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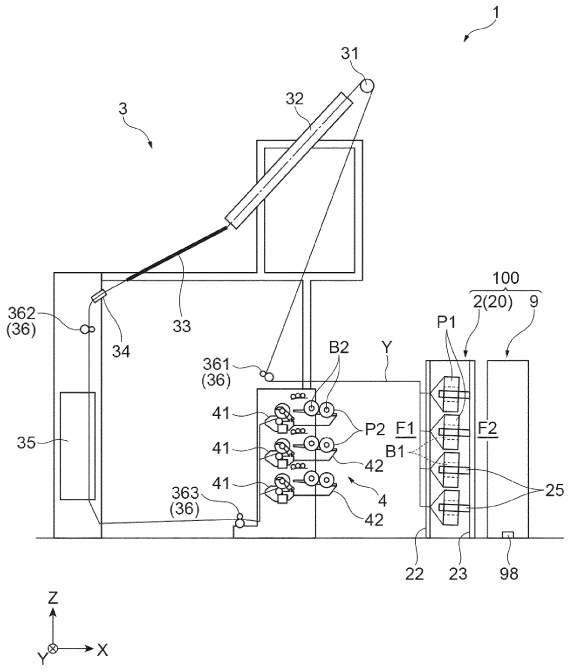
(54) **YARN SUPPLY PACKAGE ATTACHMENT SYSTEM**

(57) A yarn supply package exchange system includes a creel stand (20) which includes a pair of pegs (25, 25A, 25B) and a package exchange device which attaches a yarn supply package to the peg (25, 25A, 25B). Each of the pegs (25, 25A, 25B) is provided to be rotatable between a first rotation state (C1) in which the yarn supply package faces a direction of supplying a synthetic yarn (Y) to a processing portion and a second rotation state (C2) in which the yarn supply package faces an attachable direction of the yarn supply package using the package exchange device. The package exchange device attaches the yarn supply package to the peg (25, 25A, 25B) in the second rotation state (C2) and then rotates the peg (25, 25A, 25B) to a third rotation state (C3) corresponding to one state between the first rotation state (C1) and the second rotation state (C2).

Fig.1



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Description

TECHNICAL FIELD

[0001] An aspect of the present disclosure relates to a yarn supply package attachment system.

BACKGROUND

[0002] A false-twist texturing machine which performs false-twist texturing on a plurality of synthetic yarns supplied from a yarn supply package and winds the processed synthetic yarns to form a winding package in a winding device is known. For example, Patent Literature 1 (Japanese Examined Patent Publication No. H7-68010) discloses a false-twist texturing machine including a creel stand which holds a plurality of yarn supply packages and a false-twist texturing device which performs false-twisting on yarns supplied from the yarn supply packages. The creel stand is provided with a peg which supports the yarn supply package and is able to rotate the yarn supply package about a shaft extending in a vertical direction and serving as a rotation shaft. Then, the peg can be switched between two states, a first rotation state in which the yarn supply package faces a direction of supplying the synthetic yarn to the false twist texturing device of the false-twist texturing machine and a second rotation state in which the yarn supply package faces an attachable direction of the yarn supply package.

[0003] Among the creel stands, there is known a creel stand having a configuration in which yarn supply package support portions including pairs of the pegs are unidirectionally arranged. In such a creel stand, joining the synthetic yarn of the yarn supply package supported by one peg to the synthetic yarn of the yarn supply package supported by another peg makes it possible to send the synthetic yarn forming the other yarn supply package even when the synthetic yarn forming the one yarn supply package is exhausted, and therefore it is possible to continuously supply the synthetic yarn to the false-twist texturing device.

[0004] In the creel stand with such a configuration, a worker manually performs each of attachment work of attaching the yarn supply package supported by the peg, cap attachment work of attaching a cap for protecting the synthetic yarn unwound from the yarn supply package to a new yarn supply package, and yarn joining work (tail joining work) of joining the synthetic yarn of the yarn supply package supported by one peg to the synthetic yarn of the yarn supply package supported by the other peg. However, since the full-wound yarn supply package is heavy, the work of attaching the yarn supply package is particularly burdensome for the worker. Here, it is conceivable to newly provide an attachment mechanism for attaching the yarn supply package to the peg.

SUMMARY

[0005] Incidentally, a problem arises when the peg is left in the second rotation state after the yarn supply package is attached to the attachment mechanism. That is, the yarn supply package support portions are arranged closely in the arrangement direction in order to make the creel stand compact. Here, the peg included in one yarn supply package support portion and disposed in proximity to the other yarn supply package support portion is considered to be a first peg and the peg included in the other yarn supply package support portion and disposed in proximity to one yarn supply package support portion is considered to be a second peg in the yarn supply package support portions adjacent to each other, the yarn supply packages may contact each other when each of the first peg and the second peg supports the yarn supply package having a predetermined diameter or more in the second rotation state. In other words, when the yarn supply package is supported by one of the first peg and the second peg adjacent to each other in the second rotation state, the yarn supply package cannot be attached to the other of the first peg and the second peg.

[0006] Here, it is conceivable to rotate the peg in the first rotation state after attaching the yarn supply package to the attachment mechanism. However, when the peg is in the first rotation state, it becomes the same as the state in which the yarn is supplied to the false-twist texturing device after the cap attachment work and the yarn joining work are completed and the worker cannot distinguish whether or not the cap attachment work and the yarn joining work are completed. As a result, there is a problem that the worker overlooks the implementation of the cap attachment work or the yarn joining work.

[0007] Here, an object of an aspect of the present disclosure is to provide a yarn supply package attachment system capable of making a creel stand compact and preventing a worker from overlooking a work by allowing the worker to easily recognize a work state after a yarn supply package is attached to a peg by an attachment mechanism.

[0008] A yarn supply package attachment system according to an aspect of the present disclosure includes: a creel stand which includes a pair of pegs rotatably supporting yarn supply packages formed by winding a synthetic yarn to be supplied to a yarn texturing device and joins a yarn end of the synthetic yarn forming one of the yarn supply packages supported by one of the pegs to a yarn end of the synthetic yarn forming an other of the yarn supply packages supported by an other of the pegs so that the synthetic yarn forming the other yarn supply package can be supplied to the yarn texturing device when the synthetic yarn forming the one of the yarn supply package is exhausted; and an attachment mechanism which attaches the yarn supply packages to the pegs, wherein each of the pair of the pegs is provided to be rotatable between a first rotation state corresponding to a state in which the yarn supply package faces a di-

rection in which the synthetic yarn is supplied to the yarn texturing device and a second rotation state corresponding to a state in which the yarn supply packages face a direction in which the yarn supply packages can be attached using the attachment mechanism, wherein the attachment mechanism attaches the yarn supply packages to the pegs in the second rotation state and then rotates the pegs to a third rotation state corresponding to a state in which the yarn supply packages face a direction between the first rotation state and the second rotation state, wherein a plurality of yarn supply package support portions each including a pair of the pegs as a set are formed and a plurality of the pegs constituting a plurality of the yarn supply package support portions are unidirectionally arranged in the creel stand, wherein the pegs included in one of the yarn supply package support portions and disposed in proximity to an other of the yarn supply package support portions are considered to be first pegs and the pegs included in the other of the yarn supply package support portions and disposed in proximity to the one of the yarn supply package support portions are considered to be second pegs in the yarn supply package support portions adjacent to each other, wherein, when each of the first pegs and the second pegs support the yarn supply packages having a predetermined diameter or more, the first pegs and the second pegs are provided so that the yarn supply packages contact each other when each of the first pegs and the second pegs are in the second rotation state and the first pegs and the second pegs are provided so that the yarn supply packages having a predetermined diameter or more do not contact each other when one of the first pegs and the second pegs are in the second rotation state and an other of the first pegs and the second pegs are in the third rotation state.

[0009] In the yarn supply package attachment system with this configuration, since the yarn supply packages are provided adjacently to be in contact with each other when each of the first peg and the second peg is in the second rotation state and supports the yarn supply package having a predetermined diameter or more, it is possible to make the creel stand compact. Furthermore, in the yarn supply package attachment system with this configuration, the attachment mechanism attaches the yarn supply package to one of the first peg and the second peg in the second rotation state and then rotates the peg in the third rotation state without leaving the peg as it is. Accordingly, it is also possible to attach the yarn supply package to the other of the first peg and the second peg. Further, since the attachment mechanism rotates one of the first peg and the second peg in the third rotation state different from the first rotation state, it is possible to allow the worker to easily recognize that the cap attachment work or the yarn joining work is not completed and these works should be performed. As a result, it is possible to prevent the worker from overlooking the work after the yarn supply package is attached to the peg by the attachment mechanism.

[0010] In the yarn supply package attachment system according to an aspect of the present disclosure, the attachment mechanism collects used packages of the yarn supply packages from the pegs and attaches new packages of the yarn supply packages to the pegs. In this configuration, it is possible to attach the yarn supply packages to the peg and to collect the used packages of the yarn supply packages.

[0011] In the yarn supply package attachment system according to an aspect of the present disclosure, the creel stand further includes shaft portions extending in a vertical direction, rotation portions supporting the pegs so as to be rotatable around the shaft portions, and rotation regulation portions regulating rotation of the rotation portions in the first rotation state, the second rotation state and the third rotation state. In this configuration, it is possible to easily perform the positioning operation in the second rotation state and the third rotation state by the attachment mechanism and to easily perform the positioning operation in the first rotation state by the worker.

[0012] In the yarn supply package attachment system according to an aspect of the present disclosure, the rotation regulation portions each include a locking portion being provided in either one of the rotation portions and fixing portions provided in the shaft portions so as not to be rotatable and a locked portion being provided in an other of the fixing portions and the rotation portions to lock the locking portion. In this configuration, it is possible to position the yarn supply package support portion with a simple configuration.

[0013] In the yarn supply package attachment system according to an aspect of the present disclosure, the locking portion is a projecting portion, and the locked portion is a groove portion locking the projecting portion. In this configuration, it is possible to position the yarn supply package support portion with a simple configuration.

[0014] In the yarn supply package attachment system according to an aspect of the present disclosure, the locking portion is a projecting portion, and the locked portion is a recessed portion locking the projecting portion. In this configuration, it is possible to position the yarn supply package support portion with a simple configuration.

[0015] According to an aspect of the present disclosure, it is possible to make the creel stand compact and to prevent the worker from overlooking the work by allowing the worker to easily recognize the work state after the yarn supply package is attached to the peg by the attachment mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

FIG. 1 is a diagram showing a configuration of a package exchange system and a false-twist texturing machine including a creel stand according to an embodiment.

FIG. 2 is a perspective view showing the creel stand.

FIG. 3A is a perspective view showing a peg according to an embodiment.
FIG. 3B is a perspective view showing the peg according to an embodiment.
FIG. 4A is a perspective view showing the peg according to an embodiment.
FIG. 4B is a perspective view showing the peg according to an embodiment.
FIG. 5A is a plan view showing a groove portion.
FIG. 5B is a diagram showing an engagement state between the groove portion and a projecting portion.
FIG. 5C is a diagram showing the engagement state between the groove portion and the projecting portion.
FIG. 6 is a perspective view showing a package exchange device.
FIG. 7 is an outline diagram showing an exchange unit provided in the package exchange device.
FIG. 8 is a block diagram showing a functional configuration of the package exchange device.
FIG. 9A is a diagram showing a first rotation state.
FIG. 9B is a diagram showing a second rotation state.
FIG. 10A is a diagram showing a third rotation state.
FIG. 10B is a diagram showing that a pair of the pegs located in the second rotation state and holding a yarn supply package having a predetermined diameter or more interfere with each other.
FIG. 11A is a diagram showing one peg of the pair of pegs in the third rotation state and the other peg in the second rotation state.
FIG. 11B is a diagram showing one peg of the pair of pegs in the third rotation state and the other peg in the first rotation state.
FIG. 12 is a front view showing a package supported by the peg in the state of FIG. 10A from a work side of a worker.
FIG. 13A is a diagram showing a work state when performing yarn joining while one peg is in the third rotation state.
FIG. 13B is a diagram showing a work state when performing yarn joining while both pegs are in the first rotation state.
FIG. 14A is a perspective view showing a peg according to a modified example.
FIG. 14B is a perspective view showing the peg according to the modified example.
FIG. 15A is a perspective view of a cam provided with a groove portion.
FIG. 15B is a cross-sectional view showing an engagement state between a groove portion and a projecting portion.
FIG. 16A is a perspective view showing a peg according to a modified example.
FIG. 16B is a cross-sectional view showing an engagement state between a groove portion and a projecting portion.

DETAILED DESCRIPTION

[0017] Hereinafter, preferred embodiments of an aspect of the present disclosure will be described in detail with reference to the accompanying drawings. Additionally, in the description of the drawings, the same or equivalent components are denoted by the same reference numerals and duplicate description will be omitted.

[0018] As shown in FIG. 1, a creel stand 20 of an embodiment is provided in a false-twist texturing machine 1. Further, a yarn supply package exchange system (yarn supply package attachment system) 100 of an embodiment includes the creel stand 20 and a package exchange device (attachment mechanism) 9. In the description below, the "Z direction" shown in the drawings is the vertical direction (up and down direction), the "X direction" is the horizontal direction, and the "Y direction" is the horizontal direction orthogonal to the "X direction" and the direction orthogonal to both the X direction and the Z direction.

[0019] The false-twist texturing machine 1 processes the yarn (synthetic yarn) Y supplied from a plurality of yarn supply packages PI to manufacture a winding package P2. The yarn Y is a synthetic fiber made of thermoplastic synthetic fibers such as polyester and polyamide. The yarn supply package PI is formed by winding a partially oriented yarn (POY) on a yarn supply bobbin B1. The winding package P2 is formed by winding a draw textured yarn (DTY) on a winding bobbin B2. That is, the false-twist texturing machine 1 processes the yarn Y which is a partially oriented yarn to produce a draw textured yarn.

[0020] The false-twist texturing machine 1 includes a yarn supply portion 2, a processing portion (yarn texturing device) 3, and a winding portion 4. A plurality of components of the yarn supply portion 2, the processing portion 3, and the winding portion 4 to be described later are arranged in the Y direction (the longitudinal direction of the machine base) orthogonal to the running surface (the paper surface of FIG. 1) of the yarn Y in which a yarn path extending from the yarn supply portion 2 to the winding portion 4 through the processing portion 3 is disposed.

[0021] The yarn supply portion 2 supplies the yarn Y to the processing portion 3. The yarn supply portion 2 includes the creel stand 20 which holds a plurality of the yarn supply packages P1. As shown in FIGS. 1 and 2, the creel stand 20 includes a creel base 21, a first support column 22, a second support column (shaft portion) 23, a partition plate 24, and a peg 25. The creel base 21 is installed on a floor surface or the like and supports the first support column 22 and the second support column 23. The first support column 22 and the second support column 23 are erected on the creel base 21.

[0022] The first support column 22 extends in the Z direction (vertical direction). The first support columns 22 are arranged at equal intervals in the Y direction. The first support column 22 is disposed on one side F1 of the creel stand 20 in the X direction. The one side F1 of the

X direction is a side in which the processing portion 3 to be described in detail in the subsequent stage is disposed and is a side which sends the yarn Y to the processing portion 3 for performing false twisting.

[0023] The second support column 23 extends in the Z direction. The second support column 23 is disposed as a pair in the Y direction and a plurality of sets of the second support columns 23 and 23 are arranged in the Y direction. The second support column 23 is disposed on the other side F2 of the creel stand 20 in the X direction. The other side F2 of the X direction is a side in which the package exchange device 9 to be described in detail in a subsequent stage runs and is a side in which a worker who performs a yarn joining work performs the work. A group of the first support columns 22 including the plurality of first support columns 22 and a group of the second support columns 23 including the plurality of second support columns 23 are arranged to face each other in the X direction.

[0024] The partition plate 24 is provided to straddle the first support column 22 and the second support column 23. The partition plate 24 is a plate-shaped member and the partition plates are arranged at predetermined intervals in the Z direction. The partition plate 24 prevents the yarn supply package P1 from falling from the peg 25.

[0025] The peg 25 supports the yarn supply package P1. The peg 25 is provided in the second support column 23. A plurality of (for example, four) pegs 25 are arranged at predetermined intervals in the Z direction of the second support column 23. Each of the pegs 25 is disposed between two partition plates 24 in the Z direction. Further, the pegs 25 is disposed as pairs to correspond to the second support columns 23 and 23 disposed as pairs, and a plurality of sets (pairs) of the pegs 25 and 25 are arranged in the Y direction.

[0026] In the peg 25 with this configuration, the yarn Y of the yarn supply packages PI supported by one peg (first peg) 25 of the pair of pegs can be joined to the yarn Y of the yarn supply package PI supported by the other peg (second peg) 25 of the pair of pegs. Specifically, the yarn end on the outer layer side of the yarn Y of the yarn supply package PI supported by one peg 25 of the pair of pegs is joined to the yarn end on the inner layer side of the yarn Y of the yarn supply package P1 supported by the other peg 25 of the pair of pegs, or the yarn end on the inner layer side of the yarn Y of the yarn supply package P1 supported by one peg 25 of the pair of pegs is joined to the yarn end on the outer layer side of the yarn Y of the yarn supply package PI supported by the other peg 25 of the pair of pegs. Accordingly, one yarn Y is supplied from two yarn supply packages PI and PI respectively supported by the pair of pegs 25 and 25. That is, it is possible to continuously supply the yarn Y to the processing portion 3.

[0027] As shown in FIGS. 3A, 3B, 4A, and 4B, the peg 25 includes a yarn supply package support portion 251, a peg body portion (rotation portion) 252, a body support portion (rotation portion) 253, a rotation transmission portion 254, and a fixing portion 255. The yarn supply package support portion 251 rotatably supports the yarn supply package P1. The yarn supply package support portion 251 is a pair of rod-shaped members extending in one direction. The pair of yarn supply package support portions 251 are disposed with a predetermined gap therebetween to extend in one direction and be parallel to each other. The yarn supply package support portion 251 supports the yarn supply package PI by inserting a rod-shaped member extending from a base end portion to a front end portion into a hole portion formed in the yarn supply bobbin B1 of the yarn supply package P1. The peg 25 supports the yarn supply package PI at two points by two yarn supply package support portions 251 and 251.

[0028] The peg body portion 252 supports two yarn supply package support portions 251. The peg body portion 252 is provided so that the yarn supply package support portions 251 and 251 are rotatable about a rotation shaft extending in the Z direction. An insertion hole 252A is formed in the peg body portion 252. The second support column 23 of the creel stand 20 is inserted through the insertion hole 252A.

[0029] The body support portion 253 is a tubular member that extends in one direction. One end of the body support portion 253 in the extension direction is joined to the peg body portion 252. The body support portion 253 and the peg body portion 252 are integrally formed with each other. The body support portion 253 supports the yarn supply package support portion 251 to be rotatable with respect to the second support column 23. A hollow portion of the body support portion 253 communicates with the insertion hole 252A of the peg body portion 252. The second support column 23 of the creel stand 20 is inserted into the insertion hole 252A of the peg body portion 252 and the hollow portion of the body support portion 253.

[0030] The body support portion 253 is provided to be rotatable in a rotation range R (see FIG. 5A) having rotation ends of a first rotation state C1 corresponding to a state in which the yarn supply package PI is supported so that the yarn Y can be supplied to the processing portion 3 processing the yarn Y and a second rotation state C2 corresponding to a state in which the yarn supply package PI is supported so that the yarn supply package PI can be exchanged (the yarn supply bobbin B1 is collected and the yarn supply package PI is attached).

[0031] The rotation transmission portion 254 is a Geneva wheel which constitutes a Geneva mechanism. The rotation transmission portion 254 is joined to the other end of the body support portion 253 in the extension direction. The rotation transmission portion 254 and the peg body portion 252 are integrally formed with each other. The rotation transmission portion 254 is rotated by the driving of a rotation driver 932A (see FIG. 7) of a rotation device 932 (see FIG. 7) to be described later. The peg body portion 252 is rotated in accordance with the rotation of the rotation transmission portion 254. Ac-

cordingly, the yarn supply package support portions 251 and 251 are rotated.

[0032] The fixing portion 255 is fixed to the second support column 23 not to be rotatable. The rotation regulation portion 256 temporarily regulates (positions) the rotation of the body support portion 253 with respect to the second support column 23 in a predetermined state. The rotation regulation portion 256 temporarily regulates the rotation of the body support portion 253 with respect to the second support column 23 in the first rotation state C1, the second rotation state C2, and a third rotation state C3 corresponding to one rotation state between the first rotation state C1 and the second rotation state C2. The regulation of the body support portion 253 which is regulated in rotation by the rotation regulation portion 256 is released when the worker applies a force in the rotation direction.

[0033] The rotation regulation portion 256 includes a projecting portion (locking portion) 257 which is provided in one of the peg body portion 252 and the fixing portion 255 and a groove portion (locked portion) 258 which is provided in the other of the peg body portion 252 and the fixing portion 255 and locks the projecting portion 257. In this embodiment, the projecting portion 257 which forms the rotation regulation portion 256 is provided in the peg body portion 252 and the groove portion 258 is provided in the fixing portion 255. As shown in FIG. 5A, the fixing portion 255 is provided with the groove portion 258 in which the body support portion 253 (peg 25) is in the first rotation state C1, the groove portion 258 in which the body support portion 253 is in the second rotation state C2, and the groove portion 258 in which the body support portion 253 is in the third rotation state C3 when locking the projecting portion 257.

[0034] As shown in FIG. 5B, the groove portion 258 in which the body support portion 253 is in the first rotation state C1 when locking the projecting portion 257 includes a first locked surface 258A, a second locked surface 258B, and a third locked surface 258C. The second locked surface 258B is formed on the side in which the body support portion 253 is rotated to the second rotation state C2. The first locked surface 258A is a flat surface which extends in the vertical direction. The second locked surface 258B is an inclined surface. The third locked surface 258C is a horizontal surface. Due to the shape of such a groove portion 258, only the projecting portion 257 can enter the groove portion 258 or advance from the groove portion 258 while sliding from the second locked surface 258B so that the projecting portion 257 can be prevented from advancing from the first locked surface 258A of the groove portion 258 and the projecting portion 257 can be locked to the groove portion 258.

[0035] Although not shown in the drawings, the groove portion 258 in which the body support portion 253 is in the second rotation state C2 when locking the projecting portion 257 also includes a first locked surface 258A, a second locked surface 258B, and a third locked surface 258C. The second locked surface 258B is formed on the side in which the body support portion 253 is rotated to the first rotation state C1. The first locked surface 258A is a flat surface which extends in the vertical direction. The second locked surface 258B is an inclined surface. The third locked surface 258C is a horizontal surface. Due to the shape of such a groove portion 258, only the projecting portion 257 can enter the groove portion 258 or advance from the groove portion 258 while sliding from the second locked surface 258B so that the projecting portion 257 can be prevented from advancing from the first locked surface 258A of the groove portion 258 and the projecting portion 257 can be locked to the groove portion 258.

[0036] As shown in FIG. 5C, the groove portion 258 in which the body support portion 253 is in the third rotation state C3 when locking the projecting portion 257 includes a fourth locked surface 258D, a fifth locked surface 258E, and a sixth locked surface 258F. The fourth locked surface 258D is formed on the side in which the body support portion 253 is rotated to the first rotation state C1 and is an inclined surface. The fifth locked surface 258E is formed on the side in which the body support portion 253 is rotated to the second rotation state C2 and is an inclined surface. The sixth locked surface 258F is a horizontal surface. Due to the shape of such a groove portion 258, the projecting portion 257 can enter the groove portion 258 or advance from the groove portion 258 while sliding from the fourth locked surface 258D so that the projecting portion 257 can enter the groove portion 258 or advance from the groove portion 258 while sliding from the fifth locked surface 258E and the projecting portion 257 can be locked to the groove portion 258.

[0037] As shown in FIG. 2, the pegs 25 are arranged in the Y direction. The body support portion 253 rotates so that the front end portion of the yarn supply package support portion 251 in the first rotation state C1 faces one side F1 of the X direction as shown by the second peg 25 from the left in FIG. 9A, the front end portion of the yarn supply package support portion 251 in the second rotation state C2 faces the other side F2 of the X direction as shown by the second peg 25 from the left in FIG. 9B, and the front end portion of the yarn supply package support portion 251 in the third rotation state C3 faces the Y direction as shown by the second peg 25 from the left in FIG. 10A.

[0038] Further, as shown by the second peg 25 from the left and the third peg 25 from the left in FIG. 10B, the peg 25 prevents the yarn supply package PI having a predetermined diameter or more from being attached to the other peg 25 while the yarn supply package PI having a predetermined diameter is supported by one peg 25 of the pair of pegs. More specifically, in the relationship of $D \leq r2 + r3$, the yarn supply package PI having a predetermined diameter r3 is attached to the other peg 25 while the yarn supply package PI having a predetermined diameter r2 is supported by one peg 25 of the pair of pegs.

D: Distance between the second peg 25 (center of the second support column 23) from the left and the

third peg 25 (center of the second support column 23) from the left
r2: Radius of the yarn supply package PI supported by the second peg 25 from the left
r3: Radius of the yarn supply package PI supported by the third peg 25 from the left

[0039] That is, the pair of pegs 25 and 25 are arranged with a gap therebetween in the Y direction so that the yarn supply packages PI and PI supported in the second rotation state C2 are in contact with each other.

[0040] On the other hand, the peg 25 is provided so that the yarn supply package PI supported by the peg 25 corresponding to one of the pair of pegs in the second rotation state C2 does not contact the yarn supply package PI supported by the peg 25 corresponding to the other of the pair of pegs in the third rotation state C3 as shown by the second peg 25 from the left and the third peg 25 from the left in FIG. 11A and the yarn supply package PI supported by the peg 25 corresponding to one of the pair of pegs in the first rotation state C1 does not contact the yarn supply package PI supported by the peg 25 corresponding to the other of the pair of pegs in the third rotation state C3 as shown by the second peg 25 from the left and the third peg 25 from the left in FIG. 11B.

[0041] The processing portion 3 performs false twisting on the yarn Y supplied from the yarn supply portion 2. As shown in FIG. 1, the processing portion 3 includes a twisting guide 31, a first heating device 32, a cooling device 33, a false twisting device 34, a second heating device 35, and a feed roller 36 (feed rollers 361 to 363). Each of the twisting guide 31, the first heating device 32, the cooling device 33, the false twisting device 34, the second heating device 35, and the feed roller 36 (feed rollers 361 to 363) is individually provided in each yarn Y supplied from the yarn supply portion 2 and these components are arranged in series in the Y direction.

[0042] The twisting guide 31 prevents the twist applied to the yarn Y by the false twisting device 34 to be described later from propagating to the upstream side in the yarn running direction with respect to the twisting guide 31. The first heating device 32 heats the yarn Y sent from the yarn supply portion 2 through the feed roller 361. The cooling device 33 cools the yarn Y heated by the first heating device 32. The false twisting device 34 twists the yarn Y The second heating device 35 heats the yarn Y sent from the false twisting device 34 through the feed roller 362.

[0043] The feed roller 361 is provided between the creel stand 20 and the twisting guide 31, the feed roller 362 is provided between the false twisting device 34 and the second heating device 35, and the feed roller 363 is provided between the second heating device 35 and a winding device 41. Each feed roller 36 (feed rollers 361 to 363) includes a driving roller and a driven roller. The feed rollers 36 are arranged in series in the Y direction.

[0044] The conveying speed of the yarn Y by the feed roller 362 is faster than the conveying speed of the yarn Y by the feed roller 361 and the yarn Y is stretched between the feed roller 361 and the feed roller 362. The conveying speed of the yarn Y by the feed roller 363 is slower than the conveying speed of the yarn Y by the feed roller 362 and the yarn Y is relaxed between the feed roller 362 and the feed roller 363.

[0045] In the processing portion 3 with the above-described configuration, the yarn Y stretched between the feed roller 361 and the feed roller 362 is twisted by the false twisting device 34. The twist formed by the false twisting device 34 is propagated to the twisting guide 31, but is not propagated to the upstream side of the twisting guide 31 in the yarn running direction. The yarn Y which is twisted in a stretched state is heated by the first heating device 32 to be heat-fixed and then is cooled by the cooling device 33. The yarn Y is untwisted on the downstream side from the false twisting device 34, but each filament is maintained in a false twisted state by the above heat-fixing.

[0046] The yarn Y is heat-fixed by the second heating device 35 while being relaxed between the feed roller 362 and the feed roller 363. Finally, the yarn Y sent from the feed roller 363 is wound by the winding device 41 of the winding portion 4 to form the winding package P2.

[0047] The winding portion 4 includes the winding device 41, a package stocker 42, a ball lifting device (not shown), and the like. The winding device 41 forms the winding package P2 by winding the yarn Y which is false-twisted by the processing portion 3. The package stocker 42 stores the winding package P2 formed by the winding device 41. The ball lifting device removes the winding package P2 formed by the winding device 41, transfers the winding package P2 to the package stocker 42, and attaches an empty winding bobbin B2 to the winding device 41.

[0048] The package exchange device 9 collects the yarn supply bobbin B1 from the peg 25 and attaches the yarn supply package PI to the peg 25. As shown in FIG. 6, the package exchange device 9 runs along a rail 98. The rail 98 is laid on the floor and extends in the Y direction. That is, the package exchange device 9 is provided to be able to run in the Y direction. The package exchange device 9 includes a running unit 90, an elevating unit 91, a holding unit 92, an exchange unit 93, and a controller 94 (see FIG. 8) controlling the operation of each unit.

[0049] The running unit 90 is provided with a wheel running on the rail 98, a driving mechanism, and the like. The running unit 90 supports the elevating unit 91, the holding unit 92, and the exchange unit 93. The elevating unit 91 elevates the worker while the worker gets on the elevating unit. The elevating unit 91 is used for maintenance or the like. The elevating unit 91 includes a working table 911 on which the worker gets, a guide portion 912 which supports the working table 911 to be movable in the Z direction, and a driving mechanism (not shown) which drives the working table.

[0050] The holding unit 92 holds a plurality of (for ex-

ample, four) yarn supply packages PI. The holding unit 92 receives the yarn supply package PI supplied from a package replenishment device (not shown), temporarily stores the yarn supply package PI, and supplies the yarn supply package PI to the exchange unit 93. The holding unit 92 is provided to be rotatable in the range of about 90°. More specifically, the holding unit 92 is provided to be rotatable between a replenishment position in which the yarn supply package PI is supplied from the package replenishment device and a supply position in which the yarn supply package PI is supplied to the exchange unit 93 (a position shown in FIG. 6).

[0051] The exchange unit 93 exchanges the yarn supply bobbin B1 and the yarn supply package PI in the peg 25. Specifically, the exchange unit 93 collects the yarn supply bobbin B1 (see FIG. 1) from the peg 25 and attaches the yarn supply package PI to the peg 25. The exchange unit 93 is provided adjacent to the holding unit 92. As shown in FIG. 7, the exchange unit 93 includes a base 931, a rotation device 932, a collection device 933, a supply device 934, and a rotary table 936. Additionally, the description of the rotation device 932, the collection device 933, the supply device 934, and the rotary table 936 is omitted in FIG. 6.

[0052] The base 931 supports the rotation device 932, the collection device 933, the supply device 934, and the rotary table 936. The base 931 is provided to be elevatable in the Z direction. The rotation device 932 is fixed to the base 931. The rotation device 932 rotates the peg 25 of the creel stand 20. The rotation device 932 includes a rotation driver 932A and a rotation arm 932B.

[0053] The rotation driver 932A rotates the rotation transmission portion 254 (for example, see FIG. 3A and the like) of the peg 25. The rotation driver 932A is a Geneva driver which constitutes a Geneva mechanism. The rotation driver 932A is rotated by the rotational driving of a motor (not shown). The rotation arm 932B supports the rotation driver 932A. The rotation arm 932B is provided to be swingable in the horizontal direction. The rotation arm 932B is driven by, for example, a motor or an air cylinder (not shown). The rotation device 932 is provided to correspond to one peg 25 and the other peg 25 provided as a pair in the creel stand 20.

[0054] The rotation device 932 changes the direction of the peg 25 by rotating the peg 25 when attaching the yarn supply package PI to the peg 25. More specifically, the rotation device 932 swings the rotation arm 932B so that the rotation driver 932A engages with the rotation transmission portion 254 of the peg 25. The rotation device 932 rotates the rotation driver 932A in one direction when the rotation driver 932A engages with the rotation transmission portion 254. In the peg 25, when the rotation transmission portion 254 rotates, the body support portion 253 rotates. Accordingly, the peg 25 rotates so that the front end portion of the yarn supply package support portion 251 faces the exchange unit 93.

[0055] The collection device 933 is provided in the rotary table 936 rotatably supported by the base 931. The collection device 933 collects the yarn supply bobbin B1 from the peg 25. The collection device 933 includes a yarn supply bobbin support portion 933A which supports the yarn supply bobbin B1. The collection device 933 supports the yarn supply bobbin B1 by moving the yarn supply bobbin support portion 933A forward while the yarn supply bobbin B1 is not supported by the peg 25 and collects the yarn supply bobbin B1 from the peg 25 by moving the yarn supply bobbin support portion 933A backward while the yarn supply bobbin B1 is supported by the peg 25.

[0056] The supply device 934 is provided in the rotary table 936 rotatably supported by the base 931. The supply device 934 supplies the yarn supply package PI to the peg 25. The supply device 934 includes a yarn supply package supply portion 934A which supports the yarn supply package P1. The supply device 934 attaches the yarn supply package PI to the peg 25 by moving the yarn supply package supply portion 934A forward while the yarn supply package PI is supported by the peg 25 and supplies the yarn supply package PI to the peg 25 by moving the yarn supply package supply portion 934A backward while the yarn supply package PI is not supported by the peg 25.

[0057] The rotary table 936 is rotatably supported by the base 931. The rotary table 936 is rotated so that the yarn supply bobbin support portion 933A is located in front of the target peg 25 when collecting the yarn supply bobbin B1. Further, the rotary table 936 is rotated so that the yarn supply package supply portion 934A is located in front of the target peg 25 when supplying the yarn supply package P1.

[0058] As shown in FIG. 8, the controller 94 is an electronic control unit including a central processing unit (CPU), a read only memory (ROM), a random access memory (RAM), an I/O port, a communication port, and the like. The ROM stores a program for controlling each component of the running unit 90, the elevating unit 91, the holding unit 92, and the exchange unit 93. Further, each function of the controller 94 is executed under the control of the CPU by loading specified computer software on hardware such as CPU and main memory.

[0059] As described above, the package exchange device 9 is provided to be able to run in the Y direction on the side F2 of the creel stand 20 and takes out the used yarn supply package PI (yarn supply bobbin B1) supported by the peg 25 to exchange the used one with the non-used (new) yarn supply package P1. When exchanging the yarn supply package PI, the controller 94 controls the package exchange device 9 to rotate the body support portion 253 so that the peg 25 (the second peg 25 from the left in FIG. 9A) located in the first rotation state C1 is located in the second rotation state C2 (see the second peg 25 from the left in FIG. 9B). Next, the controller 94 controls the package exchange device 9 to exchange the used yarn supply package PI with the non-used yarn supply package P1. Next, the controller 94 rotates the body support portion 253 so that the peg 25 located in the

second rotation state C2 is located in the third rotation state C3 (see the second peg 25 from the left in FIG. 10A). More specifically, the controller 94 drives the rotation driver 932A of the rotation device 932 to rotate the rotation transmission portion 254 and to rotate the peg body portion 252.

[0060] The creel stand 20 with the above-described configuration can temporarily regulate (position) the rotation of the body support portion 253 in the first rotation state C1 corresponding to a state in which the yarn supply package P1 is supported so that the yarn Y can be supplied to the processing portion 3 processing the yarn Y (see the second peg 25 from the left in FIG. 9A) and the second rotation state C2 corresponding to a state in which the yarn supply package PI is supported so that the yarn supply package PI can be exchanged (see the second peg 25 from the left in FIG. 9B) and can temporarily regulate (position) the rotation of the body support portion 253 also in the third rotation state C3 corresponding to one rotation state between the first rotation state C1 and the second rotation state C2 (see the second peg 25 from the left in FIG. 10A).

[0061] FIG. 12 is a diagram in which the yarn supply package PI supported by the peg 25 in the state of FIG. 10A is viewed from the other side F2 (that is, from the direction in which the worker performs a work). Since the appearance of the creel stand 20 when viewed from the other side F2 in the X direction is significantly different in the yarn supply package PI supported by the peg 25 in the first rotation state C1 and the yarn supply package P1 supported by the peg 25 in the third rotation state C3, the worker can recognize the peg 25 located in the third rotation state C3 separately from the peg 25 located in the first rotation state C1 and the second rotation state C2. In other words, the worker can easily recognize the yarn supply package PI supported by the peg 25 in a situation in which the attachment work of the yarn supply package PI is completed, but the cap attachment work or the yarn joining work is not completed yet and such work needs to be performed.

[0062] In order to visually distinguish the yarn supply package P1 to be a yarn joining target, it is conceivable to maintain the peg 25 in the second rotation state C2 when exchange without switching to the first rotation state C1 after the yarn supply package PI is exchanged. However, as shown in FIG. 10B, the yarn supply package PI attached to the peg 25 in the second rotation state C2 may prevent the adjacent peg 25 from being located in the second rotation state C2. This is because the pegs 25 are arranged closely in the Y direction in order to suppress an increase in size of the creel stand 20 in the Y direction. In the creel stand 20 of this embodiment, the pegs 25 are provided so that the yarn supply packages PI supported by the pegs 25 in the second rotation state C2 and adjacent to each other in the Y direction contact each other and the yarn supply package PI supported by the peg 25 in the second rotation state C2 and the yarn supply package P1 supported by the peg 25 in the third rotation state C3 are provided so that these adjacent yarn supply packages do not contact each other. Accordingly, it is also possible to suppress an increase in size of the creel stand 20 in the Y direction.

[0063] As shown in FIGS. 13A and 13B, the cap attachment work or the yarn joining work is performed by the manual work of the worker. The cap attachment work is a work of covering the front end portion of the yarn supply package support portion 251 with a cap 259. In a conventional creel stand 520, as shown in FIG. 13B, the front end portion of the yarn supply package support portion 251 of the peg 25 in the first rotation state C1 faces one side F1 of the X direction and the worker performs the cap attachment work in such a state. At this time, the width (length) of the space in which the worker inserts his/her hand to perform the cap attachment work from the other side F2 is L2.

[0064] On the other hand, in the creel stand 20 of this embodiment, as shown in FIG. 13A, when the peg 25 is in the third rotation state C3, the front end portion of the yarn supply package support portion 251 faces the Y direction and the worker performs the cap attachment work in such a state. At this time, the width (length) of the space in which the worker inserts his/her hand to perform the cap attachment work from the other side F2 is L1 and is longer than L2. Thus, in the creel stand 20 of this embodiment, it is possible to improve the workability when performing the cap attachment work.

[0065] The yarn joining work may be performed while the peg 25 which is located in the third rotation state C3 is left in the third rotation state C3 after the attachment work of the yarn supply package PI is completed (see FIG. 10A) and may be performed by the worker in the first rotation state C1 (see FIG. 9A).

[0066] Although the embodiment of an aspect of the present disclosure has been described above, an aspect of the present disclosure is not necessarily limited to the above-described embodiment, and various changes can be made without departing from the gist thereof.

(First modified example)

[0067] The peg 25 of the above-described embodiment has been described by an example in which the projecting portion 257 serving as the locking portion is formed in the peg body portion 252 serving as the rotation portion and the groove portion 258 serving as the locked portion is formed in the fixing portion 255, but an aspect of the present disclosure is not limited thereto. For example, as shown in FIGS. 14A, 14B, 15A, and 15B, a peg 25A according to a first modified example is formed such that a cam 260 serving as a locked portion is provided in the peg body portion 252 serving as the rotation portion and a projecting portion 257A serving as a locking portion is provided in a fixing portion 255A.

[0068] The cam 260 is integrally provided with the peg body portion 252. A protrusion portion 261 which protrudes downward in an annular shape is formed in the

peripheral edge of the cam 260. The protrusion portion 261 is provided with the groove portion 262 in which the body support portion 253 is in the first rotation state C1, the groove portion 262 in which the body support portion 253 is in the second rotation state C2, and the groove portion 262 in which the body support portion 253 is in the third rotation state C3 when locking the projecting portion 257A. Also in the peg 25A with the configuration according to the first modified example, it is possible to temporarily regulate (position) the rotation of the body support portion 253 in the first rotation state C1 corresponding to a state in which the yarn supply package PI is supported so that the yarn Y can be supplied to the processing portion 3 processing the yarn Y and the second rotation state C2 corresponding to a state in which the yarn supply package PI is supported so that the yarn supply package PI can be exchanged and to temporarily regulate (position) the rotation of the body support portion 253 also in the third rotation state C3 corresponding to one rotation state between the first rotation state C1 and the second rotation state C2.

(Second modified example)

[0069] The peg 25A of the first modified example has been described by an example in which the cam 260 serving as the locked portion is provided in the peg body portion 252 serving as the rotation portion and the projecting portion 257A serving as the locking portion is provided in the fixing portion 255A, but an aspect of the present disclosure is not limited thereto. For example, as shown in FIGS. 16A and 16B, a peg 25B according to a second modified example may be formed such that a concave portion 270 serving as a locked portion is provided in the body support portion 253 serving as the rotation portion and a plunger (projecting portion) 280 serving as a locking portion is provided in a fixing portion 255B.

[0070] The body support portion 253B is provided with the concave portion 270 in which the body support portion 253B is in the first rotation state C1, the concave portion 270 in which the body support portion 253B is in the second rotation state C2, and the concave portion 270 in which the body support portion 253B is in the third rotation state C3 when locking the plunger 280. Also in the peg 25B with the configuration according to the second modified example, it is possible to temporarily regulate (position) the rotation of the body support portion 253B in the first rotation state C1 corresponding to a state in which the yarn supply package PI is supported so that the yarn Y can be supplied to the processing portion 3 processing the yarn Y and the second rotation state C2 corresponding to a state in which the yarn supply package PI is supported so that the yarn supply package PI can be exchanged and to temporarily regulate (position) the rotation of the body support portion 253B also in the third rotation state C3 corresponding to one rotation state between the first rotation state C1 and the second rotation state C2.

(Other modified examples)

[0071] In the above-described embodiments and modified examples, the package exchange device 9 which is provided to be able to run along the creel stand 20 has been described as an example, but also in the creel stand 20 without the package exchange device 9, it is possible to obtain the same effect as those of the above-described embodiments and modified examples.

[0072] In the above-described embodiments and modified examples, an example in which the present disclosure is applied to the yarn supply package exchange system 100 which collects the used yarn supply package PI from the peg 25 and attaches the new yarn supply package PI to the peg 25 has been described, but the present disclosure may be applied to a yarn supply package attachment system which attaches the new yarn supply package PI to the peg 25 without collecting the used yarn supply package PI from the peg 25.

[0073] In the above-described embodiments and modified examples, a device for performing twisting (false-twist texturing) has been described as an example of the processing portion 3, but a device for performing non-twisting (air-jet texturing) may be applied.

[0074] 1: false-twist texturing machine, 2: yarn supply portion, 20: creel stand, 23: second support column (shaft portion), 25, 25A, 25B: peg (first peg/second peg), 251: yarn supply package support portion, 252: peg body portion (rotation portion), 253, 253B: body support portion (rotation portion), 254: rotation transmission portion, 255, 255A, 255B: fixing portion, 256: rotation regulation portion, 257, 257A: projecting portion, 258: groove portion (locked portion), 262: groove portion (locked portion), 270: concave portion (locked portion), 280: plunger (locking portion/projecting portion), 3: processing portion, 34: false twisting device, 9: package exchange device (attachment mechanism), 100: yarn supply package exchange system (yarn supply package attachment system), C1: first rotation state, C2: second rotation state, C3: third rotation state, PI: yarn supply package, P2: winding package, Y: yarn (synthetic yarn).

Claims

1. A yarn supply package attachment system comprising:

   a creel stand (20) which includes a pair of pegs (25, 25A, 25B) rotatably supporting yarn supply packages (PI) formed by winding a synthetic yarn (Y) to be supplied to a yarn texturing device (3) and joins a yarn end of the synthetic yarn (Y) forming one of the yarn supply packages (PI) supported by one of the pegs (25, 25A, 25B) to a yarn end of the synthetic yarn (Y) forming an

other of the yarn supply packages (PI) supported by an other of the pegs (25, 25A, 25B) so that the synthetic yarn (Y) forming the other yarn supply package (PI) can be supplied to the yarn texturing device (3) when the synthetic yarn (Y) forming the one of the yarn supply packages (PI) is exhausted; and

an attachment mechanism (9) which attaches the yarn supply packages (PI) to the pegs (25, 25A, 25B),

wherein each of the pair of the pegs (25, 25A, 25B) is provided to be rotatable between a first rotation state (C1) corresponding to a state in which the yarn supply packages (PI) face a direction in which the synthetic yarn (Y) is supplied to the yarn texturing device (3) and a second rotation state (C2) corresponding to a state in which the yarn supply packages face a direction in which the yarn supply packages (PI) can be attached using the attachment mechanism (9),

wherein the attachment mechanism (9) attaches the yarn supply packages (PI) to the pegs (25, 25A, 25B) in the second rotation state (C2) and then rotates the pegs (25, 25A, 25B) to a third rotation state (C3) corresponding to a state in which the yarn supply packages (PI) face a direction between the first rotation state (C1) and the second rotation state (C2),

wherein a plurality of yarn supply package support portions (251) each including a pair of the pegs (25, 25A, 25B) as a set are formed and a plurality of the pegs (25, 25A, 25B) constituting a plurality of the yarn supply package support portions (251) are unidirectionally arranged in the creel stand (20),

wherein the pegs (25, 25A, 25B) included in one of the yarn supply package support portions (251) and disposed in proximity to an other of the yarn supply package support portions (251) are considered to be first pegs and the pegs (25, 25A, 25B) included in the other of the yarn supply package support portions (251) and disposed in proximity to the one of the yarn supply package support portions (251) are considered to be second pegs in the yarn supply package support portions (251) adjacent to each other, and

wherein, when each of the first pegs and the second pegs support the yarn supply packages (P1) having a predetermined diameter or more, the first pegs and the second pegs are provided so that the yarn supply packages (PI) contact each other when each of the first pegs and the second pegs are in the second rotation state (C2) and the first pegs and the second pegs are provided so that the yarn supply packages (PI) having a predetermined diameter or more do not contact each other when one of the first pegs and the second pegs are in the second rotation state (C2) and an other of the first pegs and the second pegs are in the third rotation state (C3).

2. The yarn supply package attachment system according to claim 1,

wherein the attachment mechanism (9) collects used packages of the yarn supply packages (PI) from the pegs (25, 25A, 25B) and attaches new packages of the yarn supply packages (PI) to the pegs (25, 25A, 25B).

3. The yarn supply package attachment system according to claim 1 or 2,

wherein the creel stand (20) further includes shaft portions (23) extending in a vertical direction, rotation portions (252, 253, 253B) supporting the pegs (25, 25A, 25B) so as to be rotatable around the shaft portions (23), and rotation regulation portions (256) regulating rotation of the rotation portions (252, 253, 253B) in the first rotation state (CI), the second rotation state (C2) and the third rotation state (C3).

4. The yarn supply package attachment system according to claim 3,

wherein the rotation regulation portions (256) each include a locking portion (280) being provided in either one of the rotation portions (252, 253, 253B) and fixing portions (255, 255A, 255B) provided in the shaft portions (23) so as not to be rotatable and a locked portion (258, 262, 270) being provided in an other of the fixing portions (255, 255A, 255B) and the rotation portions (252, 253, 253B) to lock the locking portion (280).

5. The yarn supply package attachment system according to claim 4,

wherein the locking portion (280) is a projecting portion, and

wherein the locked portion (258, 262, 270) is a groove portion locking the projecting portion.

6. The yarn supply package attachment system according to claim 4,

wherein the locking portion (280) is a projecting portion, and

wherein the locked portion (258, 262, 270) is a recessed portion locking the projecting portion.

Fig.1

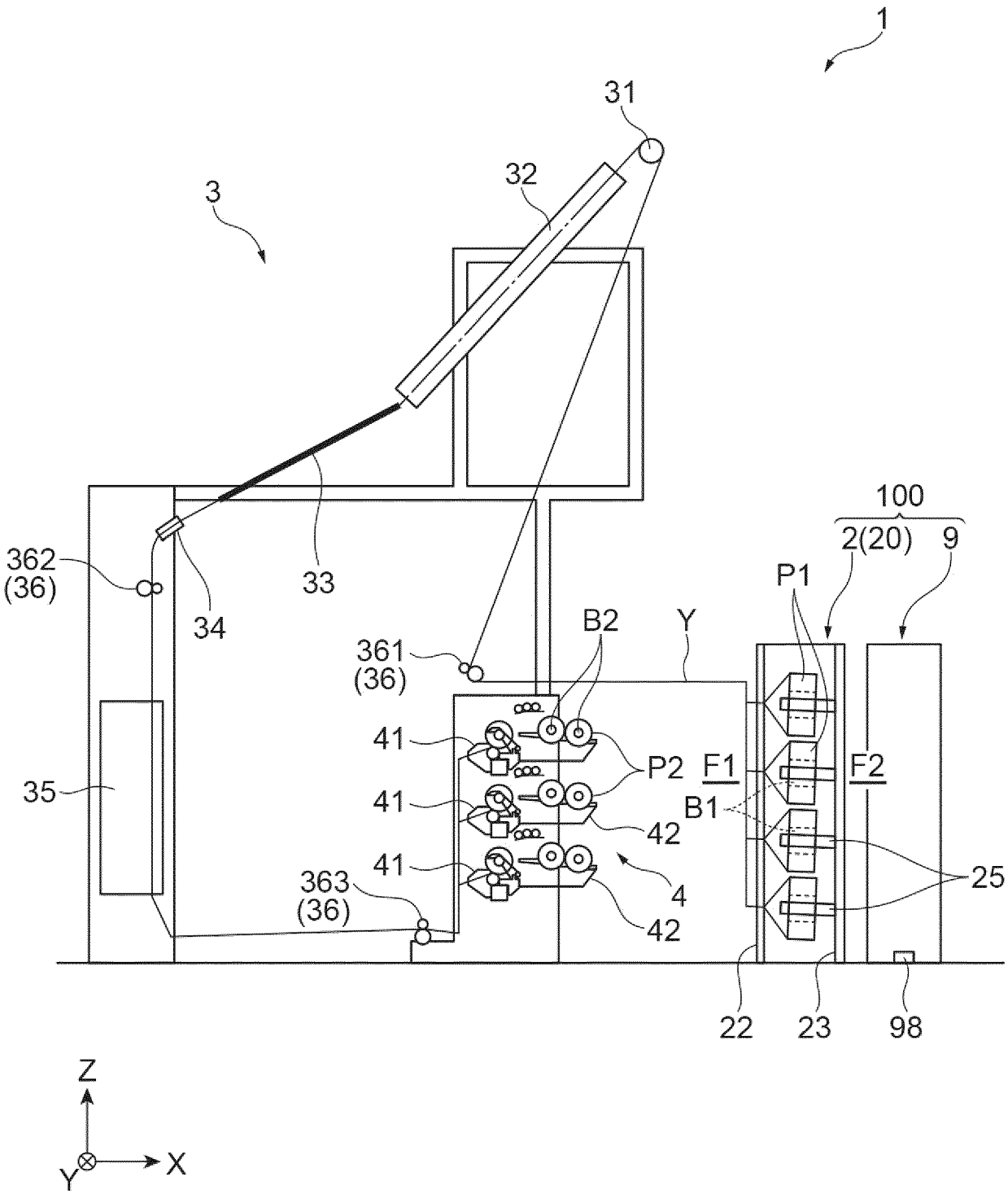

1
31
32
3
362
(36)
34
33
361
(36)
B2
Y
100
2(20)
9
P1
41
P2
F1
F2
35
41
B1
42
41
4
363
(36)
42
25
22
23
98
Z
Y
X

Fig.2

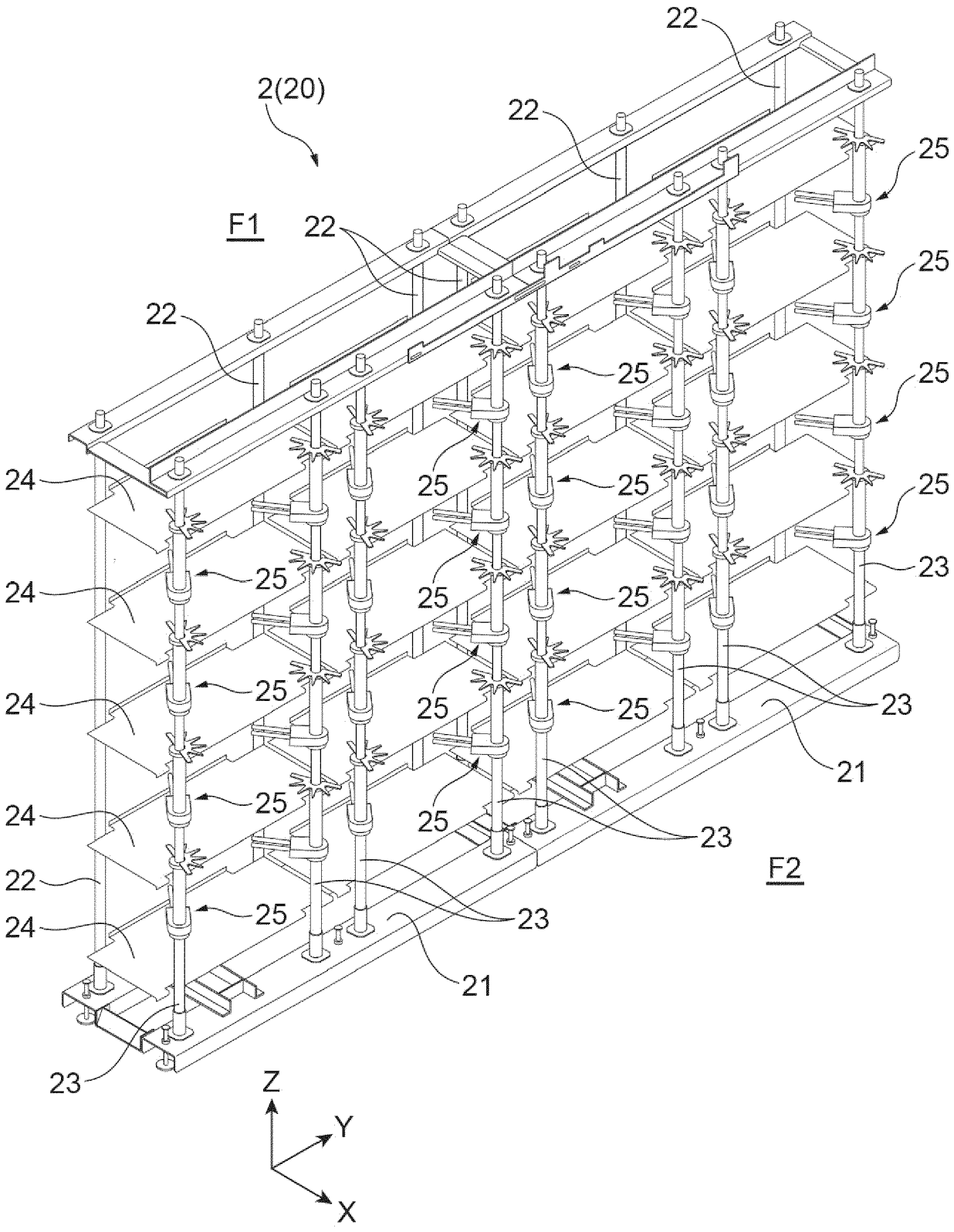


Fig.3B

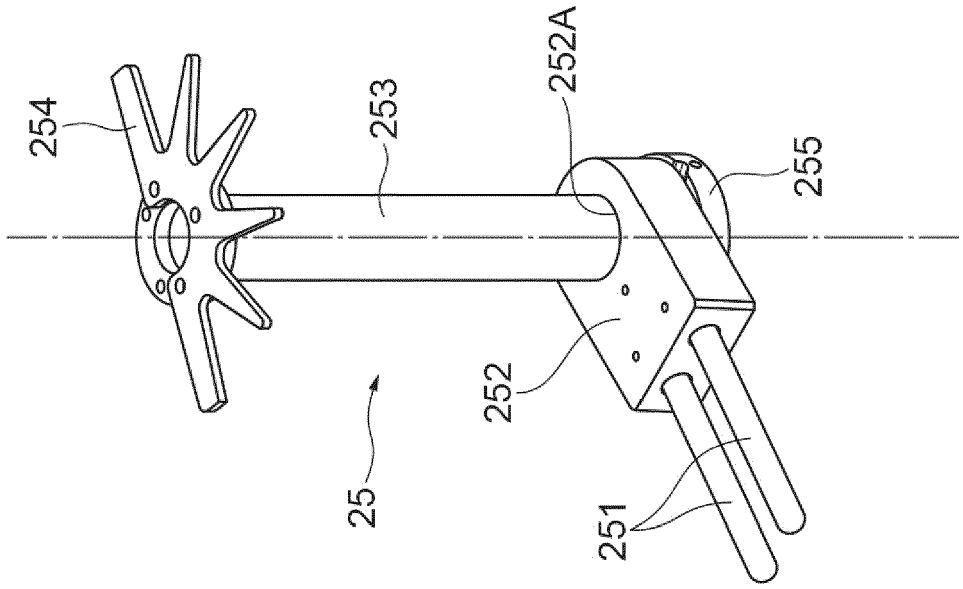

254
253
252A
255
252
25
251

Fig.3A

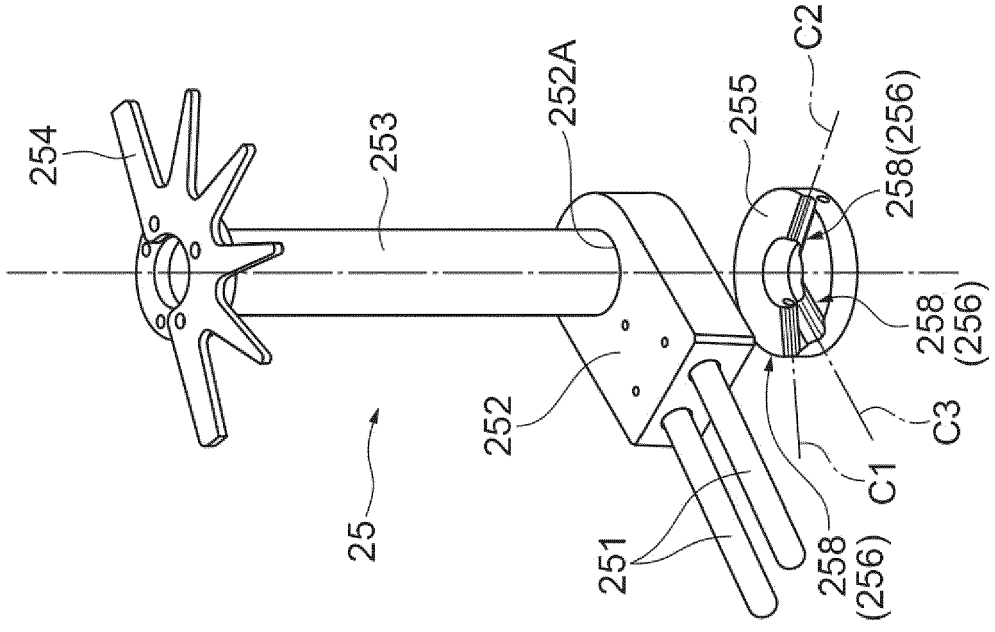

254
253
252A
255
C2
258(256)
258
(256)
C3
C1
252
25
251
258
(256)

Fig.4B

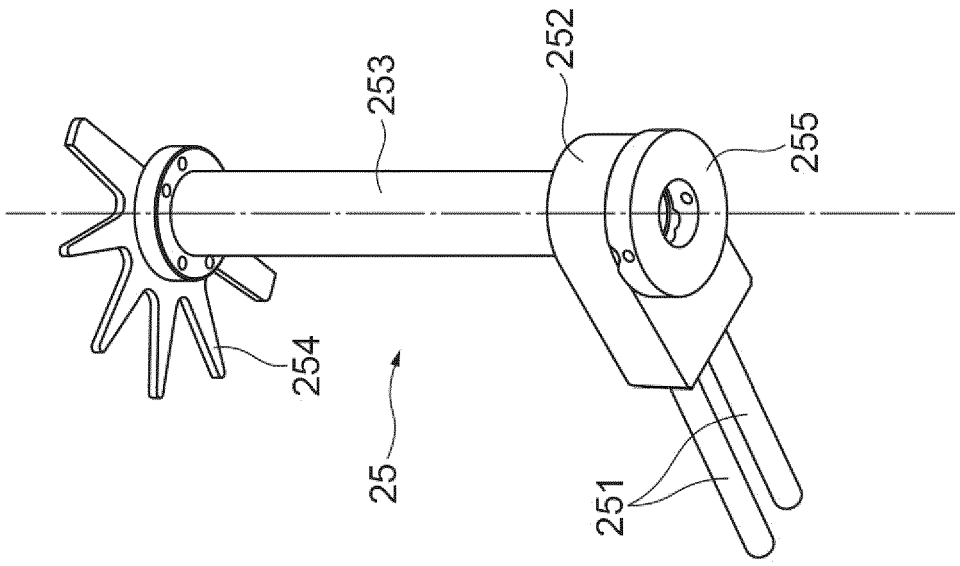


Fig.4A

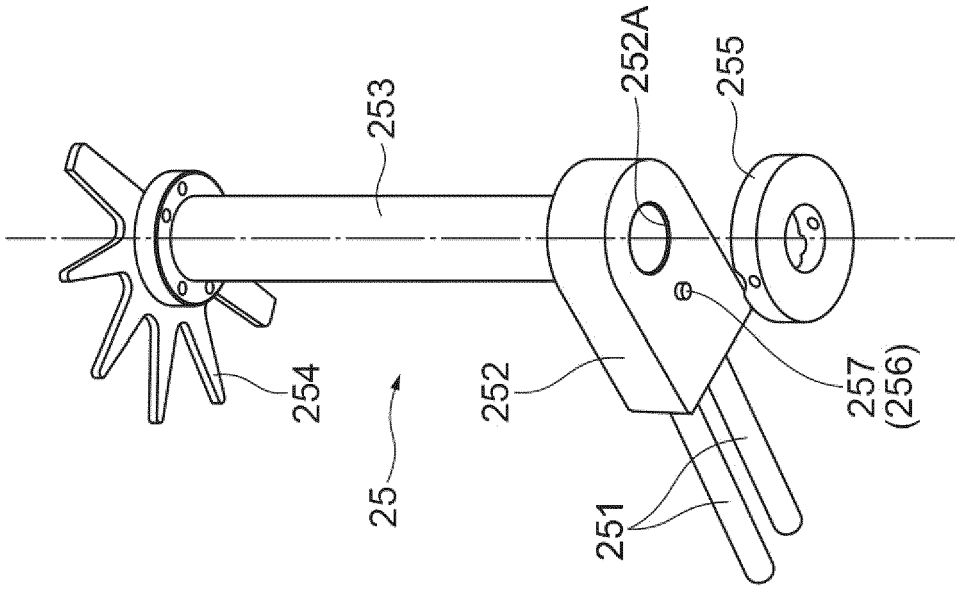


Fig.5A

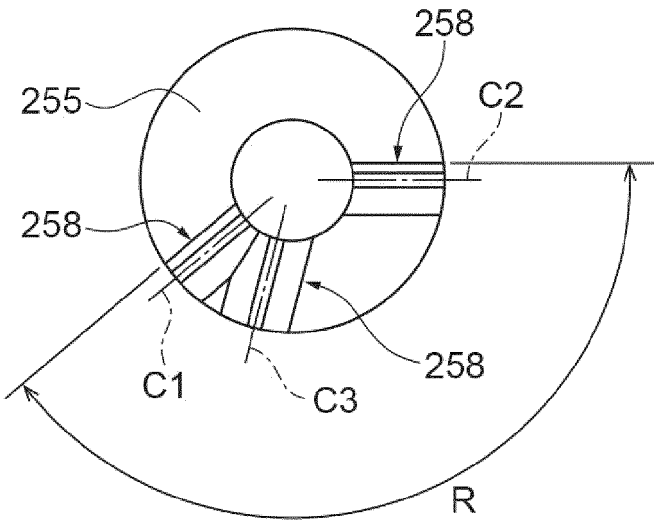


Fig.5B

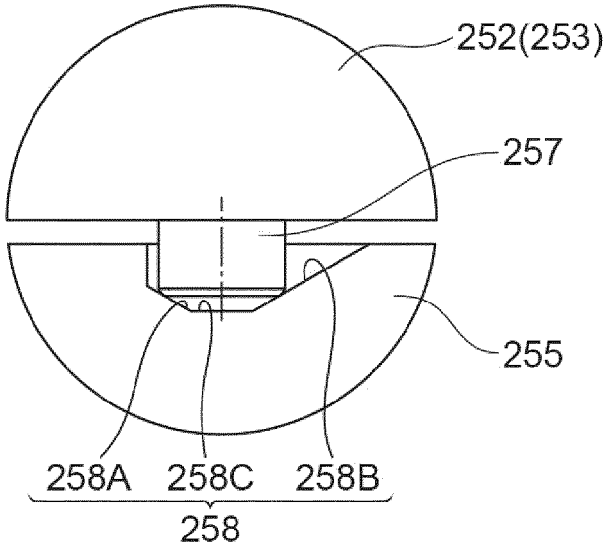


Fig.5C

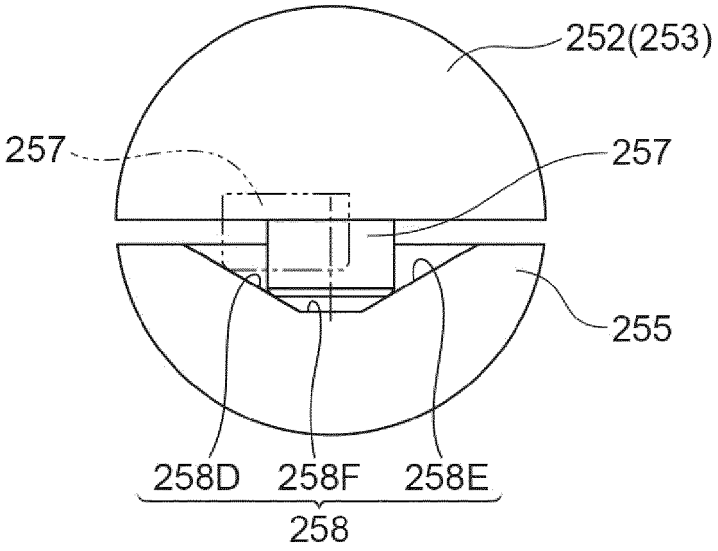
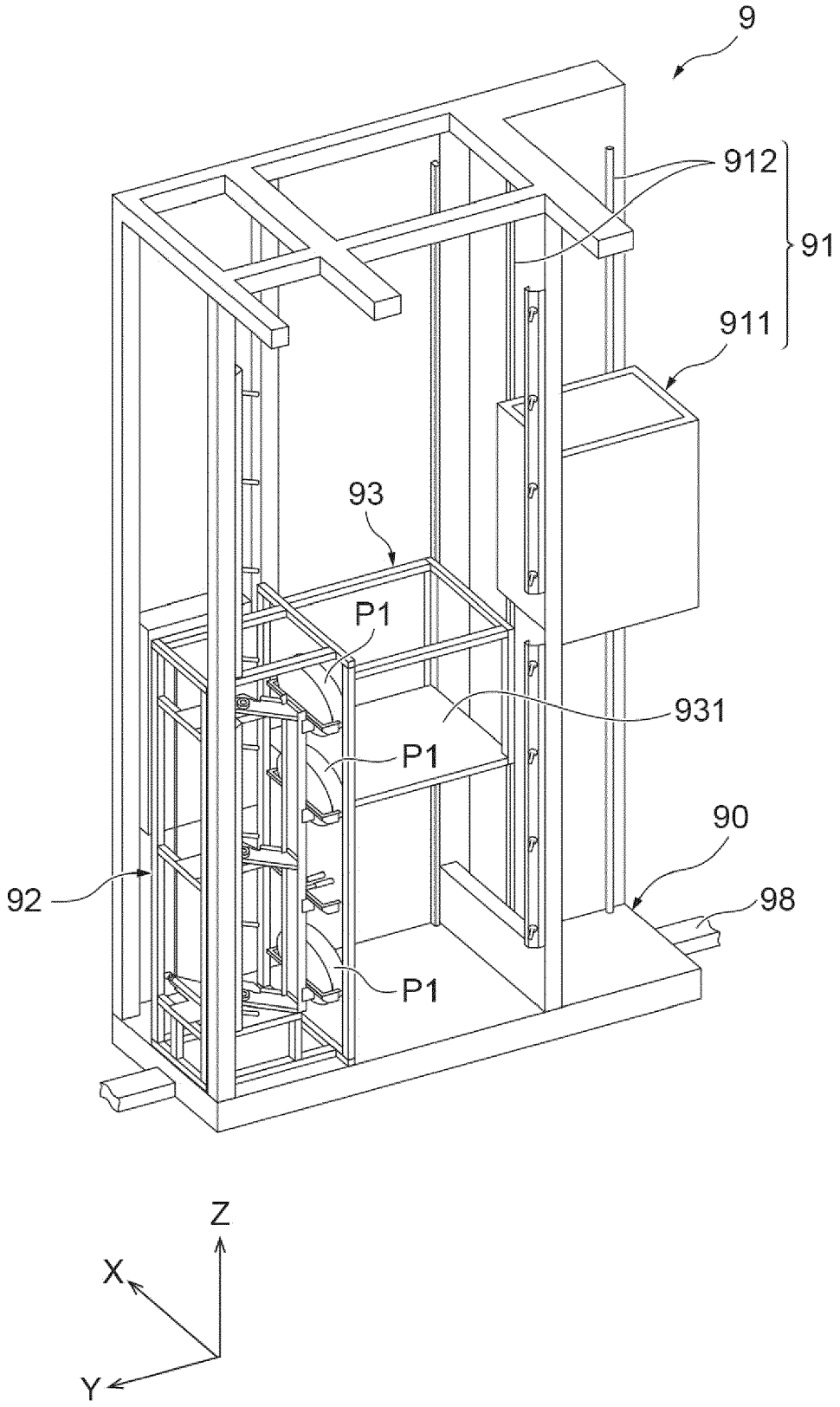


Fig.6



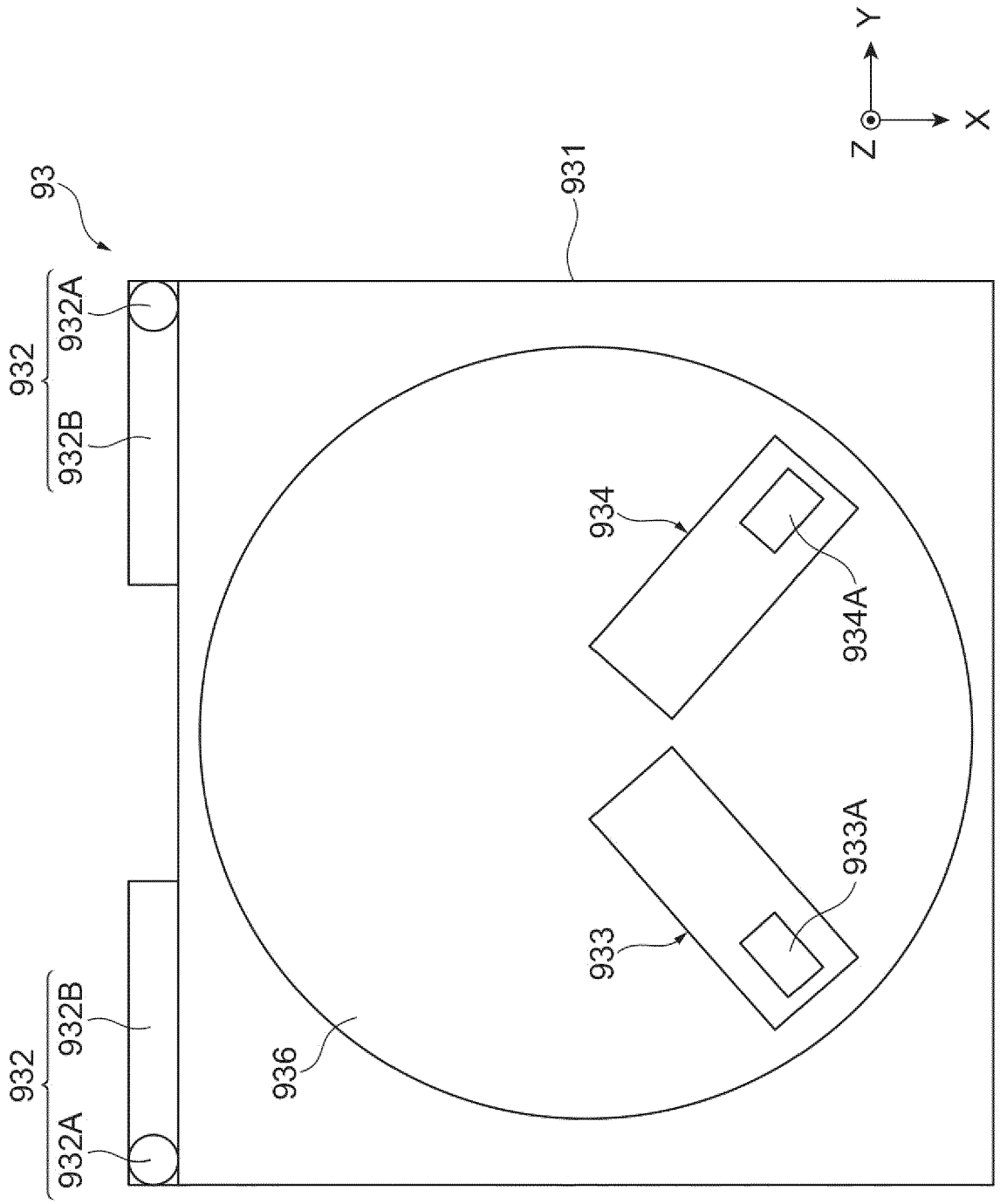


Fig.7

Fig.8

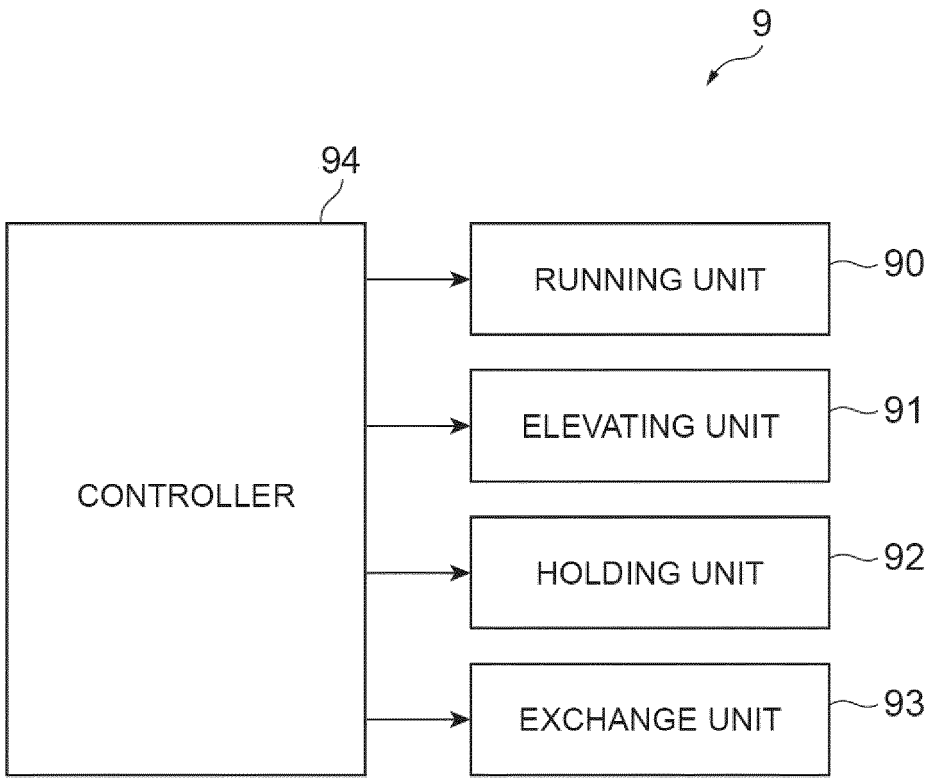

9
94
CONTROLLER
RUNNING UNIT
90
ELEVATING UNIT
91
HOLDING UNIT
92
EXCHANGE UNIT
93

Fig.9A

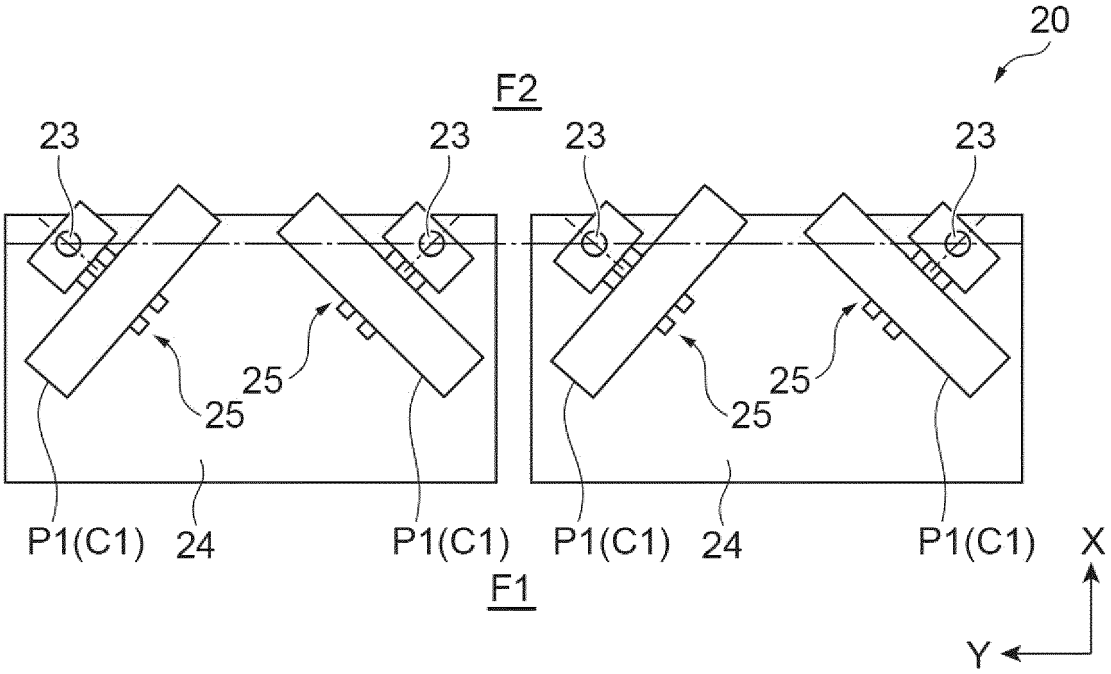

20
F2
23
23
23
23
25
25
25
25
P1(C1)
24
P1(C1)
P1(C1)
24
P1(C1)
X
F1
Y

Fig.9B

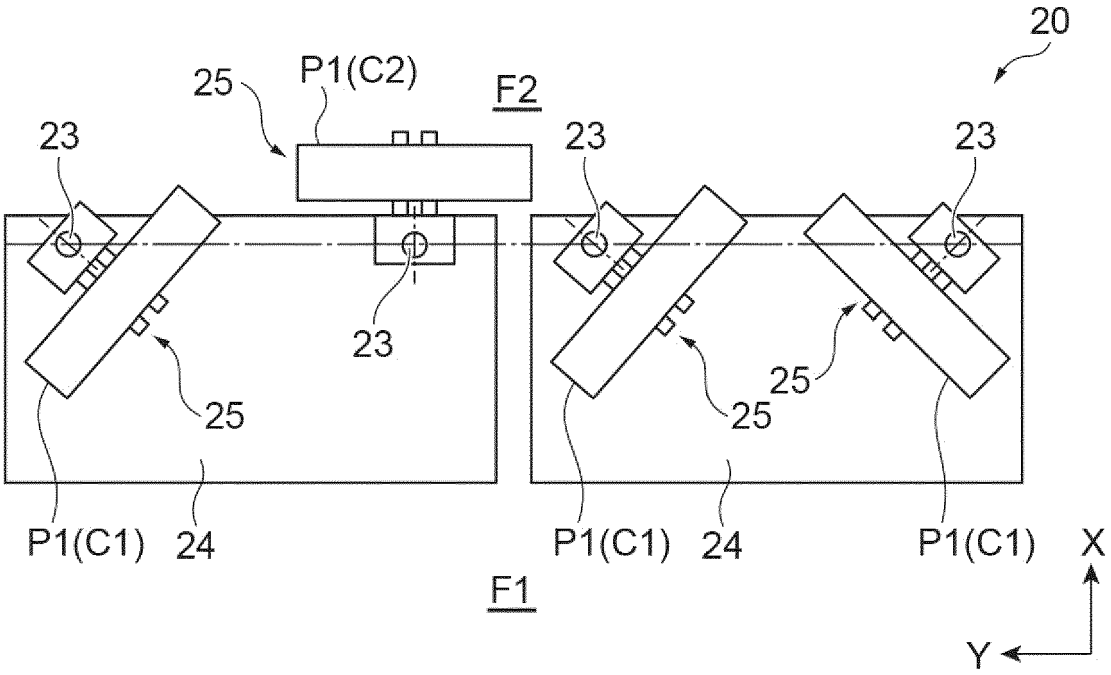

20
25
P1(C2)
F2
23
23
23
23
25
25
25
25
P1(C1)
24
P1(C1)
P1(C1)
24
P1(C1)
X
F1
Y

Fig.10A

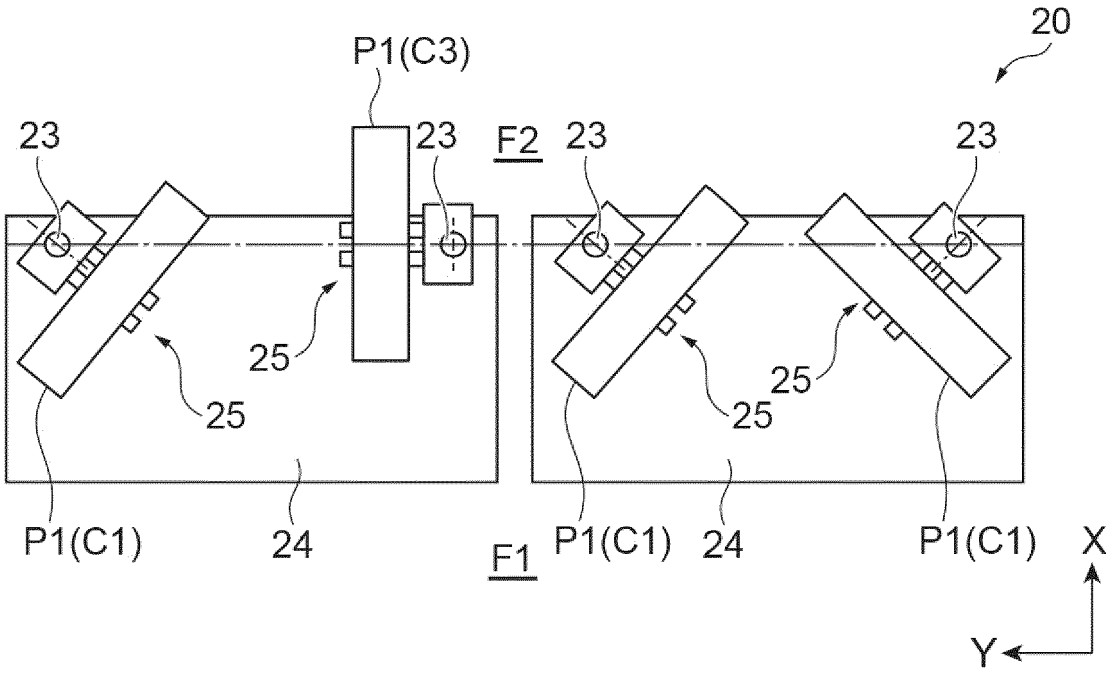


Fig.10B

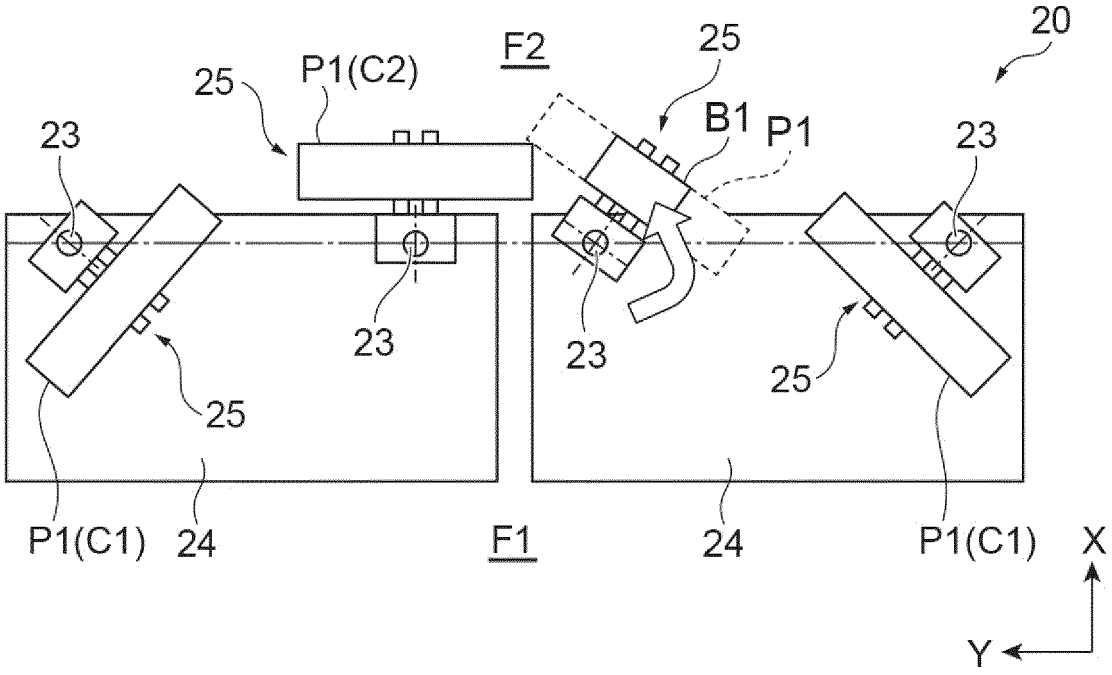


Fig.11A

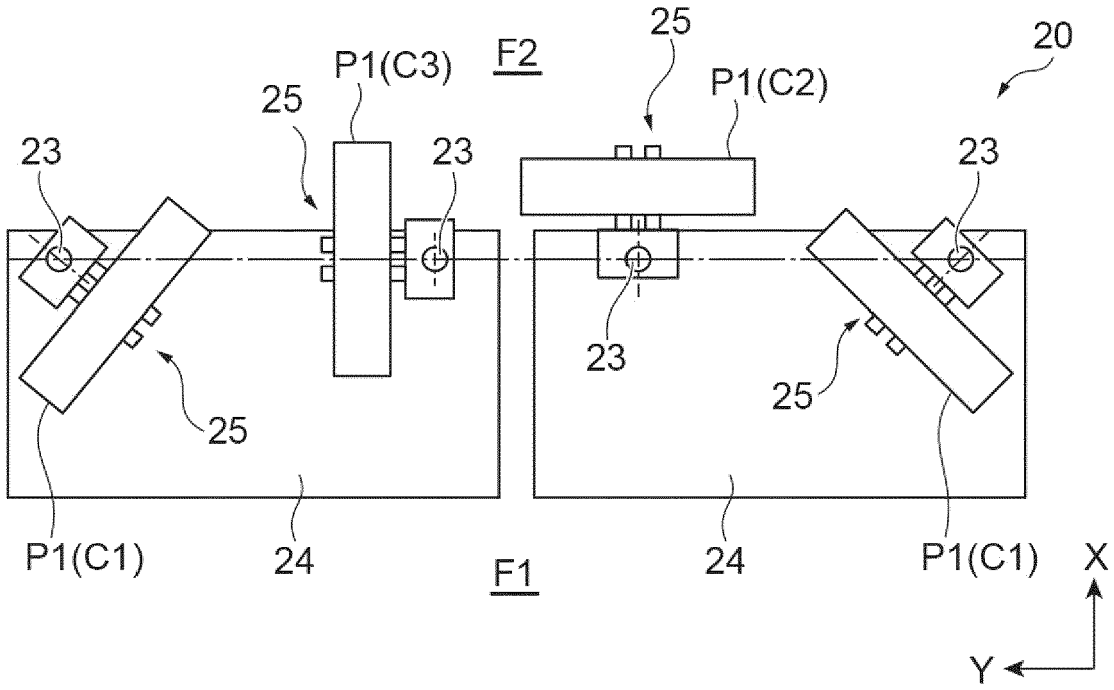


Fig.11B

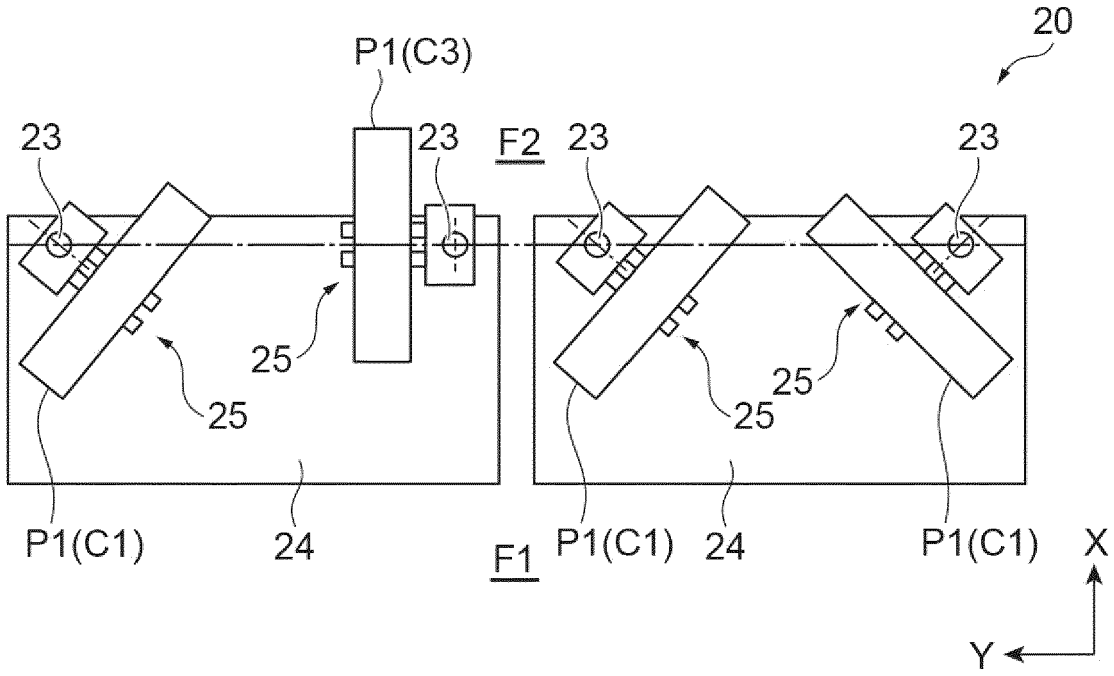


Fig.12

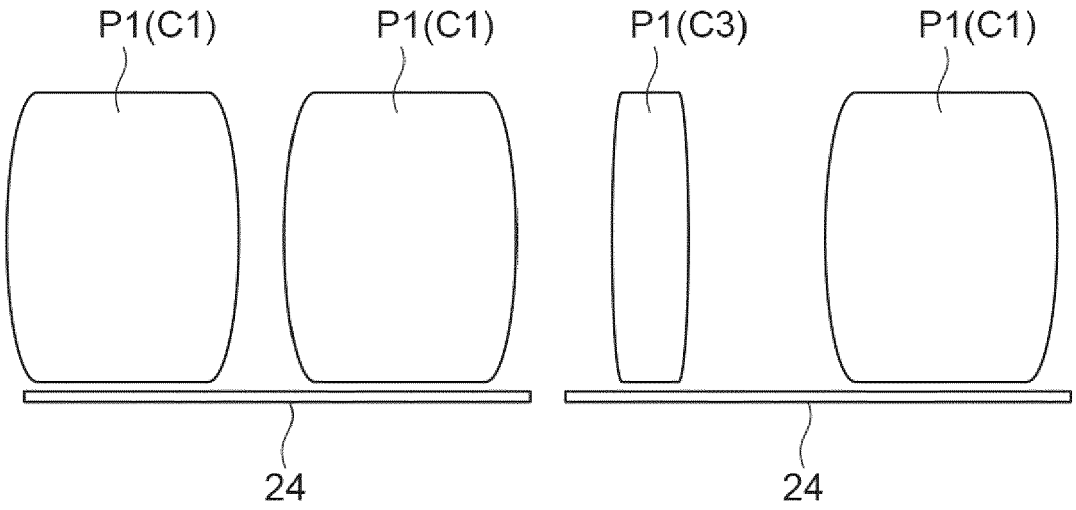


Fig.13B

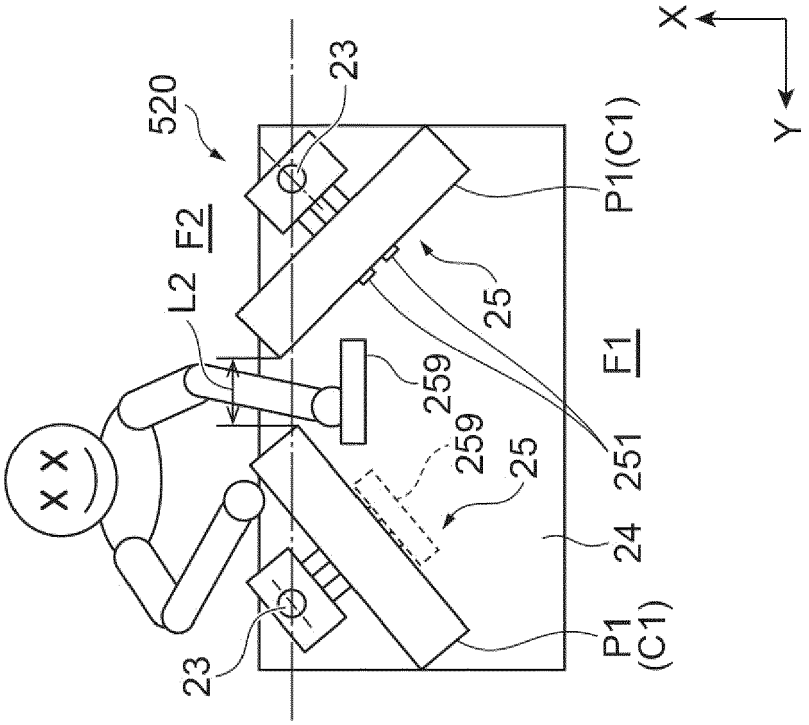


Fig.13A

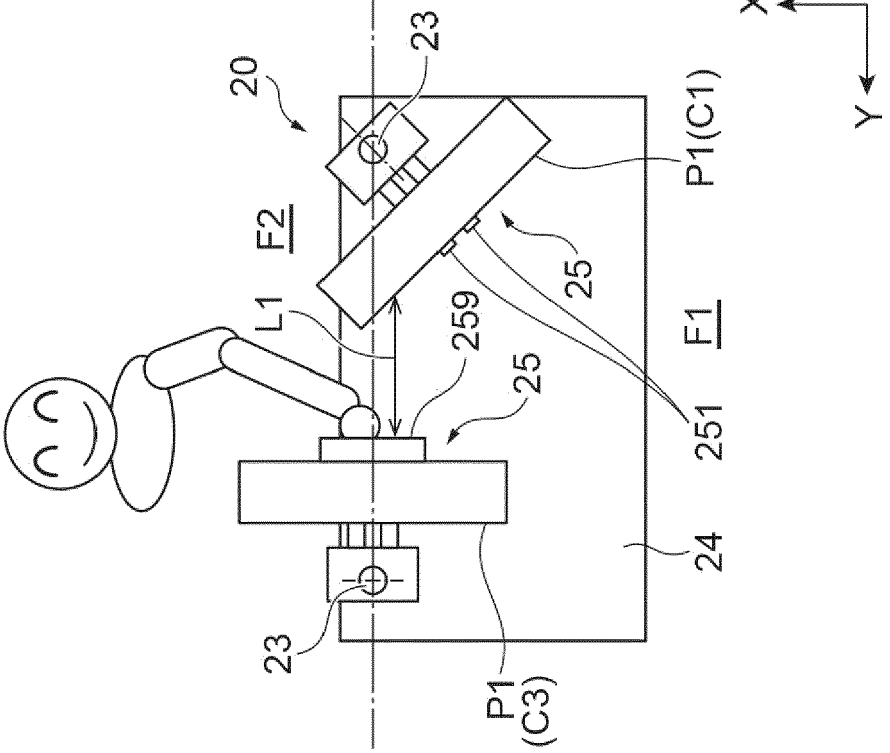


Fig.14B

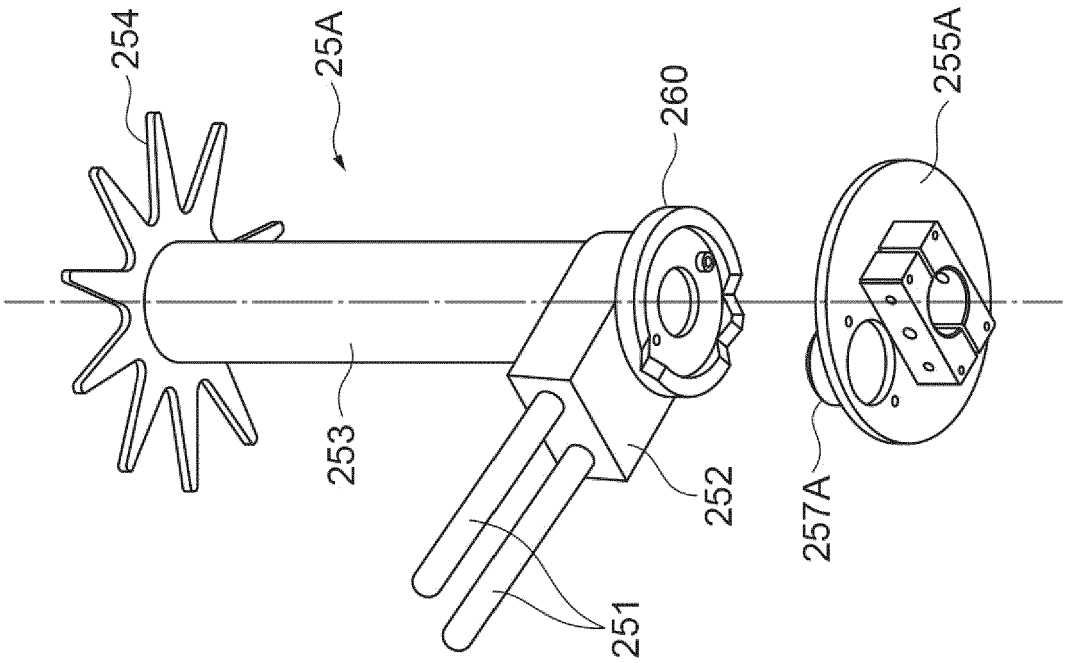


Fig.14A

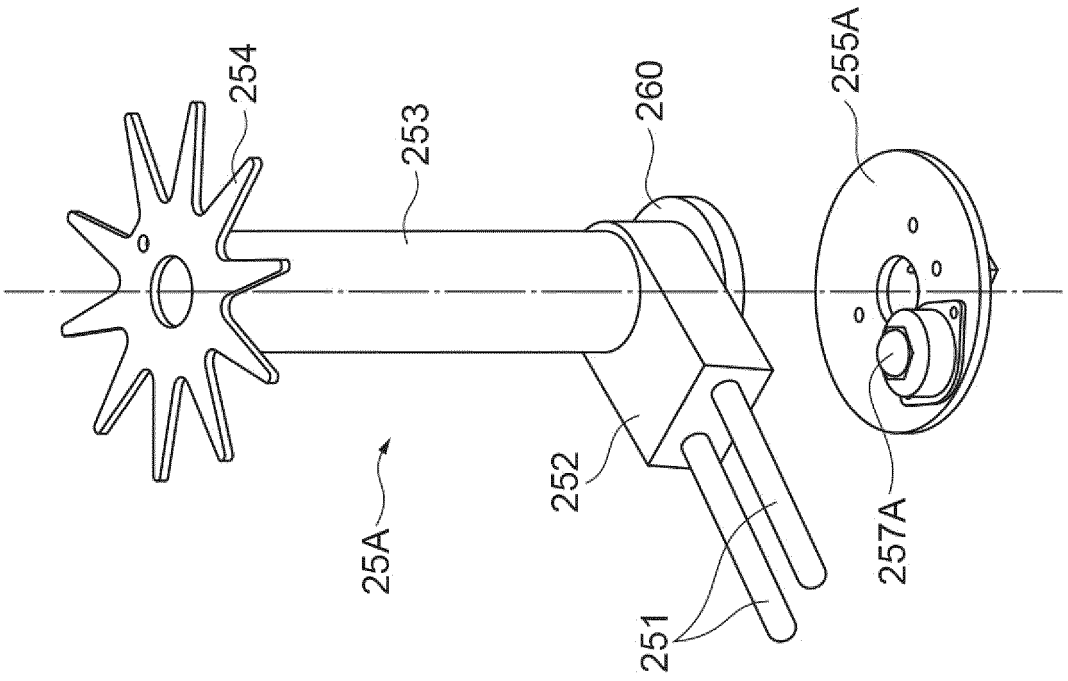


Fig.15A

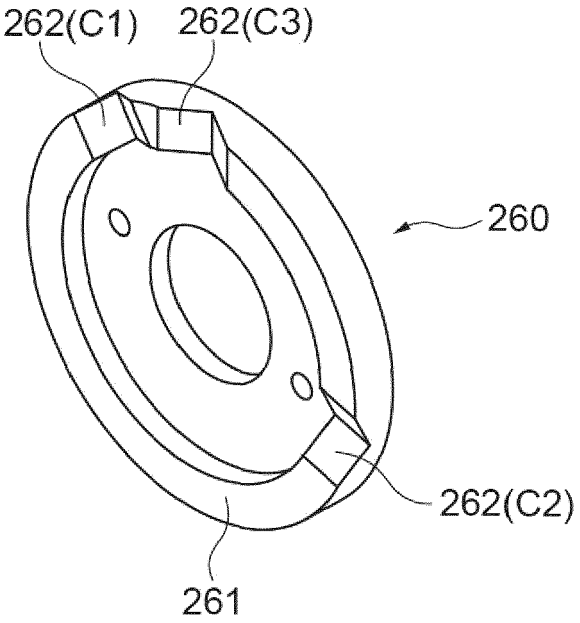


Fig.15B

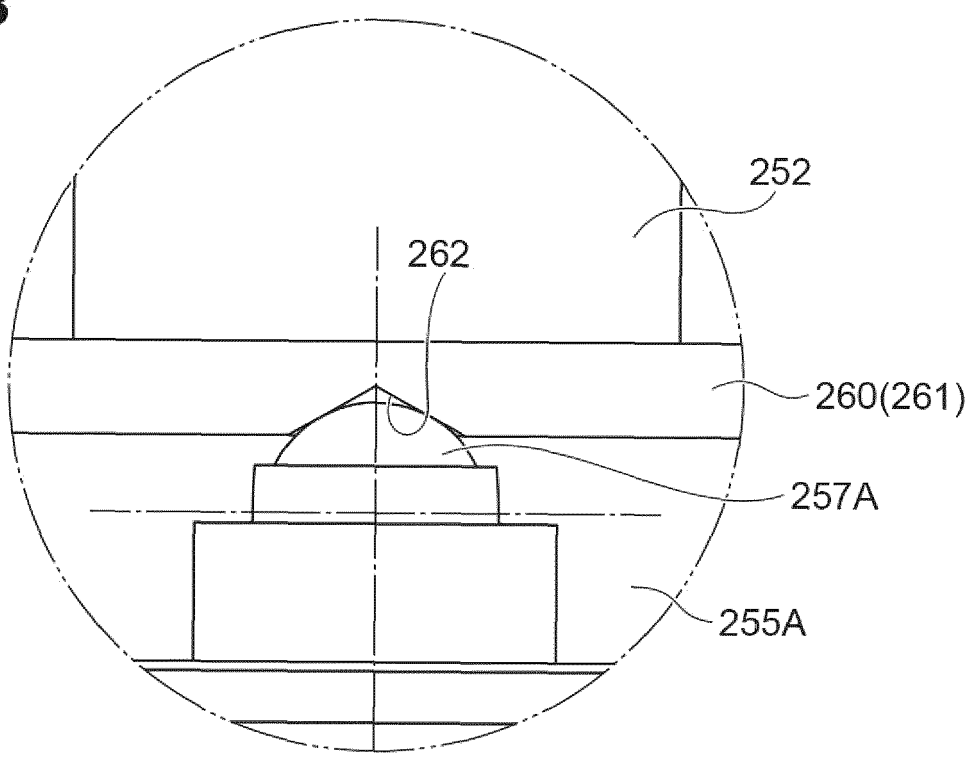


Fig.16A

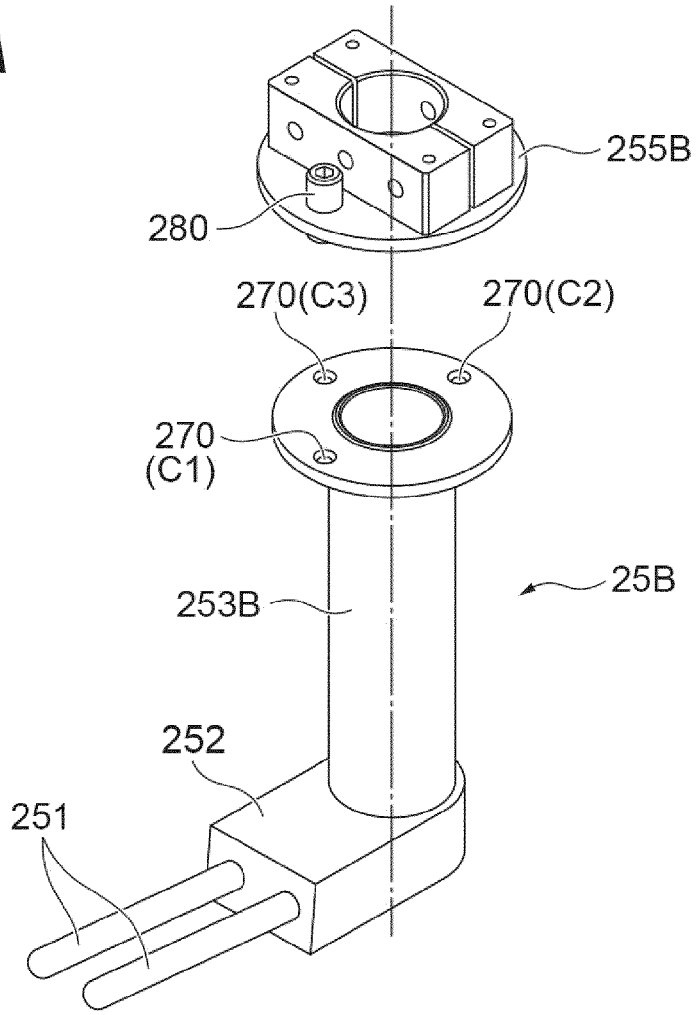
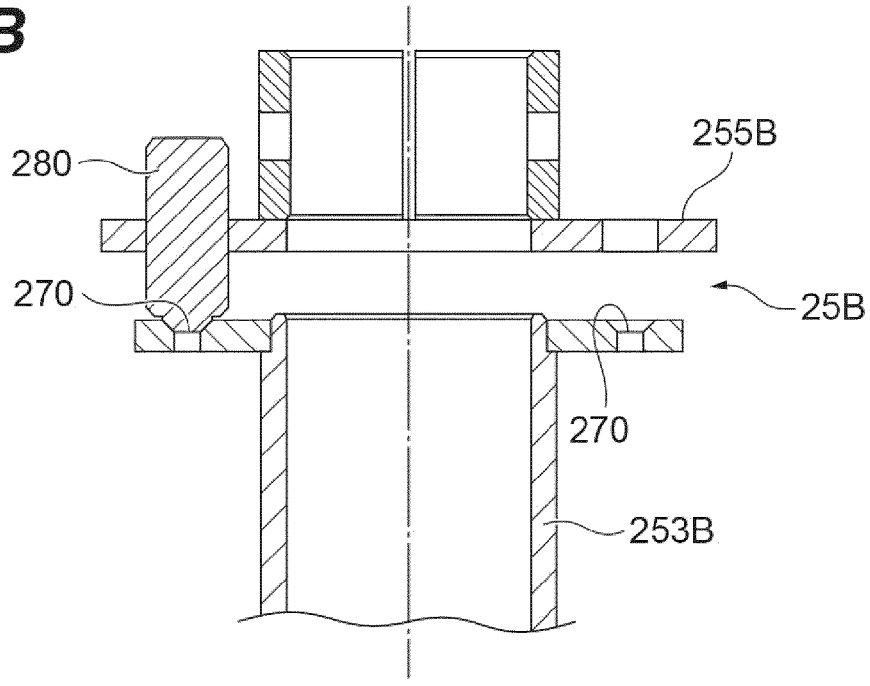


Fig.16B



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EUROPEAN SEARCH REPORT

Application Number
EP 22 15 9687

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 3 771 676 A1 (TMT MACHINERY INC [JP]) 3 February 2021 (2021-02-03) * paragraphs [0024] - [0026], [0032] - [0034], [0044] - [0048], [0081], [0083] - [0085]; figures *	1-6	INV. B65H49/12 B65H49/16 B65H67/02
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A,D	JP H07 68010 B2 (MURATA MACHINERY LTD) 26 July 1995 (1995-07-26) * the whole document *	1-6	

TECHNICAL FIELDS SEARCHED (IPC)

B65H
D02H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 July 2022	Lemmen, René

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