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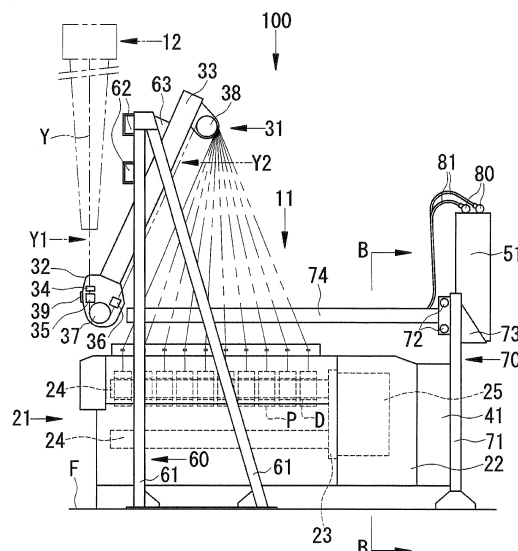
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(54) **Take-up apparatus and take-up facility**

(57) [OBJECT] A yam feeding unit of a take-up apparatus can readily be arranged, so as to facilitate ease of installation and maintenance for the take-up apparatus.

[MEANS OF REALIZING THE OBJECT] A take-up apparatus includes a package winding unit (21), a first godet roller (37), a second godet roller (38) arranged above the package winding unit (21) and more on the downstream side than the first godet roller (37) in the travel direction of the yarns, a yam feeding unit (31) including the first godet roller (37) and the second godet roller (38) and configured to feed the yarns Y from a melt spinning machine (12) to the package winding unit (21) while processing the yarns, and a first beam (62) disposed in an area sandwiched by a first yam path (Y1) between the melt spinning machine (12) and the first godet roller (37) and by a second yam path (Y2) leading from the first godet roller (37) to the second godet unit roller (38) and configured to support the yam feeding unit (31).

Fig. 2



Description

[TECHNICAL FIELD]

[0001] The present invention relates to a take-up apparatus configured to wind a plurality of yarns spun by a melt spinning machine around a plurality of winding bobbins and to a take-up facility.

[BACKGROUND ART]

[0002] A take-up apparatus winds a plurality of yarns spun by a melt spinning machine, around a plurality of winding bobbins. A take-up facility is formed by arranging a plurality of take-up apparatuses in parallel. The take-up apparatus includes a package winding unit configured to wind the yarns around the winding bobbins. In the vicinity of the package winding unit, various devices, such as rollers, yarn guides, and yarn cutting-and-sucking devices, are provided to feed the yarns spun from the melt spinning machine to the package winding unit while processing the yarns.

[0003] These devices provided in the vicinity of the package winding unit are separately disposed on a frame forming the take-up apparatus. Accordingly, installation or maintenance of the take-up apparatus requires these devices to be separately attached or detached, and thus is cumbersome. Thus, there is an idea of assembling these devices into a yarn feeding unit. By attaching or detaching these devices together as the yarn feeding unit, the installation or maintenance of the take-up apparatus can be facilitated. To arrange the yarn feeding unit in the vicinity of the package winding unit, the yarn feeding unit needs to be supported by a frame or another supporting member (see patent document 1).

[0004] The rollers and the yarn guides change the direction of the yarns, thereby defining the yarn path. The yarn guides bend the yarns to change the direction of the yarns. When the bending angle of the yarn exceeds a predetermined angle (hereinafter referred to as an upper limit bending angle, for example, 15°), the quality of yarns is deteriorated. Thus, the rollers configured to feed the yarns to the package winding unit are disposed in an upper portion above the package winding unit so that the bending angle of the yarns through the yarn guides does not exceed the upper limit bending angle. As a result, a space including a plurality of yarn paths is defined between the package winding unit and the rollers disposed in the upper portion above the package winding unit (see FIG. 2).

[0005] As described above, the yarn feeding unit needs to be supported by the frame or another supporting member to be arranged in the vicinity of the package winding unit. However, the supporting member needs to be prevented from interfering with the yarn paths, and thus cannot be disposed in the space including the yarn paths. More specifically, the supporting member cannot be arranged to laterally cross the space including the yarn

paths. Accordingly, it is difficult to achieve a configuration in which a plurality of take-up apparatuses share the supporting member at the lower portion or in the vicinity of the yarn feeding unit arranged in the vicinity of the package winding unit. There is also an idea of disposing the supporting member above the rollers at the upper portion above the package winding unit. In this case, however, the position of the supporting member is extremely high, making it difficult to attach or detach the yarn feeding unit and increasing the size of the take-up apparatus as a whole.

[0006] The yarn feeding unit may be supported by the frame protruding from the back surface side of the take-up apparatus. However, this means that the supporting member protrudes at a position far from the yarn feeding unit provided on the front surface of the take-up apparatus. Thus, the frame and the take-up apparatus become larger and more complicated. The supporting member that can be shared by the take-up apparatuses can be installed only at a position not interfering with the yarn path leading from the yarn feeding unit to the package winding unit. Accordingly, a shared member cannot be provided in the vicinity of the yarn feeding units, and thus the configuration in which the yarn feeding units are supported by the shared member is difficult to achieve.

[RELATED ART DOCUMENT]

[PATENT DOCUMENT]

[0007] [Patent Document 1] Japanese Patent No. 4204548.

[DISCLOSURE OF THE INVENTION]

[PROBLEMS TO BE SOLVED BY THE INVENTION]

[0008] The present invention has been made to solve the above-described problems. A first object of the present invention is to provide a take-up apparatus in which devices configured to feed the yarns spun from the melt spinning machine to a package winding unit while processing the yarns are assembled into a yarn feeding unit so as to be readily installed and to thereby facilitate installation and maintenance of the take-up apparatus. A second object of the present invention is to allow a plurality of take-up apparatuses to share a supporting member for the yarn feeding unit, so that a take-up facility can be installed easily in a space saving manner.

[MEANS OF SOLVING THE PROBLEMS]

[0009] The problems to be solved by the present invention have been described hereinabove, and subsequently, the means of solving the problems will be described below.

[0010] A take-up apparatus according to a first aspect

of the present invention is configured to wind yarns spun from a melt spinning machine, and includes a package winding unit, a first godet roller, a second godet roller, a yarn feeding unit, and a first beam. The package winding unit is configured to wind the yarns around winding bobbins. The first godet roller is configured to receive the yarns from the melt spinning machine. The second godet roller is disposed above the package winding unit and more on a downstream side than the first godet roller in a travel direction of the yarns, and is configured to feed the yarns to the package winding unit. The yarn feeding unit includes the first godet roller and the second godet roller and is configured to feed the yarns to the package winding unit while processing the yarns from the melt spinning machine. The first beam is disposed in an area sandwiched by a first yarn path between the melt spinning machine and the first godet roller and by a second yarn path leading from the first godet roller to the second godet roller, and is configured to support the yarn feeding unit.

[0011] A take-up apparatus according to a second aspect of the present invention is the take-up apparatus according to the first aspect of the present invention that may further include a first coupling unit configured to connect the yarn feeding unit with the first beam. The first coupling unit may be configured in such a manner that a mounting position to the first beam is adjustable in an axial direction of the first beam and a mounting position to the yarn feeding unit is adjustable in a direction intersecting with the axial direction of the first beam.

[0012] A take-up apparatus according to a third aspect of the present invention is the take-up apparatus according to the first or the second aspect of the present invention in which the second godet roller may be movable between a winding position at which the yarn paths of the yarns are set to be proper yarn paths in a winding operation and a threading position lower than the winding position.

[0013] A take-up apparatus according to a fourth aspect of the present invention is the take-up apparatus according to any one of the first to the third aspects of the present invention in which the yarn feeding unit may include at least a yarn cutting-and-sucking device, an interlace, and a yarn guide.

[0014] A take-up apparatus according to a fifth aspect of the present invention is the take-up apparatus according to any one of the first to the fourth aspects of the present invention in which an axis of a bobbin holder configured to hold the winding bobbin in the package winding unit and an axis of the second godet roller may be orthogonal to each other.

[0015] A take-up apparatus according to a sixth aspect of the present invention is the take-up apparatus according to any one of the first to the fifth aspects of the present invention that may further include a first controller a second controller. The first controller is configured to control the package winding unit. The second controller is configured to control the yarn feeding unit.

[0016] A take-up facility according to a seventh aspect

of the present invention includes plurality of the take-up apparatuses according to any one of claims 1 to 6 arranged in parallel. The first beam is arranged to be laid across the plurality of take-up apparatuses arranged in parallel, and is shared by the plurality of take-up apparatuses.

[0017] A take-up facility according to an eighth aspect of the present invention is the take-up facility according to the seventh aspect of the present invention, in which an end portion of the first beam may be supported by a supporting unit installed on a floor.

[0018] A take-up facility according to a ninth aspect of the present invention is the take-up facility according to the seventh aspect of the present invention in which an end portion of the first beam is supported by a supporting unit installed on any one of a wall surface and a ceiling surface of a building or both.

[EFFECTS OF THE INVENTION]

[0019] The aspects of the present invention provide the following advantageous effects.

[0020] According to the first aspect of the present invention, devices configured to feed the yarns from the melt spinning machine to the package winding unit while processing the yarns are assembled into the yarn feeding unit. The first beam configured to support the yarn feeding unit is arranged in the area sandwiched by the first yarn path between the melt spinning machine and the first godet roller and by the second yarn path leading from the first godet roller to the second godet roller. Accordingly, even in the take-up apparatus in which the second godet roller is arranged above the package winding unit, the first beam and the yarn feeding unit can be disposed without interfering with the yarn paths. Thus, installation and maintenance of the take-up apparatus can be facilitated.

[0021] According to the second aspect of the present invention, the first coupling unit is configured in such a manner that the mounting positions to the first beam is adjustable in the axial direction of the first beam, and the mounting positions to the yarn feeding unit is adjustable in the direction intersecting with the axial direction of the first beam. Accordingly, the position of the yarn feeding unit relative to the package winding unit is readily adjustable.

[0022] According to the third aspect of the present invention, the second godet roller is movable between the winding position and the threading position. Thus, the threading for the second godet roller is facilitated. Also, the second godet roller is provided to the yarn feeding unit. Thus, such a second godet roller having the moving function can be readily installed.

[0023] According to the fourth aspect of the present invention, the yarn feeding unit includes at least the yarn cutting-and-sucking device, the interlace and yarn guides. These devices are assembled into the yarn feeding unit to be installed. Thus, these devices need not to

be separately installed when installing the take-up apparatus.

[0024] According to the fifth aspect of the present invention, the axis of the second godet roller and the axis of the bobbin holder of the package winding unit holding the winding bobbins are orthogonal to each other. In the take-up apparatus having this configuration, the yarn feeding unit can be readily installed.

[0025] According to the sixth aspect of the present invention, take-up apparatus includes the first controller configured to control the package winding unit and the second controller configured to control the yarn feeding unit. Accordingly, the package winding unit and the yarn feeding unit can be separately controlled.

[0026] According to the seventh aspect of the present invention, the first beam is arranged to be laid across the plurality of take-up apparatuses arranged in parallel, and the first beam is shared by the plurality of take-up apparatuses. Thus, the first beam needs not to be separately provided for the respective take-up apparatuses. Thus, the take-up facility can be easily installed in a space saving manner.

[0027] According to the eighth aspect of the present invention, the end portion of the first beam is supported by the supporting unit installed on a floor. Accordingly, the number of the supporting units to be installed on the floor can be reduced. Thus, the take-up facility can be easily installed in a space saving manner.

[0028] According to the ninth aspect of the present invention, the end portion of the first beam is supported by the supporting unit installed on any one of a wall surface and a ceiling surface of a building or both. Accordingly, the supporting unit needs not to be installed on the floor. Thus, the take-up facility can be easily installed in a space saving manner.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0029]

[FIG. 1] FIG. 1 is a front view of take-up apparatuses 11 and a take-up facility 100 in which a plurality of take-up apparatuses 11 are arranged in parallel, according to a first embodiment of the present invention.

[FIG. 2] FIG. 2 is a side view of the take-up apparatuses 11 and the take-up facility 100 in which the plurality of take-up apparatuses 11 are arranged in parallel, according to the first embodiment of the present invention.

[FIG. 3] FIG. 3 is a cross-sectional view taken along the line A-A in FIG. 1.

[FIG. 4] FIG. 4 is an enlarged perspective view of a coupling unit between a yarn feeding unit 31 and first beams 62.

[FIG. 5] FIG. 5 is a cross-sectional view taken along the line B-B in FIG. 2.

[FIG. 6] FIG. 6 is a front view of take-up apparatuses

11 and a take-up facility 100 in which a plurality of take-up apparatuses 11 are arranged in parallel, according to a second embodiment of the present invention.

[FIG. 7] FIG. 7 is a side view of the take-up apparatuses 11 and the take-up facility 100 in which the plurality of take-up apparatuses 11 are arranged in parallel, according to the second embodiment of the present invention.

[BEST MODE FOR CARRYING OUT THE INVENTION]

[0030] Embodiments of the present invention will be described with reference to the drawings.

[First Embodiment]

[0031] Take-up apparatuses 11 and a take-up facility 100 in which a plurality of take-up apparatuses 11 are arranged in parallel, according to the first embodiment of the present invention, will be described with reference to FIGs. 1 to 5. In the description below, a surface of the take-up apparatus 11 on a free end side of a bobbin holder 24 described later is defined as the front surface, and a surface thereof on the opposite side is defined as the back surface. A surface of the take-up apparatus 11 viewed in lateral directions of the bobbin holder 24 is defined as the side surfaces. A vertical direction in the diagram is defined as the vertical direction in a state where the take-up apparatus 11 is installed on a horizontal surface.

[0032] First, a melt spinning machine 12 configured to supply yarns Y to the take-up apparatus 11 will be described with reference to FIGs. 1 and 2. The melt spinning machine 12 spins a plurality of filaments and supplies the spun filaments as the yarns Y from the upward direction to the downward direction. Synthetic raw materials (raw materials of the filaments) that are put into the melt spinning machine 12 are forced by pressure by an extruder and spun through a plurality of spinnerets provided on a spinning head (not shown). The filaments spun through the spinnerets of the spinning head are combined on the basis of a predetermined number into each of a plurality of yarns Y and fed to the take-up apparatus 11. That is, the yarns Y are each made by combining a predetermined number of filaments and then are fed to the take-up winding apparatus 11. A plurality of melt spinning machines 12 is provided in a factory, and with a plurality of the take-up apparatuses 11 arranged in parallel and respectively corresponding to the melt spinning machines 12 provided, the take-up facility 100 is formed in the factory.

[0033] Next, the take-up apparatus 11 will be described. As is illustrated in FIGs. 1, 2, and 3, the take-up apparatus 11 is configured to form packages P by winding the yarns Y spun from the melt spinning machines 12, respectively around the winding bobbins D. In general, the take-up apparatus includes the following two types

of apparatuses: Partially Oriented Yarn (POY) take-up apparatus that winds partially oriented yarns (POY); and Fully Drawn Yarn (FDY) take-up apparatus that winds fully drawn yarns (FDY). The take-up apparatus 11 according to the first embodiment of the present invention is the POY take-up apparatus.

The take-up apparatus 11 mainly includes a package winding unit 21, a yarn feeding unit 31, a first controller 41, a second controller 51, a first supporting unit 60, and a second supporting unit 70.

[0034] The package winding unit 21 winds the plurality of yarns Y fed from the melt spinning machines 12 respectively around the winding bobbins D. The package winding unit 21 mainly includes a base body 22, a turret 23, bobbin holders 24, a traverse device (not shown), and a driving device 25.

[0035] The turret 23 is provided to the base body 22 and can rotate about the rotation axis. The turret 23 is provided with two bobbin holders 24 each being provided with a plurality of winding bobbins D. Substantially half turn of the turret 23 makes one of the bobbin holders 24 positioned at a winding position above while the other one of the bobbin holders 24 is positioned at doffing and waiting position below. Thus, the bobbin holders 24 can switch positions. The traverse device traverses the yarns Y to be wound around the winding bobbins D. The driving device 25 drives the turret 23, the bobbin holders 24, and the traverse device. The package winding unit 21 is electrically connected to the first controller 41, which controls the operation of the package winding unit 21. The package winding unit 21 and the first controller 41 are separately or integrally installed on the floor F of the factory.

[0036] The yarn feeding unit 31 is configured to feed the yarns Y spun from the melt spinning machine 12 to the package winding unit 21 while processing the yarns Y. The yarn feeding unit 31 mainly includes a yarn cutting-and-sucking device 34, a first interlace 35, a first godet roller 37, a second interlace 36, and a second godet roller 38 that arranged in this order from the upstream side along the travel direction of the yarns Y and are provided as a single unit. The yarn feeding unit 31 is arranged at a position above the front surface side of the package winding unit 21, that is, above a portion of the package winding unit 21 on the free end side of the bobbin holders 24. The yarn feeding unit 31 is supported by the first supporting unit 60 described later.

[0037] The first godet roller 37 is a roller configured to receive the plurality of yarns Y from the melt spinning machine 12. The plurality of yarns Y spun from the melt spinning machine 12 are supplied from the upward direction to the downward direction, and thus the first godet roller 37 is arranged below the melt spinning machine 12. The yarn path between the melt spinning machine 12 and the first godet roller 37 is defined as a first yarn path Y1.

[0038] The second godet roller 38 is configured to feed the yarns Y to the package winding unit 21. As is illustrated in FIG. 3, during a winding operation, the second

godet roller 38 is arranged more on the downstream side than the first godet roller 37 in the travel direction of the yarns Y and is at a position (winding position a) above the package winding unit 21. The winding position a of the second godet roller 38 is set in such a manner that the bending angle of the yarns Y does not exceed an upper limit bending angle (for example, 15°) at and below which the quality of the yarns Y is not deteriorated. A yarn path leading from the first godet roller 37 to the second godet roller 38 formed while the second godet roller 38 is at the winding position a is defined as a second yarn path Y2.

[0039] The axis of the second godet roller 38 and the axis of the bobbin holder 24 are orthogonal to each other. When the yarns Y fed from the first godet roller 37 are divided to be provided respectively to the winding bobbins D, the second godet roller 38 divides the yarns Y in the direction of the tangent of the second godet roller 38. The yarn Y divided by the second godet roller 38 toward the direction of the package winding unit 21 is wound around the winding bobbin D in the package winding unit 21. Specifically, the yarns Y are traversed in lateral directions (axial directions of the bobbin holder 24) by the traverse device and wound around the rotating winding bobbins D. Then, the yarn Y wound around the winding bobbin D is formed into the package P on the winding bobbin D.

[0040] When a problem arises or abnormality such as cutting of the yarn is found in the take-up apparatus 11, the yarn cutting-and-sucking device 34 cuts the entire yarns Y, and sucks and thus holds the yarns Y being spun from the melt spinning machine 12.

[0041] The first interlace 35 and the second interlace 36 equalize the attached amount of oil solution among the yarns Y by means of a fluid injection nozzle and give converging property to the yarns Y by alternately combining the filaments forming the yarns Y, thereby preventing widening and separation between the filaments. It is noted that yarn guides (not shown) configured to guide the yarn Y are respectively provided to the yarn cutting-and-sucking device 34, the first interlace 35, and the second interlace 36 in an integrated manner. Alternatively, the yarn guides may be separately provided.

[0042] The base body of the yarn feeding unit 31 includes a first unit frame 32 and a second unit frame 33. The first unit frame 32 is provided with the yarn cutting-and-sucking device 34, the first interlace 35, the first godet roller 37, and the second interlace 36 arranged in this order from the upstream side in the travel direction of the yarns Y. The second unit frame 33 is coupled to the first unit frame 32. The second unit frame 33 is provided with the second godet roller 38 and an elevator (not shown).

[0043] The elevator is configured to move the second godet roller 38 between the winding position a and a threading position b. The elevator, which will not be described in detail, includes pulley pairs, a belt, a rail, and a driving motor. The second unit frame 33 mainly includes

an extruding member and incorporates the elevator. The winding position a of the second godet roller 38 is defined as the position of the second godet roller 38 during the winding operation and the position where the yarn paths of the plurality of yarns divided by the second godet roller 38 are set to be proper yarn paths during the winding operation. The threading position b of the second godet roller 38 is the position where threading is carried out for the second godet roller 38, and is a position sufficiently lower than the winding position a for an operator at a low position to carry out the threading for the second godet roller 38.

[0044] The yarn feeding unit 31 is electrically connected to the second controller 51 that controls the operation of the yarn feeding unit 31. The second controller 51 is installed separately from the package winding unit 21 by means of the second supporting unit 70 described later. The yarn feeding unit 31 is provided with a switch board 39 for performing operations such as starting/stopping the yarn feeding unit 31 and moving the second godet roller 38.

[0045] Next, the first supporting unit 60 and the second supporting unit 70 will be described. As illustrated in FIGs. 1 to 4, the first supporting unit 60 is configured to support the yarn feeding unit 31. The first supporting unit 60 includes first props 61, first beams 62, and a first coupling unit 63.

[0046] The first beams 62 are configured to support the yarn feeding unit 31. The position of the first beams 62 relative to the yarn feeding unit 31 is within an area sandwiched by the first yarn path Y1 between the melt spinning machine 12 and the first godet roller 37 and by the second yarn path Y2 leading from the first godet roller 37 to the second godet roller 38. Even if the second godet roller 38 is arranged above the package winding unit 21 in the take-up apparatus 11, the area includes no yarn paths. Accordingly, the first beams 62 can be disposed without interfering with the yarn paths.

[0047] The first beams 62 are arranged to be laid across the plurality of take-up apparatuses 11 forming the take-up facility 100. Specifically, the first beams 62 are arranged to be laid over the plurality of the package winding units 21 on the front surface side of the plurality of package winding units 21 arranged in parallel, that is, on the free end side of the bobbin holders 24. Accordingly, the plurality of take-up apparatuses 11 can share the first beams 62.

[0048] As described above, the area sandwiched by the first yarn path Y1 and by the second yarn path Y2 includes no yarn paths. Thus, even when the first beams 62 are arranged to be laid across the plurality of package winding units 21 arranged in parallel, the first beams 62 do not interfere with the yarn paths. Areas other than this area, for example, an area below the second godet roller 38 at the winding position a, includes the yarn paths of the plurality of yarns Y. Accordingly, the first beams 62 cannot be arranged in such an area.

[0049] In the first embodiment, no roller exists between

the first godet roller 37 and the second godet roller 38, and thus the second yarn path Y2 is a linear yarn path starting from the first godet roller 37, and the area sandwiched by the first yarn path Y1 and the second yarn path Y2 is approximately V-shaped space in a side view. However, the area sandwiched by the first yarn path Y1 and the second yarn path Y2 is not limited to the one described above. The first yarn path Y1 is a yarn path (yarn path from the upward direction to the downward direction) leading from the melt spinning machine 12 arranged above the take-up apparatus 11 to the first godet roller 37 arranged below the melt spinning machine 12. The second yarn path Y2 is a yarn path (yarn path from below to above) from the first godet roller 37 arranged below the melt spinning machine 12 to the second godet roller 38 arranged above the package winding unit 21. Thus, the area sandwiched by the first yarn path Y1 and the second yarn path Y2 may be an area sandwiched by a yarn path advancing downwardly from the melt spinning machine 12 and a yarn path advancing upwardly to the second godet roller 38. This area is not strictly limited to the area sandwiched by the first yarn path Y1 and the second yarn path Y2, but may be an area sandwiched by the extension lines of the first yarn path Y1 and the second yarn path Y2. The first beams 62 do not interfere with the yarn paths in such areas.

[0050] As described above, the first beams 62 are arranged to be laid across the plurality of package winding units 21 arranged in parallel, and thus can support the plurality of yarn feeding units 31. Two first beams 62 are vertically arranged in parallel, and the both end portions of each first beam 62 are supported by the first props 61. The first props 61 are installed on the floor F of the factory on both sides of the take-up facility 100 in which the plurality of take-up apparatuses 11 are arranged in parallel.

[0051] It is to be noted that, an operator who is in charge of the threading, doffing operation for packages P, and the like of the take-up apparatus 11, carries out these operations mainly on the front surface side of the take-up apparatus 11. Thus, the first beams 62 are arranged to be laid over the package winding units 21, and the first props 61 are installed on both sides of the take-up facility 100 in which the plurality of take-up apparatuses 11 are arranged in parallel. Therefore, the first beams 62 and the first props 61 are not likely to become impediments in the work area of the operator, and thus the operator can smoothly carry out the operations.

[0052] The first coupling unit 63 couples the yarn feeding unit 31 of the take-up apparatus 11 with the first beams 62. The first coupling unit 63 is configured to make the mounting positions to the first beams 62 adjustable in the axial direction of the first beams 62. The first coupling unit 63 is configured to make the mounting positions to the yarn feeding unit 31 adjustable in the direction intersecting with the axial direction of the first beams 62. Accordingly, the position of the yarn feeding unit 31 relative to the package winding unit 21 is adjustable. For example, even if the positions of the first beams 62 slight-

ly deviates from the proper position, the yarn feeding unit 31 can readily be positioned accurately. The yarn feeding unit 31 is supported by the first coupling unit 63 in such a manner that the yarn feeding unit 31 is hung from the first beams 62.

[0053] The configuration of the first coupling unit 63 will be described in detail. As is illustrated in FIG. 4, the first coupling unit 63 includes first locking units 64 and second locking units 65. The first locking units 64 are provided at two positions respectively corresponding to the two first beams 62. The first locking units 64 are locked in such a manner as to be laid over the respective first beams 62 and are fastened to the first beams 62 with bolts 66 to be secured thereon. The first coupling unit 63 is secured on the first beams 62 only by the fastening to the first beams 62. Thus, the position of the first coupling unit 63 can be adjusted in the axial direction of the first beams 62 by loosening the bolts 66.

[0054] The second locking units 65 are locked on the second unit frame 33 forming the yarn feeding unit 31. Specifically, the second unit frame 33 is provided with a slit S formed along the longitudinal direction. The second locking units 65 are secured in the slit S of the second unit frame 33 with bolts 67. The position of the first coupling unit 63 can be adjusted along the slit S of the second unit frame 33 by loosening the bolts 67.

[0055] Thus, the position of the first coupling unit 63 relative to the first beams 62 and the yarn feeding unit 31 is adjustable. Accordingly, the position of the yarn feeding unit 31 relative to the package winding unit 21 can be adjusted in the axial direction of the first beam 62 and in the direction orthogonal to the axial direction of the first beam 62.

[0056] As illustrated in FIG. 1, 2, 3, and 5, the second supporting unit 70 is configured to support the second controller 51 separately from the package winding unit 21. The second supporting unit 70 itself is installed separately from the package winding unit 21. Furthermore, the second supporting unit 70 commonly supports the second controllers 51 of the plurality of take-up apparatuses 11. The second supporting unit 70 includes second props 71, second beams 72, second coupling units 73, and guiding ducts 74.

[0057] The second props 71 are installed on the floor F of the factory and are on both sides of the take-up facility 100 in which the plurality of take-up apparatuses 11 are arranged in parallel. The second beams 72 are supported by the second props 71 on both sides of the take-up facility 100. The two second beams 72 are vertically arranged in parallel. Accordingly, the second beams 72 are arranged in such a manner as to be laid over the back surface side of the respective package winding units 21 of the plurality of take-up apparatuses 11 forming the take-up facility 100.

[0058] The second coupling unit 73 makes the second beams 72 support the second controller 51 of the take-up apparatus 11. A plurality of the second coupling units 73 are provided respectively for the plurality of take-up

apparatuses 11. Each second coupling unit 73 is locked in such a manner as to be laid across the two second beams 72, positioned in the axial direction of the second beam 72, and is secured with bolts and the like. Also, the second controller 51 is placed and secured on the second coupling unit 73.

[0059] In the guiding duct 74, wires and pipes coupled to the yarn feeding unit 31 are arranged. The guiding duct 74 is secured on the second coupling unit 73. A plurality of the guiding ducts 74 are provided respectively for the plurality of take-up apparatuses 11. For example, a wire coupling the yarn feeding unit 31 with the second controller 51 and a power line supplying electricity to the yarn feeding unit 31 are arranged in the guiding ducts 74. A main pipe 80 supplying compressed gas to each take-up apparatus 11 is installed above the second controller 51, and branched pipes 81 branched off from the main pipe 80 are respectively coupled to the yarn feeding units 31. The branched pipes 81 are also installed in the respective guiding ducts 74.

[0060] The take-up apparatus 11 according to the embodiment described above provides the following advantageous effects.

[0061] The devices configured to feed the yarns Y from the melt spinning machine 12 to the package winding unit 21 while processing the yarns Y are assembled into the yarn feeding unit 31. The first beams 62 configured to support the yarn feeding unit 31 are arranged in the area sandwiched by the first yarn path Y1 between the melt spinning machine 12 and the first godet roller 37 and by the second yarn path Y2 leading from the first godet roller 37 to the second godet roller 38. Accordingly, even in the take-up apparatus 11 in which the second godet roller 38 is arranged above the package winding unit 21, the first beams 62 and the yarn feeding unit 31 can be disposed without interfering with the yarn paths. Thus, installation and maintenance of the take-up apparatus 11 can be facilitated.

[0062] For example, by replacing the yarn feeding unit 31, which requires maintenance, with another yarn feeding unit 31 after the maintenance, work load for the maintenance at the installation site can be reduced. By replacing the yarn feeding unit 31 as a whole, time during which the take-up apparatus 11 is stopped for the maintenance can be shortened to improve production efficiency.

[0063] The first coupling unit 63 is configured in such a manner that the mounting positions to the first beams 62 is adjustable in the axial direction of the first beams 62, and the mounting positions to the yarn feeding unit 31 is adjustable in the direction intersecting with the axial direction of the first beams 62. Accordingly, the position of the yarn feeding unit 31 relative to the package winding unit 21 is readily adjustable.

[0064] The second godet roller 38 is movable between the winding position a and the threading position b. Thus, the threading for the second godet roller 38 is facilitated. Also, the second godet roller 38 is provided to the yarn

feeding unit 31. Thus, such a second godet roller 38 having the moving function can be readily installed.

[0065] The yarn feeding unit 31 includes the yarn cutting-and-sucking device 34, the first interlace 35, the first godet roller 37, the second interlace 36, the second godet roller 38, and yarn guides. These devices are assembled into the yarn feeding unit 31 to be installed. Thus, these devices need not to be separately installed when installing the take-up apparatus.

[0066] The axis of the second godet roller 38 and the axis of the bobbin holder 24 of the package winding unit 21 holding the winding bobbins D are orthogonal to each other. In the take-up apparatus 11 having this configuration, the yarn feeding unit 31 can be readily installed.

[0067] The take-up apparatus 11 includes the first controller 41 configured to control the package winding unit 21 and the second controller 51 configured to control the yarn feeding unit 31. Accordingly, the package winding unit 21 and the yarn feeding unit 31 can be separately controlled. For example, when maintenance is performed for the package winding unit 21, only the package winding unit 21 and the first controller 41 may be transferred to a maintenance site to have the operation checked. Thus, maintenance for the take-up apparatus 11 can be performed more efficiently.

[0068] The first beams 62 are arranged to be laid across the plurality of take-up apparatuses 11 arranged in parallel, and the first beams 62 are shared by the plurality of take-up apparatuses 11. Thus, the first beams 62 need not to be separately provided for the respective take-up apparatuses 11. Thus, the take-up facility 100 can be easily installed in a space saving manner.

[0069] The end portions of the first beam 62 are supported by the first props 61 installed on the floor. Accordingly, the number of the supporting units to be installed on the floor F can be reduced. Thus, the take-up facility 100 can be easily installed in a space saving manner.

[Second Embodiment]

[0070] Next, a take-up apparatus 11 and a take-up facility 100 in which a plurality of the take-up apparatuses 11 are arranged side by side, according to a second embodiment of the present invention, will be described with reference to FIGs. 6 and 7. The take-up apparatus 11 according to the second embodiment of the present invention is the FDY take-up apparatus that winds fully drawn yarns (FDY). The components that are the same as those in the first embodiment will not be described in detail.

[0071] As is illustrated in FIGs. 6 and 7, the take-up apparatus 11 according to the second embodiment of the present invention includes the yarn feeding unit 31. The yarn feeding unit 31 in the FDY take-up apparatus is configured to feed the yarns spun from the melt spinning machine 12 to the package winding unit 21 while performing heat-treatment and the like on the plurality of yarns. The yarn feeding unit 31 includes a plurality of

yarn processing godet rollers 91 to 96, as well as the first godet roller 37 and the second godet roller 38, which are assembled into a single unit. The yarn feeding unit 31 according to the second embodiment of the present invention includes a first yarn feeding unit 311 and a second yarn feeding unit 312. The first yarn feeding unit 311 and the second yarn feeding unit 312 are supported by the first supporting units 60.

[0072] The first godet roller 37 is configured to receive the plurality of yarns Y from the melt spinning machine 12. The plurality of yarns Y from the melt spinning machine 12 are supplied from the upward direction to the downward direction, and thus the first godet roller 37 is arranged below the melt spinning machine 12. A yarn path between the melt spinning machine 12 and the first godet roller 37 is defined as the first yarn path Y1.

[0073] The second godet roller 38 is configured to feed the yarns Y to the package winding unit 21. As is illustrated in FIG. 7, during winding operation, the second godet roller 38 is arranged more on the downstream side than the first godet roller 37 in the travel direction of the yarns Y and at a position (winding position a) above the package winding unit 21. The winding position a of the second godet roller 38 is set in such manner that the bending angle of the yarns Y does not exceed the upper limit bending angle (for example, 15°) at and below which the quality of the yarns Y is not deteriorated. A yarn path from the first godet roller 37 to the second godet roller 38, in particular, in the second embodiment, a yarn path leading from the yarn processing godet roller 96 to the second godet roller 38, while the second godet roller 38 is at the winding position a is defined as the second yarn path Y2.

[0074] The base body of the first yarn feeding unit 311 includes a first unit frame 321 and a second unit frame 322. The first unit frame 321 is provided with the yarn processing godet roller 96. The second unit frame 322 is coupled to the first unit frame 321. The second unit frame 322 is provided with the second godet roller 38 and an elevator (not shown). The elevator is configured to move the second godet roller 38 between the winding position a and the threading position b. The configuration of the elevator, the winding position a, and the threading position b are similar to those in the first embodiment, and thus will not be described in detail.

[0075] The base body of the second yarn feeding unit 312 includes a third unit frame 323. The third unit frame 323 is provided with the first godet roller 37 and the yarn processing godet rollers 91 to 95.

[0076] Next, the first supporting unit 60 will be described. As is illustrated in FIGs. 6 and 7, the first supporting unit 60 is configured to support the first yarn feeding unit 311 and the second yarn feeding unit 312 forming the yarn feeding unit 31. The first supporting unit 60 includes the first props 61 and the first beams 62.

[0077] The first beams 62 are configured to support the first yarn feeding unit 311 and the second yarn feeding unit 312. The positions of the first beams 62 relative to

the yarn feeding unit 31 are within an area sandwiched by the first yarn path Y1 between the melt spinning machine 12 and the first godet roller 37 and by the second yarn path Y2 from the first godet roller 37 to the second godet roller 38. To be more specific, the positions of the first beams 62 are within an area sandwiched by the first yarn path Y1 between the melt spinning machine 12 and the first godet roller 37 and by the extension lines of the second yarn path Y2 between the yarn processing godet roller 96 and the second godet roller 38. The area includes no yarn paths even in the take-up apparatus 11 in which the second godet roller 38 is arranged above the package winding unit 21. Accordingly, the first beams 62 can be arranged without interfering with the yarn paths.

[0078] Also, the first beams 62 are arranged to be laid across the plurality of take-up apparatuses 11 forming the take-up facility 100. Specifically, the first beams 62 are arranged to be laid over the plurality of the package winding units 21 on the front surface side of the plurality of package winding units 21 arranged in parallel, that is, on the free end side of the bobbin holders 24. Accordingly, the plurality of take-up apparatuses 11 can share the first beams 62.

[0079] The embodiments of the present invention have been described above. The present invention is not limited to the embodiments and can be modified in various ways.

[0080] The first supporting unit 60 configured to support the yarn feeding unit 31 and the second supporting unit 70 configured to support the second controller 51 are not limited to those in the embodiments of the present invention, and can be modified in various ways. For example, a unit to support the first beams 62 of the first supporting unit 60 can be modified in accordance with the structure of a factory. In the embodiments of the present invention, the two first props 61 support both ends of the first beams 62. Alternatively, three or more portions of the first beams 62 may be supported by three or more of first props 61. One end or both end portions of the first beams 62 may be supported by the wall surface or props of the factory. The first props 61, which have been described to stand on the floor F of the factory, may be hung from the ceiling and the like. In this case, the first props 61 need not to be installed on the floor F, and thus the take-up facility 100 can be easily installed in a space saving manner.

[0081] In the embodiments of the present invention, the plurality of take-up apparatuses 11 are arranged in parallel at regular intervals, but can be arranged in various other ways. For example, the plurality of take-up apparatuses 11 may be installed in such a way that the front and rear surfaces are alternately arranged.

[0082] A coupling unit between the yarn feeding unit 31 and the first supporting unit 60 is not limited to that in the embodiments of the present invention. While the first coupling unit 63 is secured on the second unit frame 33 of the yarn feeding unit 31 in the embodiments, the

first coupling unit 63 may be secured on the first unit frame 32 for example.

[0083] The yarn feeding unit 31 of the first embodiment includes the yarn cutting-and-sucking device 34, the first interlace 35, the first godet roller 37, the second interlace 36, and the second godet roller 38. Alternatively, the yarn feeding unit 31 may not include all of devices. Still alternatively, the yarn feeding unit 31 may additionally include other devices. Furthermore, these devices do not have to integrally be provided, but may separately be provided. For example, the first godet roller 37 and the second godet roller 38 may separately be provided in different units. The position of the second godet roller 38 may be fixed, instead of moving up or down. The same configuration (as is illustrated in FIGs. 6 and 7) can be applied to the take-up apparatus 11 in which the plurality of yarn processing godet rollers 91 to 96 for heating and non-heating are installed between the first godet roller 37 and the second godet roller 38. In this case, the axis of the first godet roller 37 and the axis of the bobbin holder 24 may be orthogonal to each other as illustrated in FIGs. 1 to 3, and 5, and, alternatively, be parallel to each other as illustrated in FIGs. 6 and 7.

[Description of the Reference Numeral]

[0084]

11	take-up apparatus
12	melt spinning machine
100	take-up facility
21	package winding unit
22	base body
23	turret
24	bobbin holder
25	driving device
31	yarn feeding unit
32	first unit frame
33	second unit frame
34	yarn cutting-and-sucking device
35	first interlace
36	second interlace
37	first godet roller
38	second godet roller
39	switch board
41	first controller
51	second controller
60	first supporting unit
61	first prop
62	first beam
63	first coupling unit
70	second supporting unit
71	second prop
72	second beam
73	second coupling unit

(continued)

74	guiding duct
80	main pipe
81	branched pipe
91 to 96	yarn processing godet rollers
a	winding position
b	threading position
Y	yarn
Y1	first yarn path
Y2	second yarn path
D	winding bobbin
P	package
F	floor

and a threading position lower than the winding position.

4. The take-up apparatus according to any one of claims 1 to 3, wherein the yarn feeding unit comprises at least a yarn cutting-and-sucking device, an interlace, and a yarn guide.
5. The take-up apparatus according to any one of claims 1 to 4, wherein an axis of a bobbin holder configured to hold the winding bobbin in the package winding unit and an axis of the second godet roller are orthogonal to each other.
6. The take-up apparatus according to any one of claims 1 to 5, further comprising:

Claims

1. A take-up apparatus configured to wind yarns spun from a melt spinning machine, the take-up apparatus comprising:
 - a package winding unit configured to wind the yarns around winding bobbins;
 - a first godet roller configured to receive the yarns from the melt spinning machine;
 - a second godet roller disposed above the package winding unit and more on a downstream side than the first godet roller in a travel direction of the yarns, and configured to feed the yarns to the package winding unit;
 - a yarn feeding unit including the first godet roller and the second godet roller and configured to feed the yarns to the package winding unit while processing the yarns from the melt spinning machine; and
 - a first beam disposed in an area sandwiched by a first yarn path between the melt spinning machine and the first godet roller and by a second yarn path leading from the first godet roller to the second godet roller, and configured to support the yarn feeding unit.
2. The take-up apparatus according to claim 1, further comprising a first coupling unit configured to connect the yarn feeding unit with the first beam, wherein the first coupling unit is configured in such a manner that a mounting position to the first beam is adjustable in an axial direction of the first beam and a mounting position to the yarn feeding unit is adjustable in a direction intersecting with the axial direction of the first beam.
3. The take-up apparatus according to claims 1 or 2, wherein the second godet roller is movable between a winding position at which yarn paths of the yarns are set to be proper yarn paths in a winding operation

a first controller configured to control the package winding unit; and
a second controller configured to control the yarn feeding unit.

7. A take-up facility comprising a plurality of the take-up apparatuses according to any one of claims 1 to 6 arranged in parallel, wherein the first beam is arranged to be laid across the plurality of take-up apparatuses arranged in parallel, and is shared by the plurality of take-up apparatuses.

8. The take-up facility according to claim 7, wherein an end portion of the first beam is supported by a supporting unit installed on a floor.

9. The take-up facility according to claim 7, wherein an end portion of the first beam is supported by a supporting unit installed on any one of a wall surface and a ceiling surface of a building or both.

Fig. 1

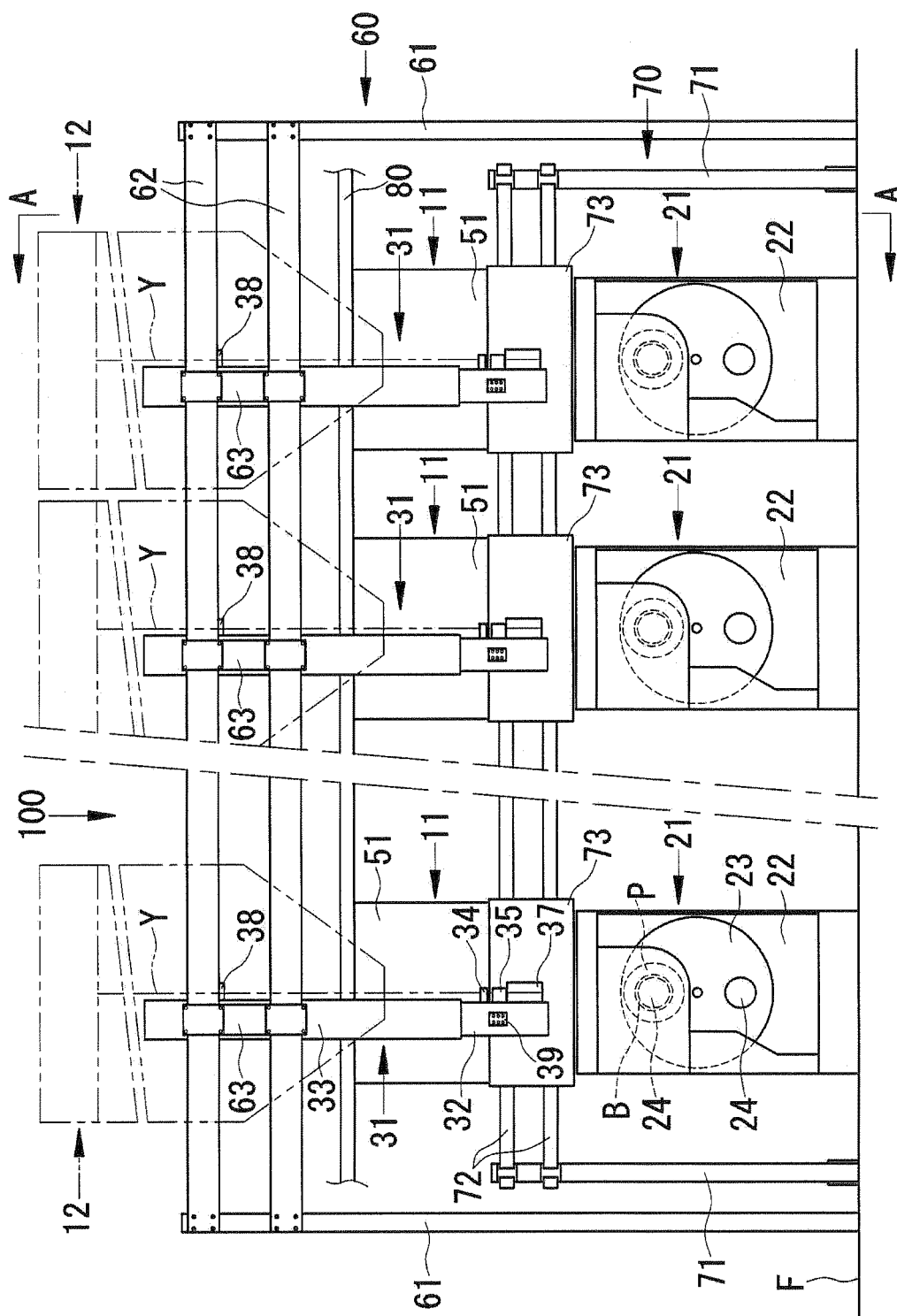


Fig. 2

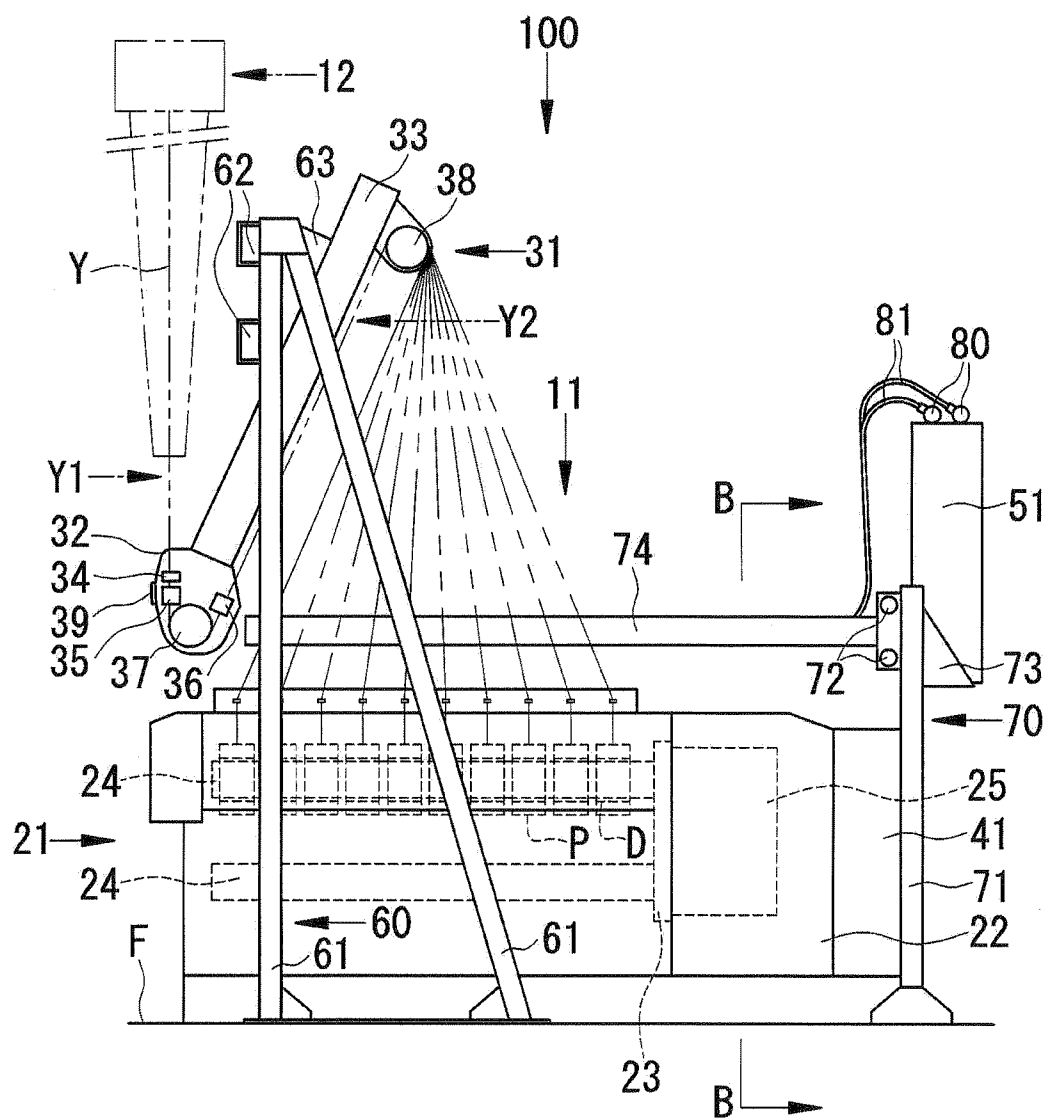


Fig. 3

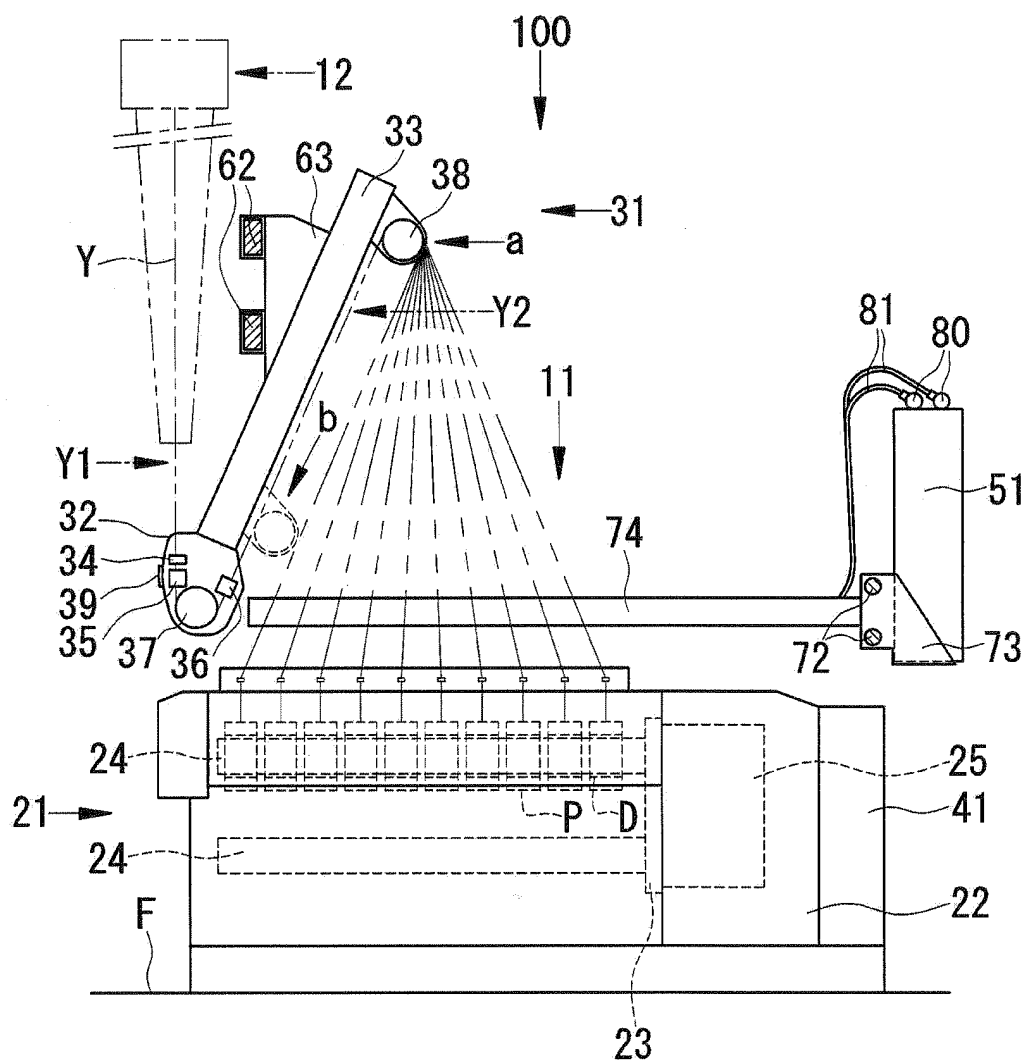


Fig. 4

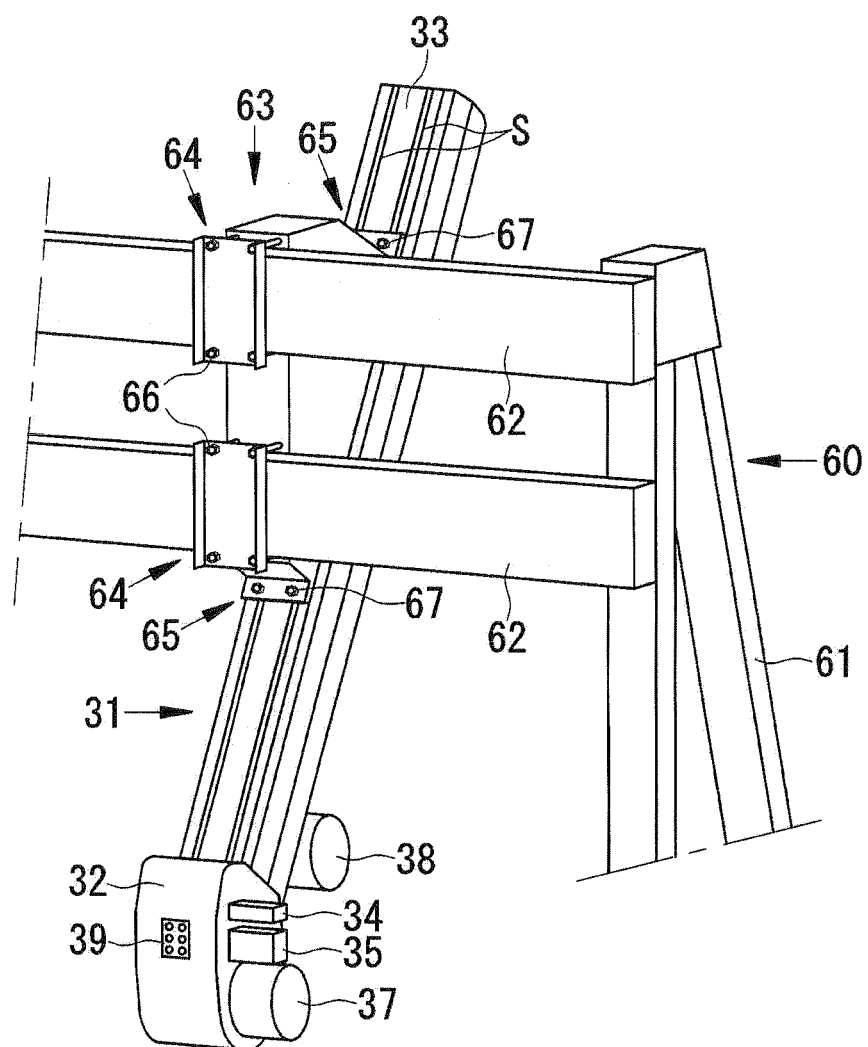


Fig. 5

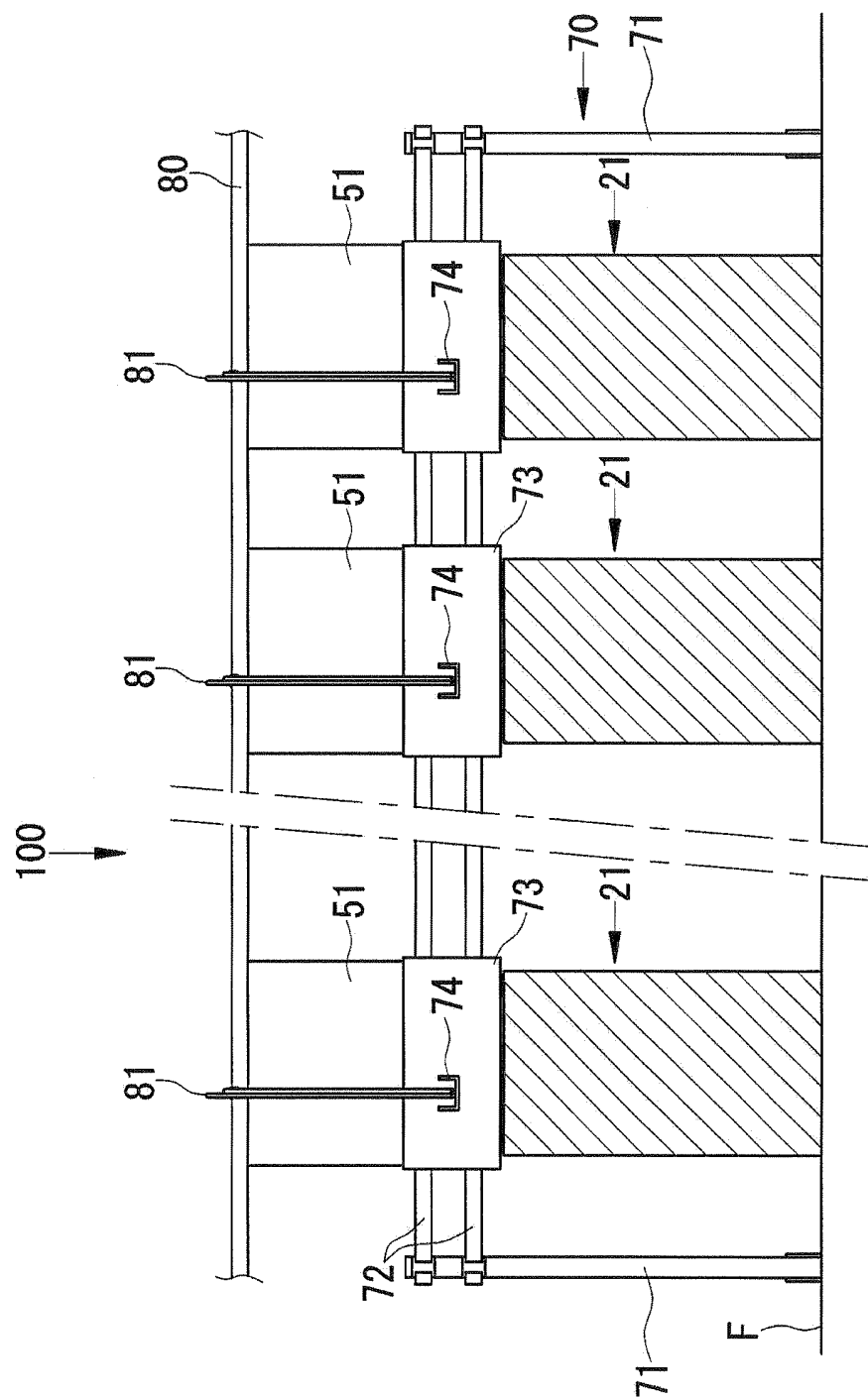


Fig. 6

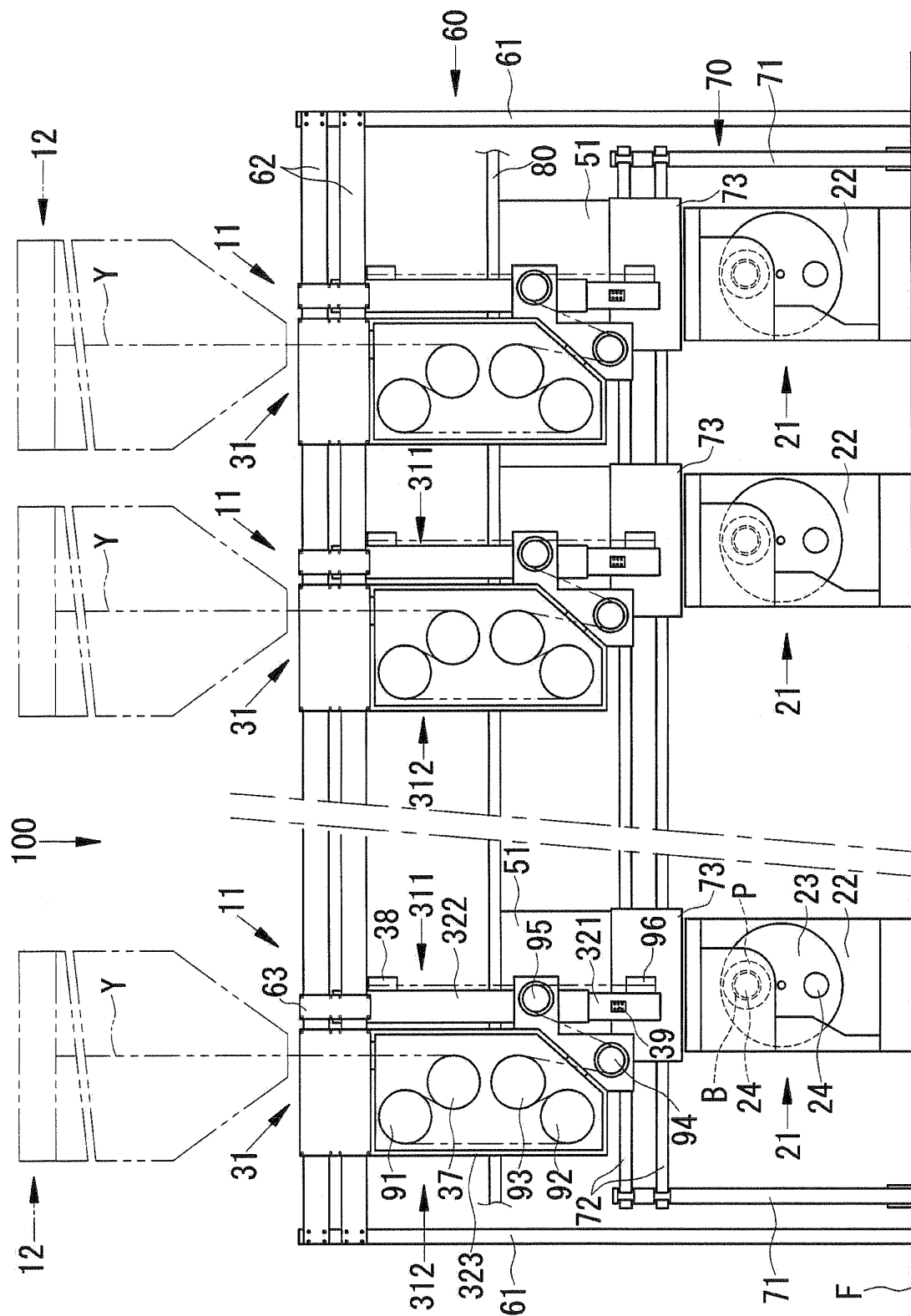
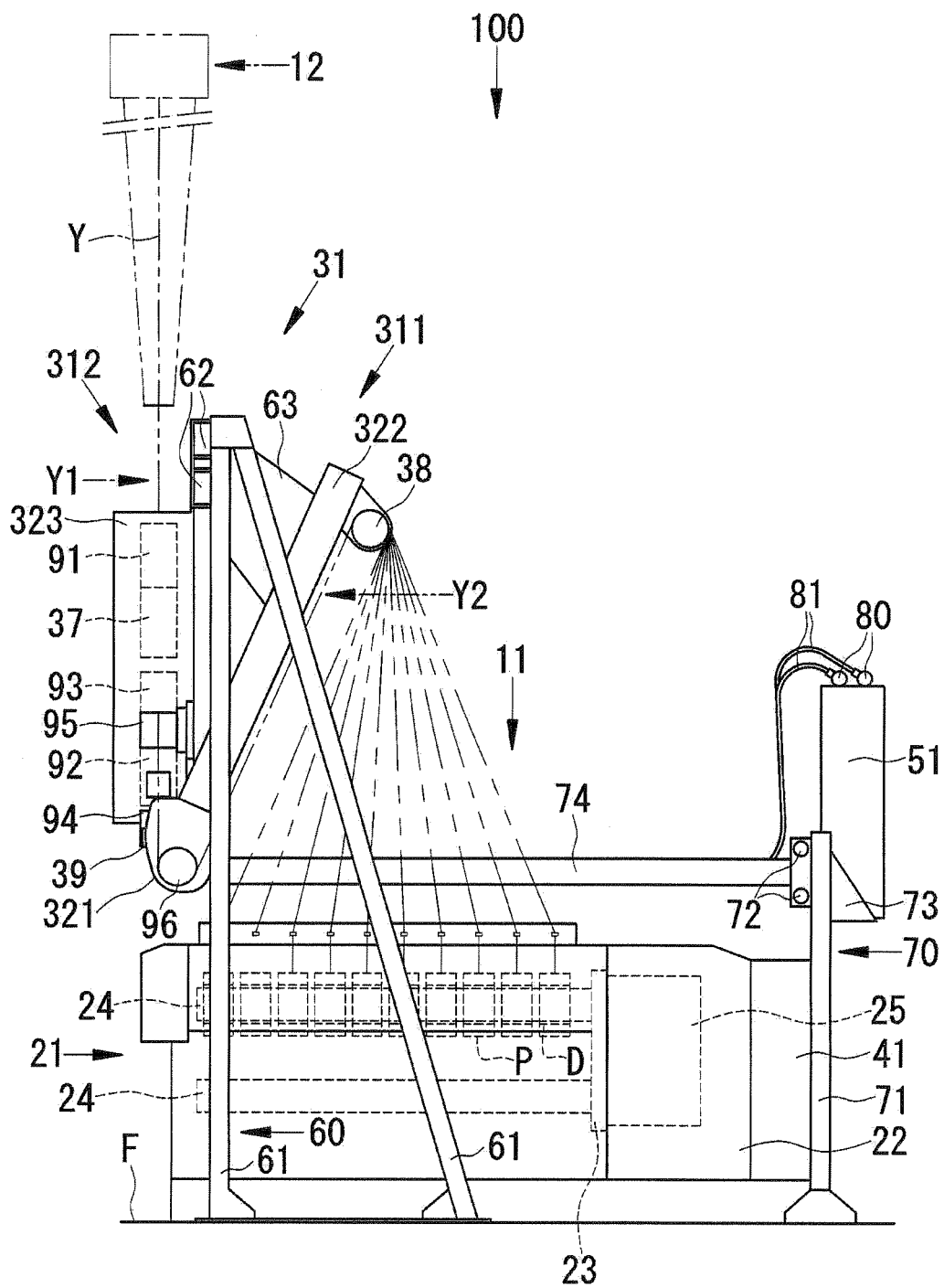


Fig. 7



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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