcrum guides one end portion in the predetermined direction of the guide supporter;
(ii) moving the guide unit from a yarn winding position where the yarns are wound onto the respective bobbins to a yarn threading position which is at least on one side in the predetermined direction of the yarn winding position; and

after the steps (i) and (ii), threading the yarns onto the fulcrum guides, respectively.

FIG.1

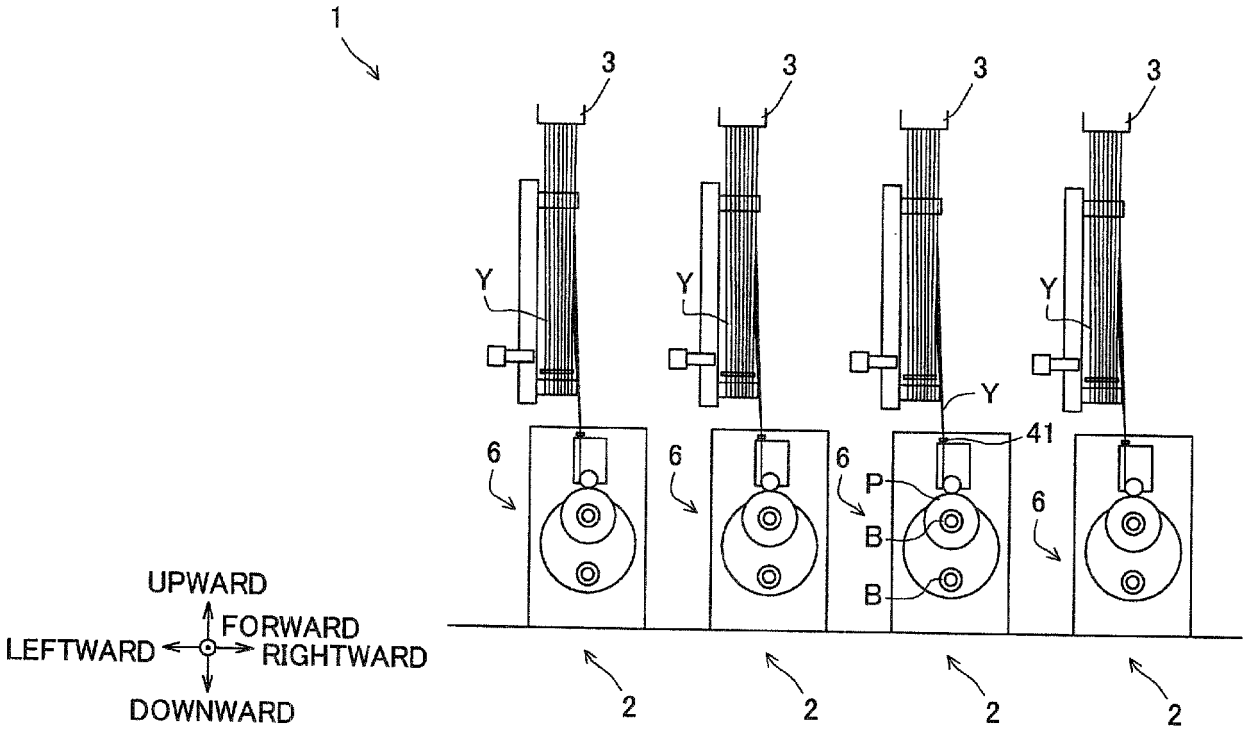
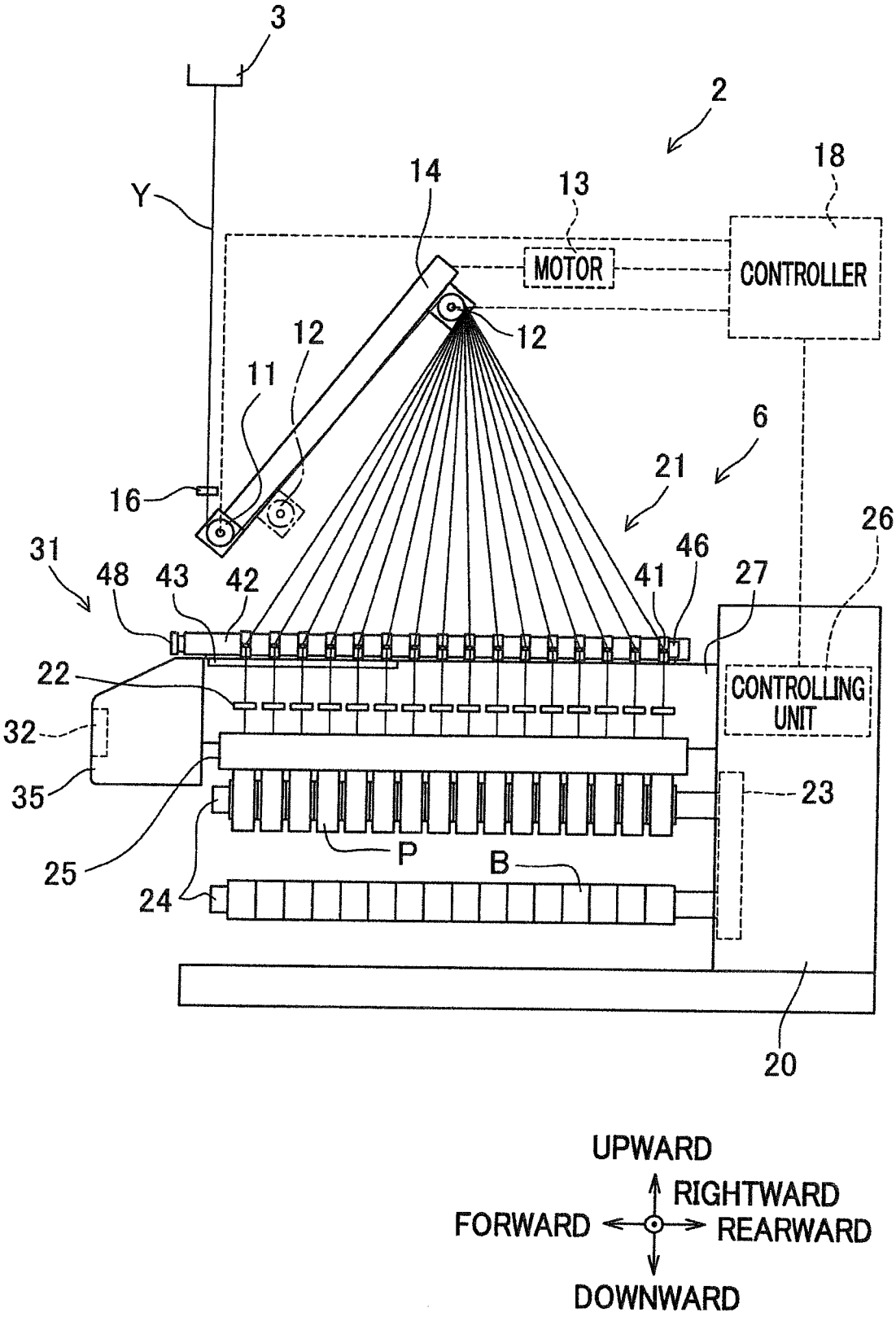

1
3
3
3
3
Y
Y
Y
Y
41
6
6
6
6
P
B
B
UPWARD
FORWARD
LEFTWARD
RIGHTWARD
DOWNWARD
2
2
2
2

FIG.2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2
18
14
13
Y
MOTOR
CONTROLLER
12
12
11
6
21
16
26
31
46
48
43
42
41
27
22
CONTROLLING UNIT
32
23
35
P
B
25
24
20
UPWARD
RIGHTWARD
FORWARD
REARWARD
DOWNWARD

FIG.3

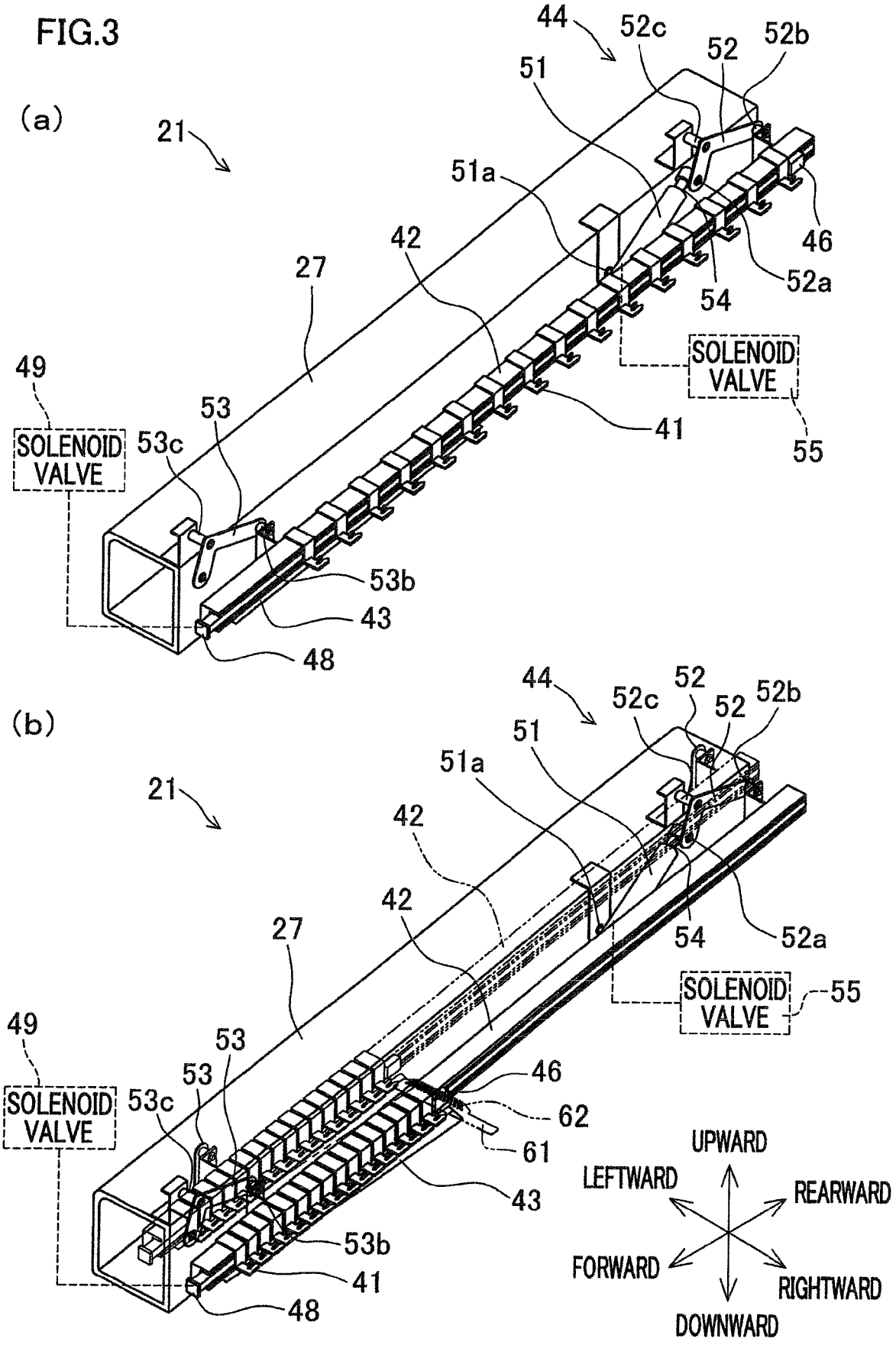
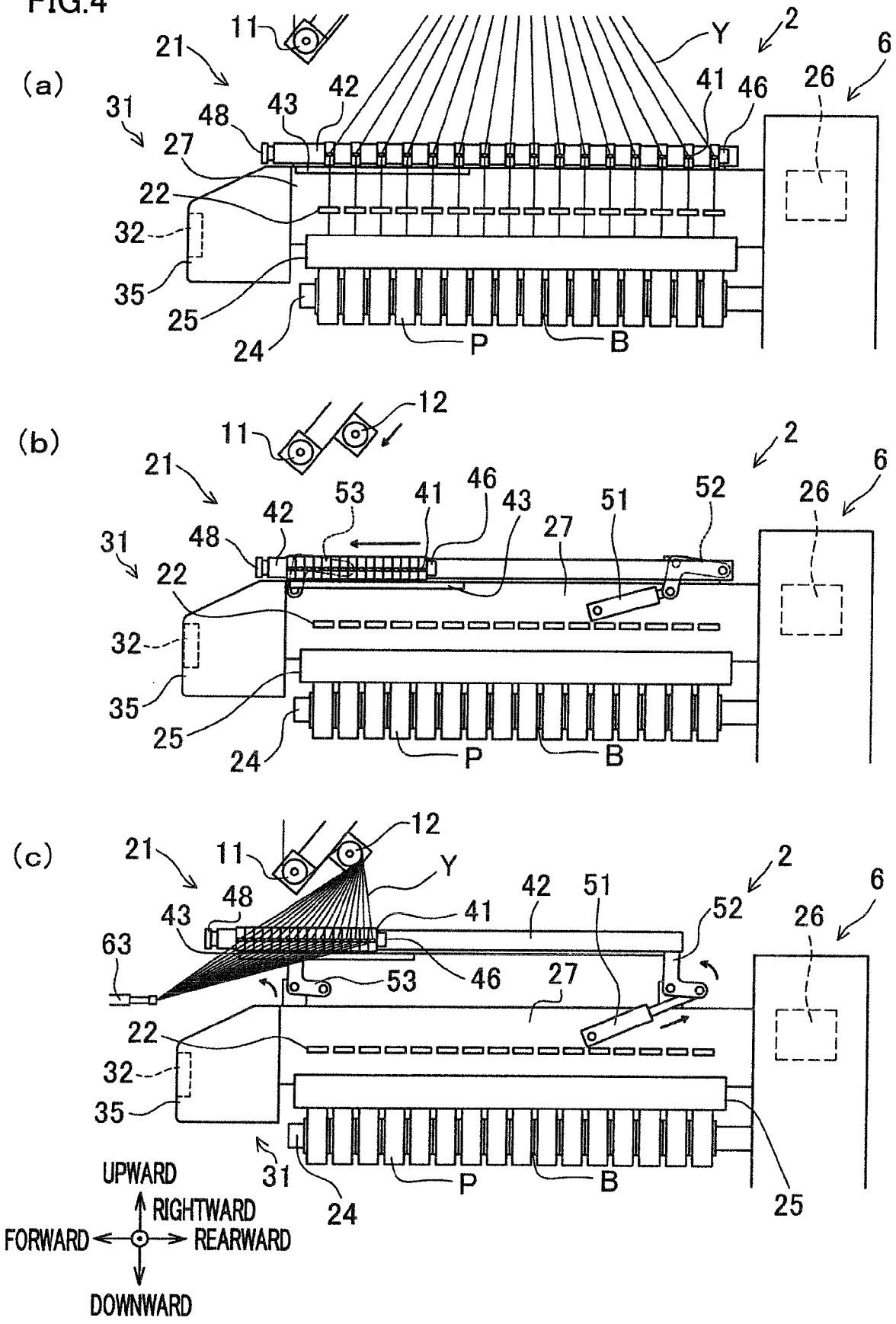

(a)
21
44
52c
52
52b
51
51a
42
27
46
52a
54
SOLENOID VALVE
55
41
49
SOLENOID VALVE
53
53c
53b
43
48
(b)
21
44
52c
52
52b
51
51a
42
42
27
54
52a
SOLENOID VALVE
55
49
SOLENOID VALVE
53
53
53c
46
62
61
43
53b
41
48
UPWARD
LEFTWARD
REARWARD
FORWARD
RIGHTWARD
DOWNWARD

FIG.4


(a)
11
21
Y
2
6
41
46
26
31
48
43
42
27
22
32
35
25
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(b)
12
11
2
21
6
53
41
46
43
51
52
26
42
27
31
48
22
32
35
25
24
P
B
(c)
12
21
11
Y
2
6
42
51
48
43
41
52
26
63
53
46
27
22
32
35
31
24
P
B
25
UPWARD
RIGHTWARD
FORWARD
REARWARD
DOWNWARD

FIG.5

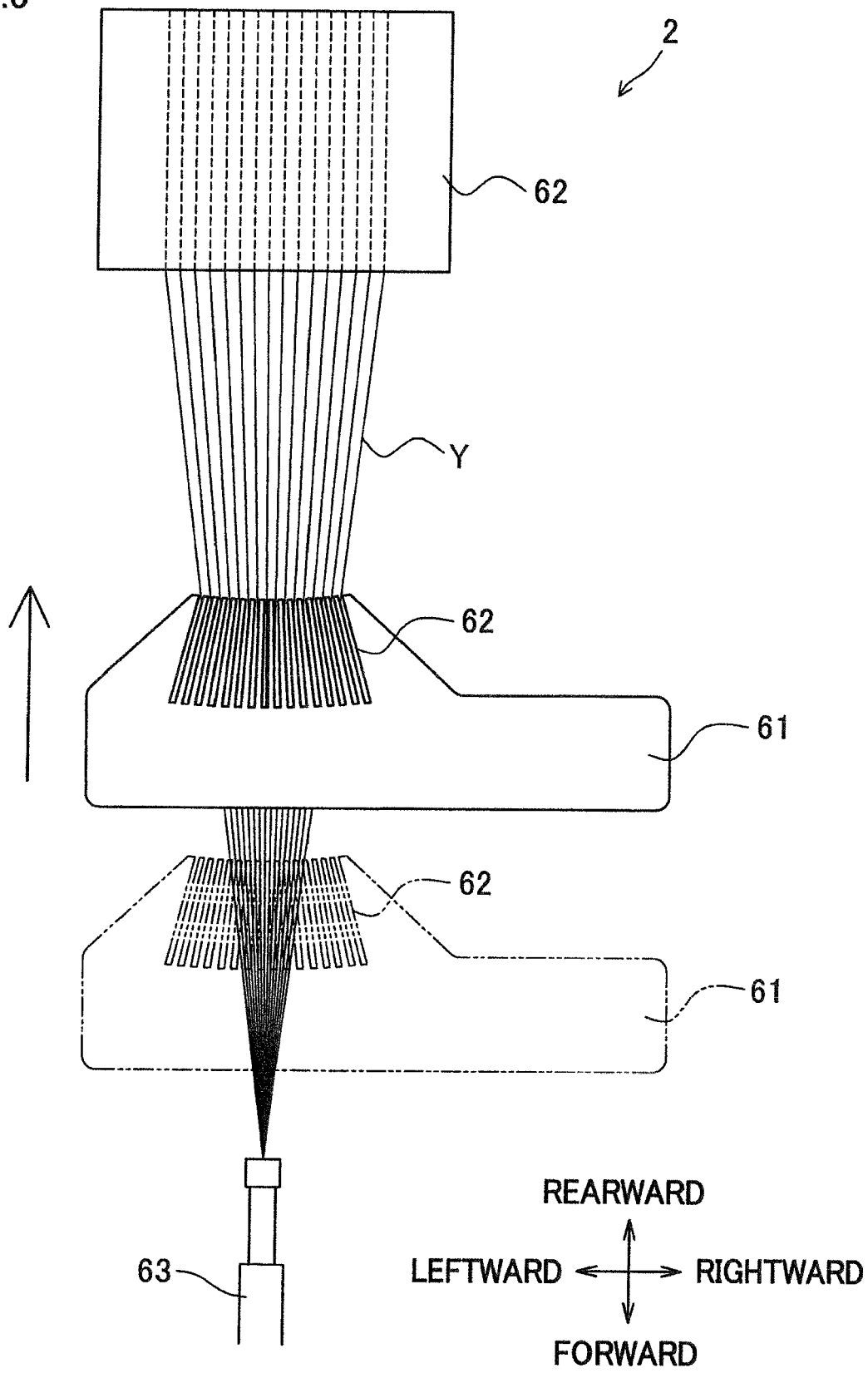


FIG.6

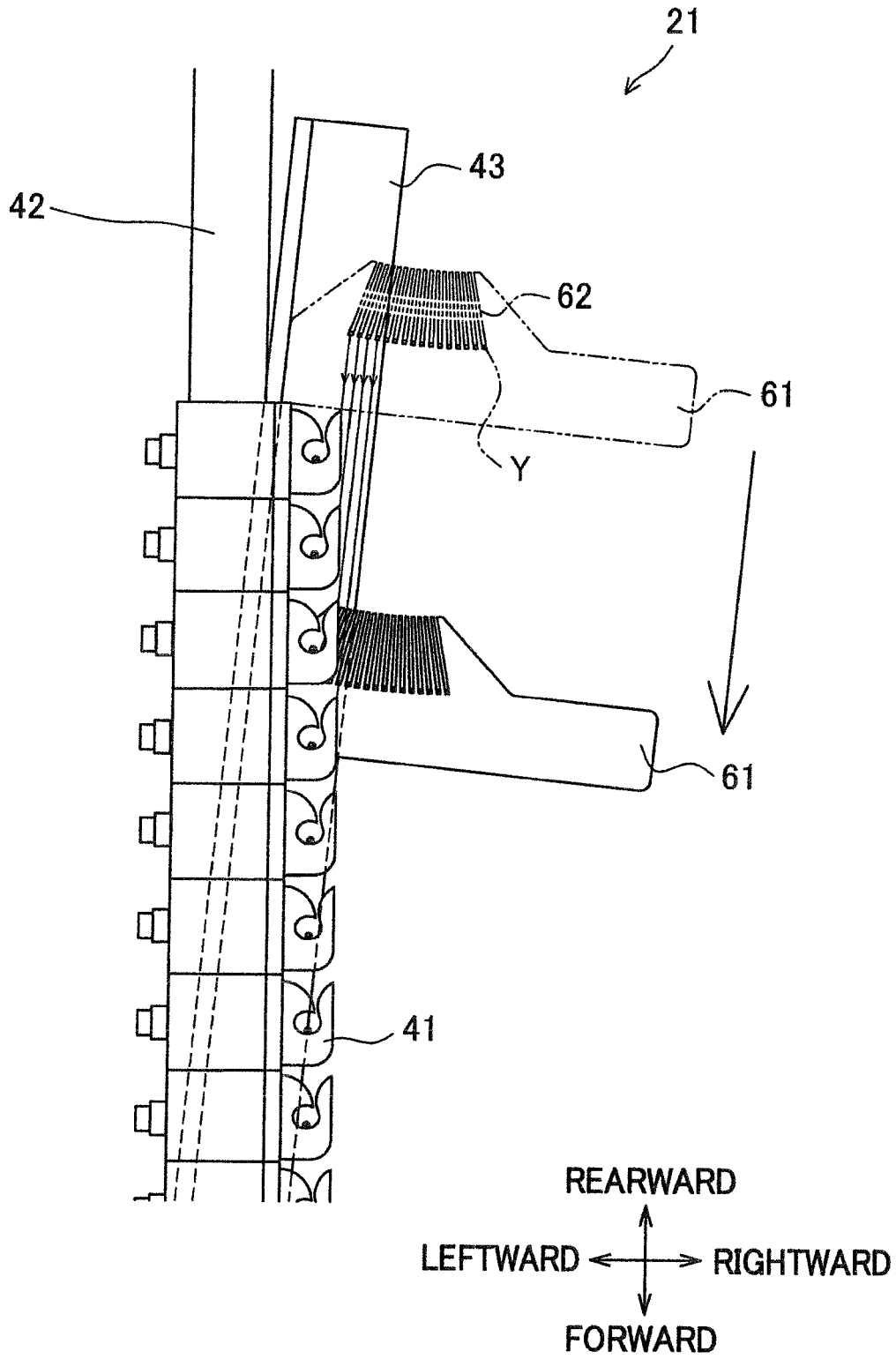
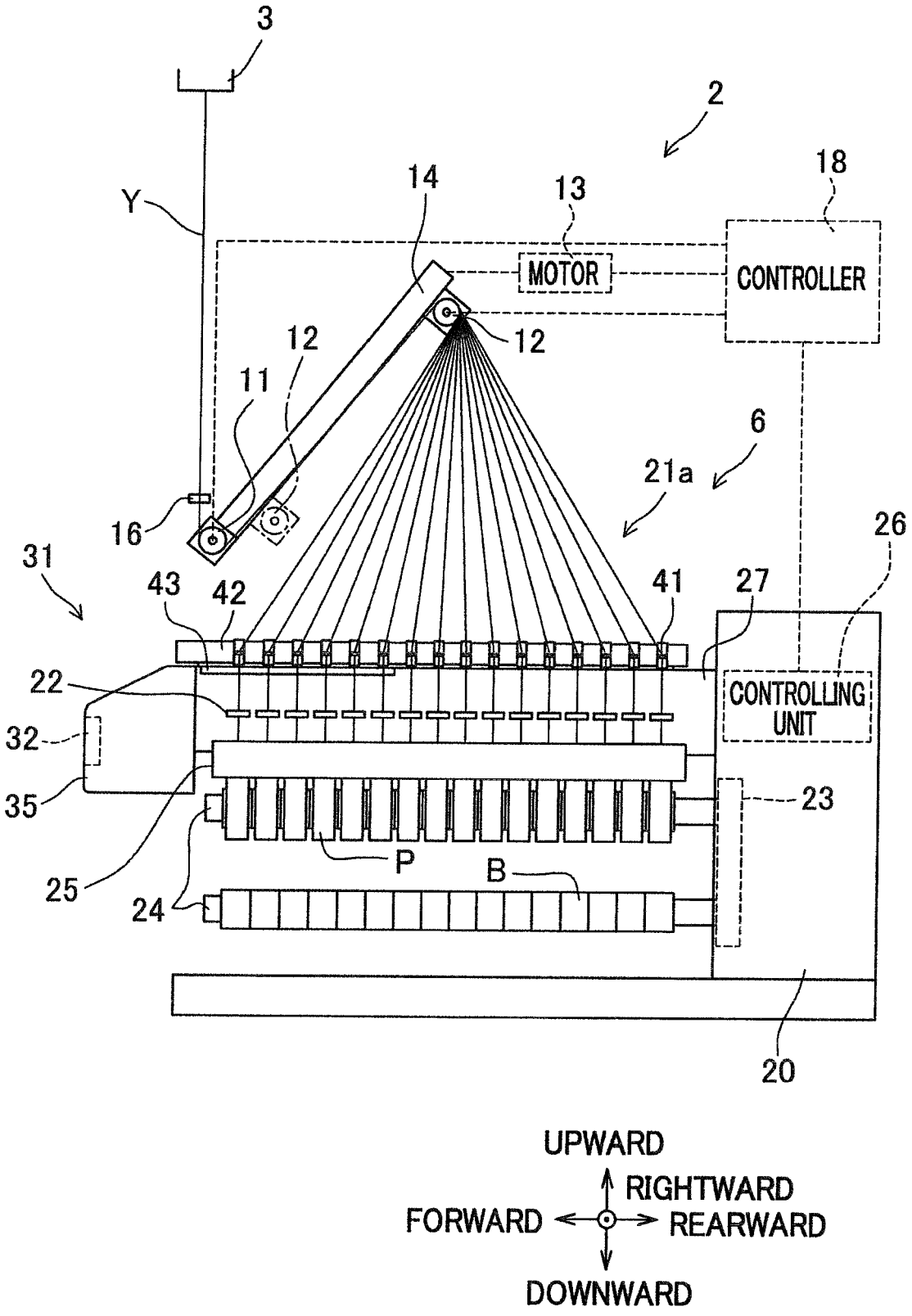


FIG.7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18
Y
14
13
MOTOR
CONTROLLER
12
12
11
6
21a
16
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42
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22
CONTROLLING UNIT
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P
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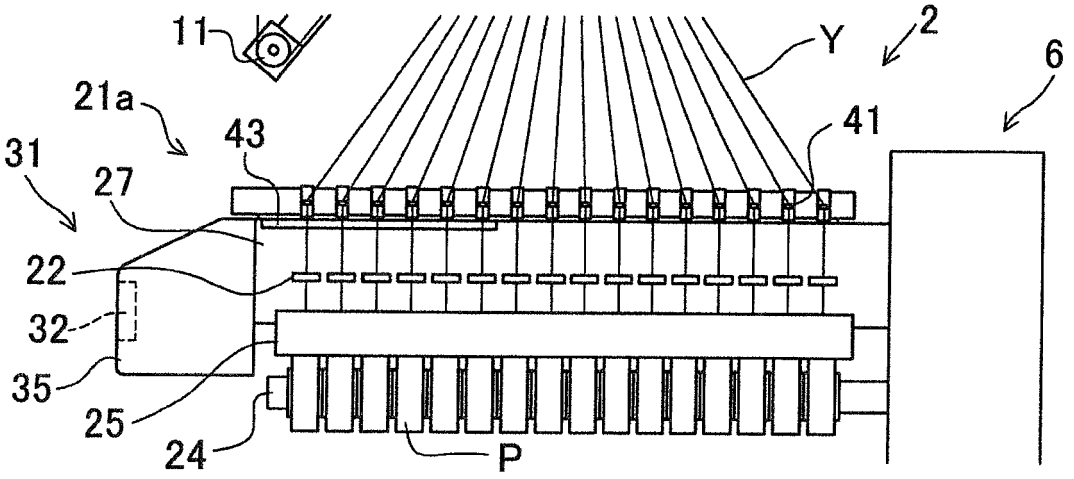
UPWARD
RIGHTWARD
FORWARD
REARWARD
DOWNWARD

FIG.8

(a)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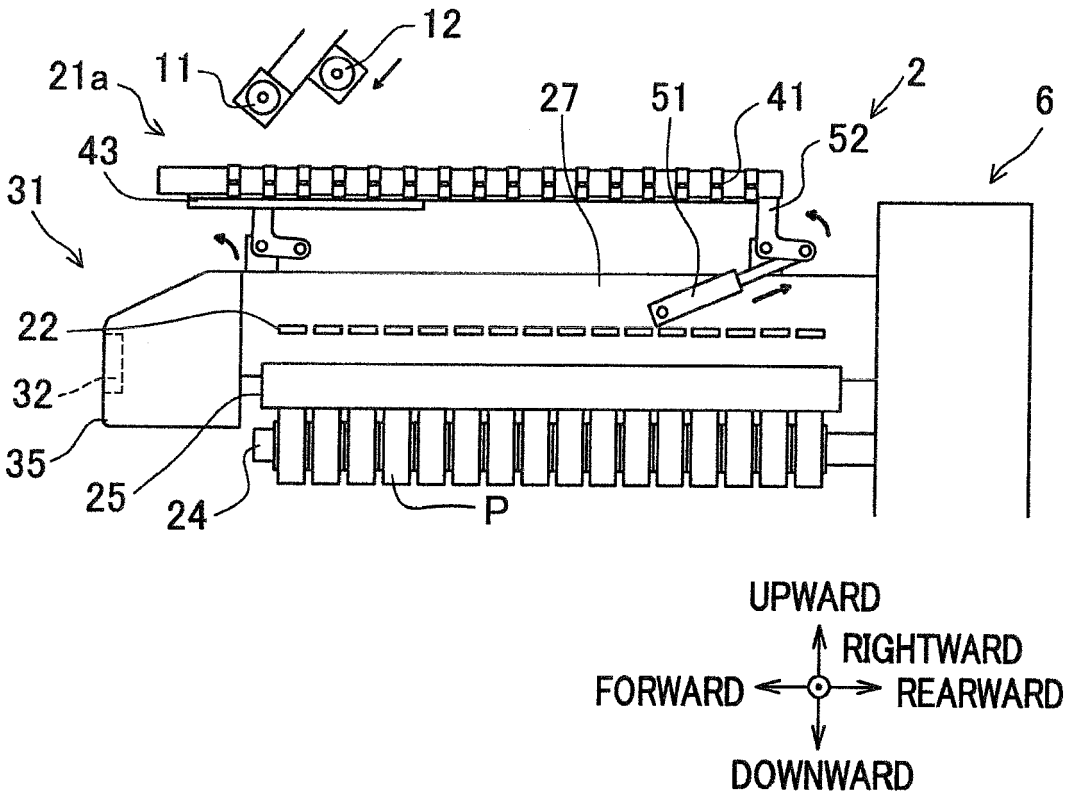
(b)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21a
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27
51
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52
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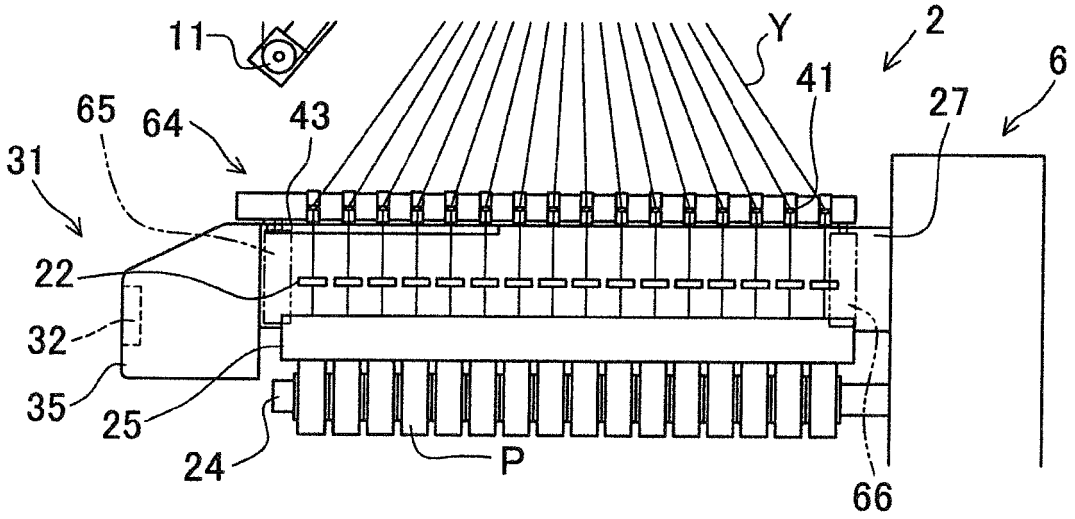
UPWARD
RIGHTWARD
FORWARD
REARWARD
DOWNWARD

FIG.9

(a)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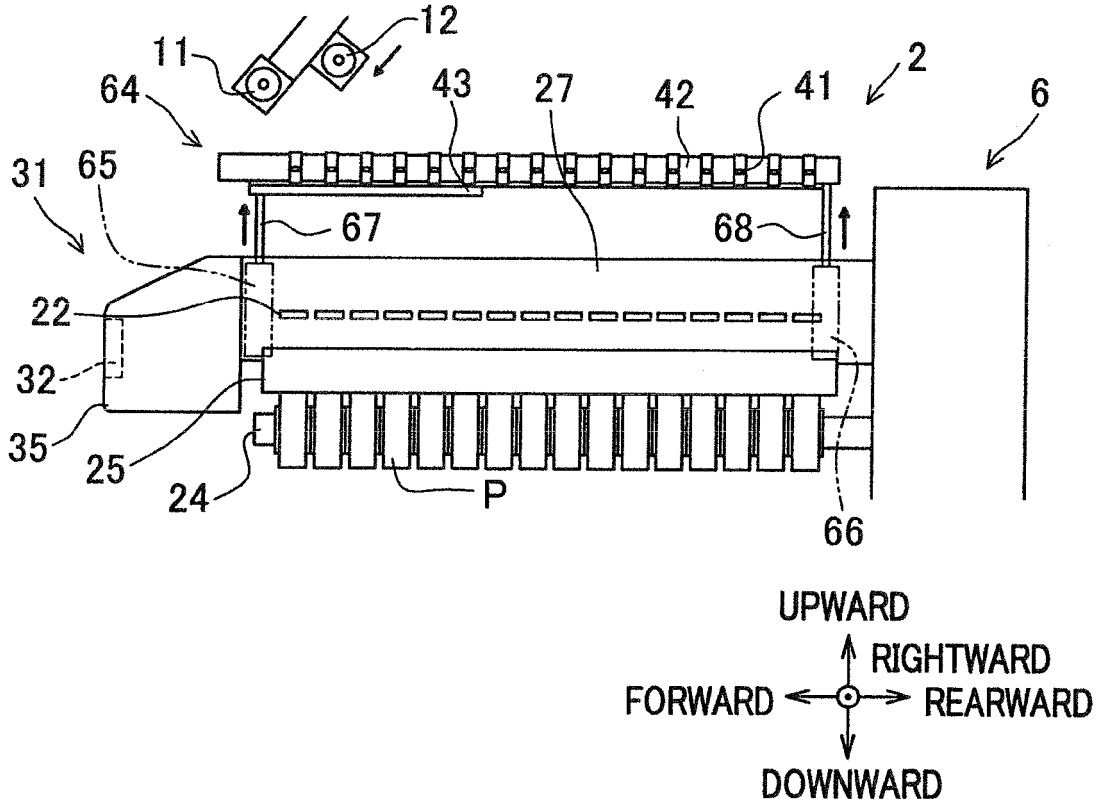
(b)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UPWARD
RIGHTWARD
FORWARD
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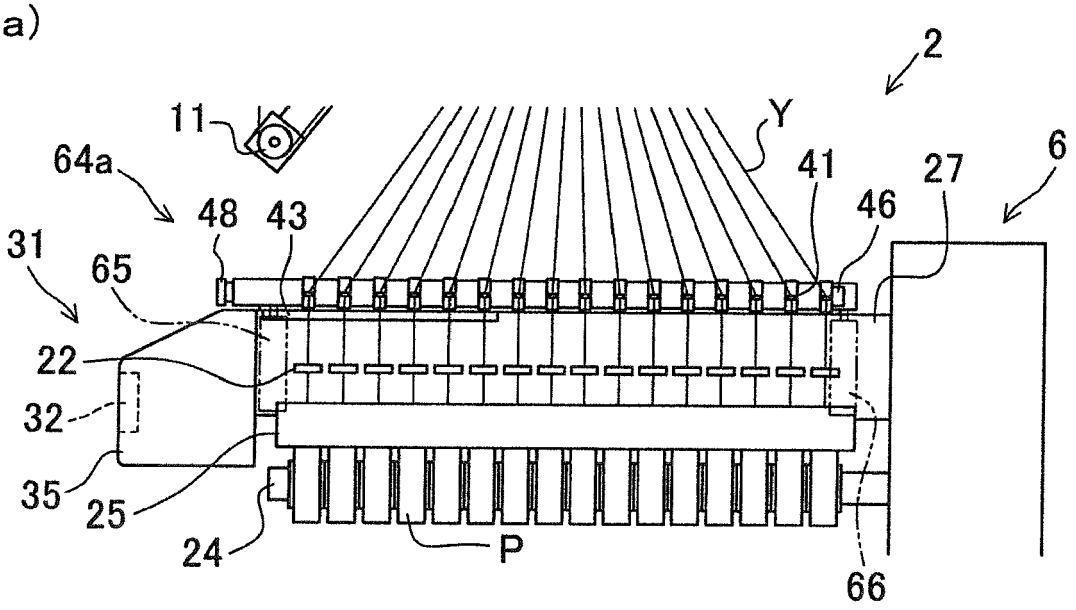
FIG.10

(a)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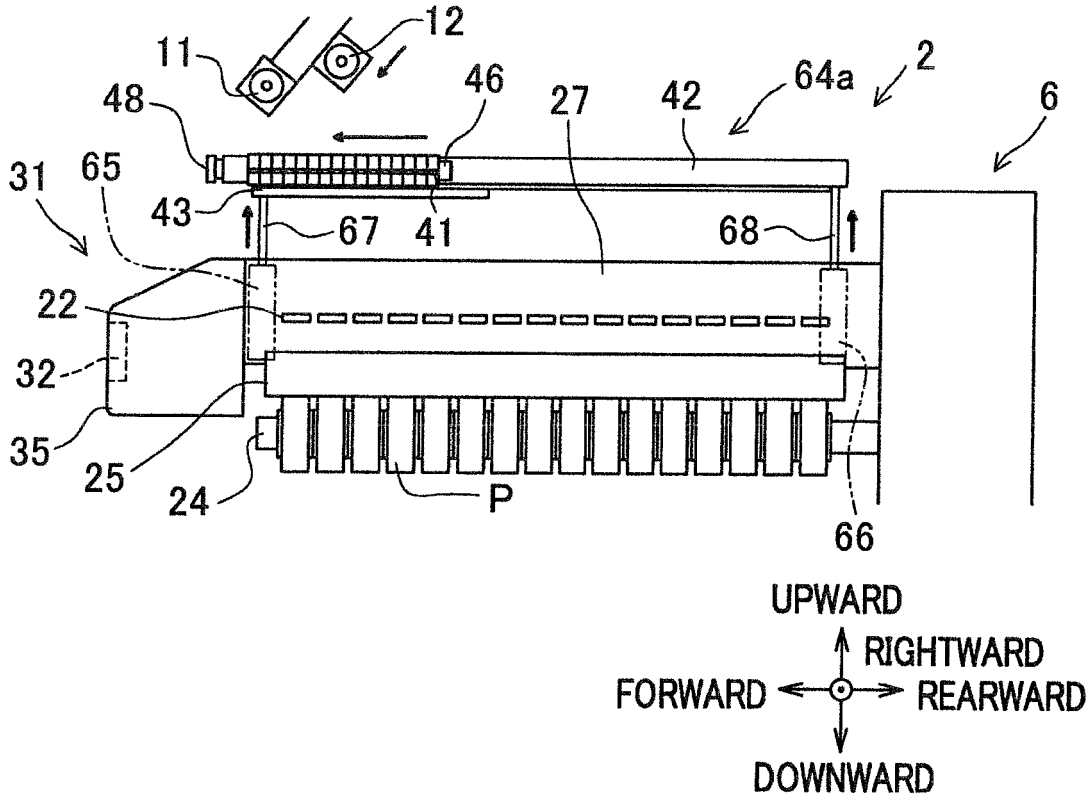
(b)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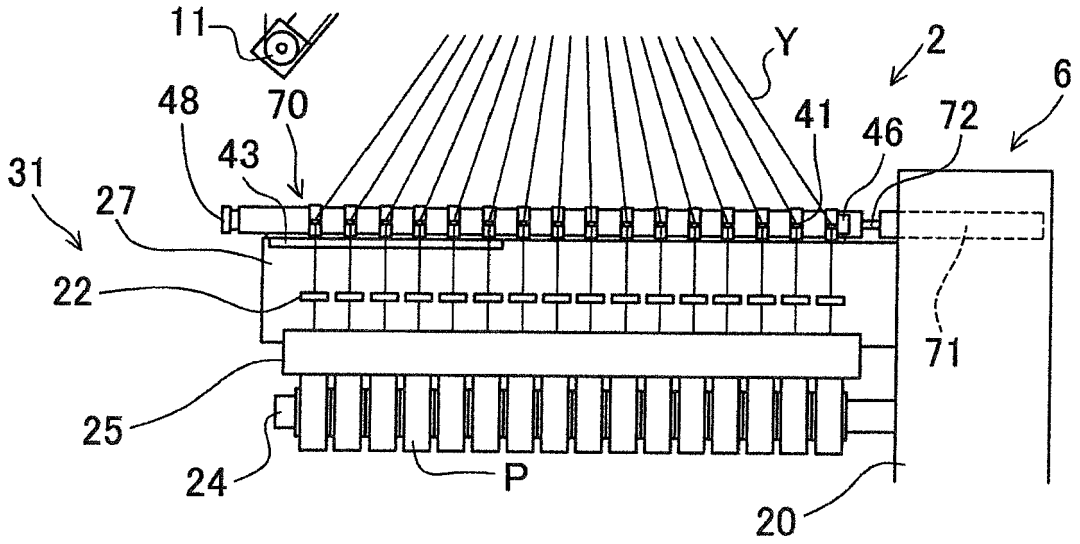
UPWARD
RIGHTWARD
FORWARD
REARWARD
DOWNWARD

FIG.11

(a)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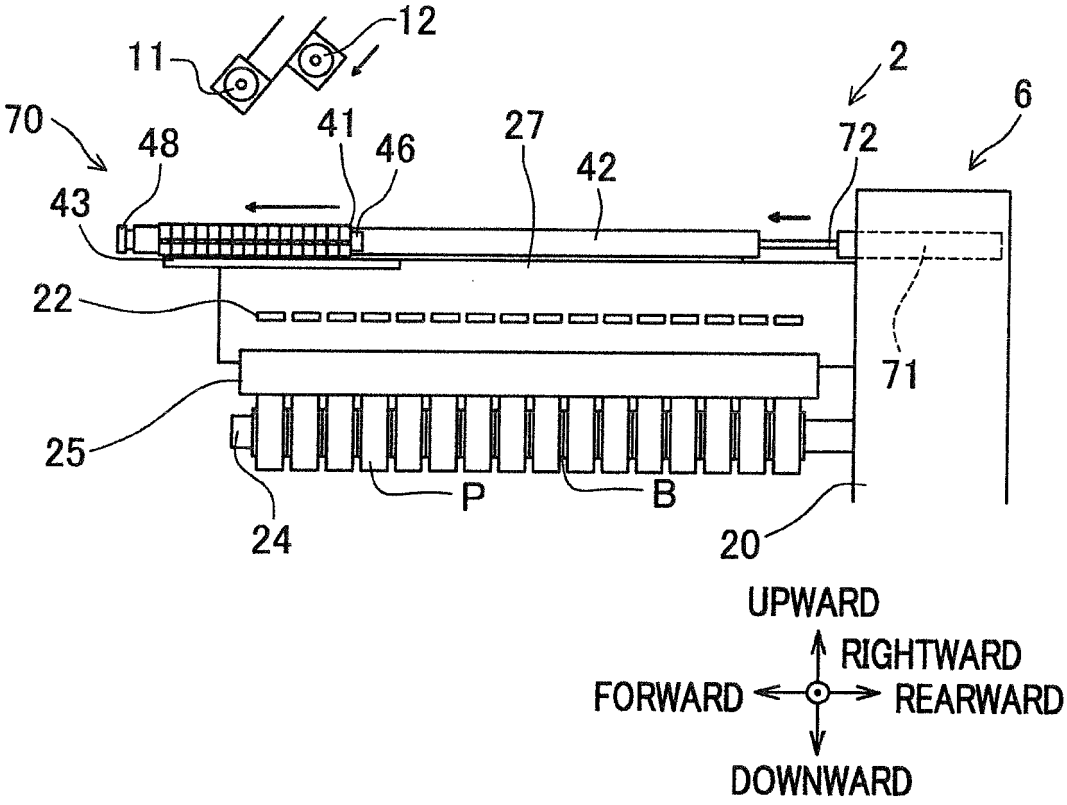
(b)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UPWARD
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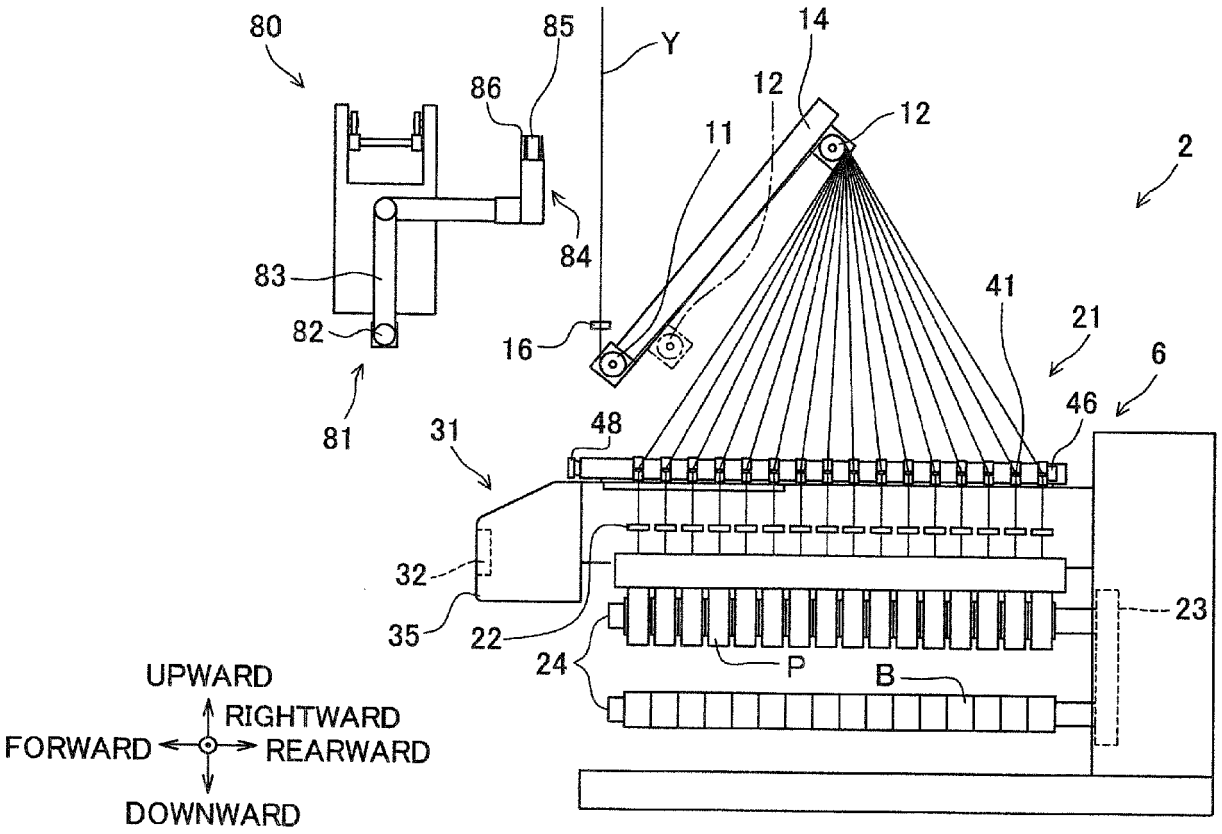
REARWARD
DOWNWARD

FIG.12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81
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UPWARD
RIGHTWARD
FORWARD
REARWARD
DOWNWARD

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EUROPEAN SEARCH REPORT

Application Number
EP 18 15 4871

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y A	JP 2008 297078 A (TMT MACHINERY INC) 11 December 2008 (2008-12-11) * figures 2-4c, 7, 8 *	1-3,5-8, 11 9,10 4	INV. B65H57/00 B65H67/048
X Y A	JP H10 194593 A (TORAY ENG CO LTD) 28 July 1998 (1998-07-28) * abstract; figures 5-1 - 5-3 *	1,5,6,11 9 2-4	
X Y	DE 10 2011 114312 A1 (OERLIKON TEXTILE GMBH & CO KG [DE]) 3 May 2012 (2012-05-03) * paragraph [0047]; figures 3-5 *	7,8 10	
X	EP 2 392 532 A2 (TMT MACHINERY INC [JP]) 7 December 2011 (2011-12-07) * paragraphs [0054], [0055] *	7	
Y	EP 2 644 548 A2 (TMT MACHINERY INC [JP]) 2 October 2013 (2013-10-02) * figure 3 *	9,10	

TECHNICAL FIELDS SEARCHED (IPC)

B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	7 June 2018	Pussemier, Bart

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07-06-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2008297078 A	11-12-2008	NONE	
JP H10194593 A	28-07-1998	NONE	
DE 102011114312 A1	03-05-2012	NONE	
EP 2392532 A2	07-12-2011	CN 102267652 A	07-12-2011
		EP 2392532 A2	07-12-2011
		JP 5529632 B2	25-06-2014
		JP 2011255979 A	22-12-2011
EP 2644548 A2	02-10-2013	CN 103361750 A	23-10-2013
		EP 2644548 A2	02-10-2013
		JP 5864338 B2	17-02-2016
		JP 2013213291 A	17-10-2013
		TW 201339383 A	01-10-2013

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Patent documents cited in the description

- JP 2015164875 A **[0002] [0068]**