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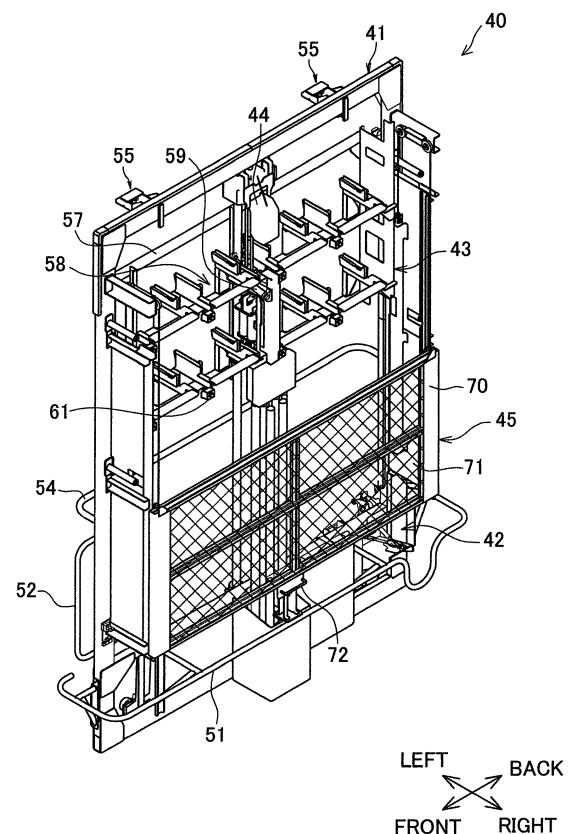
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(54) **PACKAGE TAKE DOWN APPARATUS AND TEXTILE MACHINE**

(57) A package take down apparatus which is shared between package bases and allows wound packages to be taken down from the package bases is provided. A package take down apparatus 40 includes: a main body frame 41 configured to be movable in the arrangement direction of the winding bases; a package receiver 43 provided in the main body frame 41; and an air hoist 44 configured to move up and down the package receiver 43 between a receiving position where the wound packages P are received from the stockers and a collection position which is below the receiving position.

FIG.5



Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a package take down apparatus configured to take down wound packages wound by a winding device, and a textile machine including the package take down apparatus.

[0002] As a textile machine configured to wind yarns having been subjected to various processes, a draw texturing machine is recited in Patent Literature 1 (Japanese Unexamined Patent Publication No. 2012-097369). This draw texturing machine includes components such as a yarn supply creel supporting a yarn supply package, a false-twisting device configured to false-twist yarns supplied from the yarn supply creel, and a winding device configured to form wound packages by winding the false-twisted yarns.

[0003] The draw texturing machine of Patent Literature 1 includes a main frame which is long in a predetermined direction. To this main frame, plural false-twisting devices and winding devices corresponding to the respective false-twisting devices are attached. The winding devices are lined up to form four stages in an up-down direction and are lined up along the longitudinal direction of the main frame. The yarn supply creel is provided to oppose the winding devices on the main frame, over a working space.

[0004] In the above-described draw texturing machine, the winding devices are lined up to form four stages in the up-down direction, and the winding devices on the topmost stage are at very high positions. Because of this, a working frame for package collection is provided in the vicinity of the winding devices. In the working space between the main frame and the yarn supply creel, an operator on the working frame stretches hands and collects the wound packages from the winding devices on the topmost stage.

[0005] In the meanwhile, Patent Literature 2 (Japanese Unexamined Patent Publication No. 2014-077217) recites a draw texturing machine which is structurally similar to the machine recited in Patent Literature 1. In this draw texturing machine, a winding base to which winding devices are attached is provided to be independent from a main frame to which members such as a false-twisting device are attached. In a manner similar to Patent Literature 1 above, the winding devices are lined up on the winding base to form four stages in the up-down direction.

[0006] In this draw texturing machine of Patent Literature 2, an apparatus for taking down wound packages formed by the winding devices on the topmost stage is provided on the winding base. This apparatus includes a package receiver and an air cylinder configured to move up and down the package receiver. This apparatus moves the package receiver up to the topmost winding devices, and after receiving the wound packages formed by these winding devices by the package receiver, the apparatus moves down the package receiver. This struc-

ture makes it easy to take down wound packages from the topmost winding devices which are at very high positions.

SUMMARY OF THE INVENTION

[0007] In a typical draw texturing machine, the winding devices are lined up not only in the up-down direction but also in the longitudinal direction of the base. On this account, over the length of the base, the operator is required to take down a lot of wound packages which are provided at high positions.

[0008] In this regard, according to Patent Literature 1, the operator is required to go up and down the working frame many times to collect the wound packages which are heavy. The package collection is therefore not efficiently done, and the burden on the operator is large.

[0009] According to Patent Literature 2, the burden on the operator is small regarding package collection, because the apparatus for taking down packages is provided on each winding base. However, even if package take down apparatuses are provided on all winding bases, the operator operates only one of these apparatuses at a time. An unnecessarily large number of apparatuses are therefore provided, and this leads to cost increase. Furthermore, spaces where these apparatuses are provided are additionally required.

[0010] An object of the present invention is to provide a package take down apparatus which is shared between package bases and allows wound packages to be taken down from the package bases.

[0011] According to the first aspect of the invention, a package take down apparatus includes stockers each of which stores wound packages and being configured to take the wound packages down from package bases which are lined up in a predetermined arrangement direction, the package take down apparatus including: a main body frame configured to be movable in the arrangement direction; a package receiver provided in the main body frame; and an elevation drive unit configured to move up and down the package receiver between a receiving position where the wound packages are received from the stockers and a collection position which is below the receiving position.

[0012] When a wound package is taken down from a package base, the main body frame is moved to the position corresponding to the target package base. Subsequently, the package receiver is elevated to the receiving position by the elevation drive unit, and the wound package stored in the stocker of the package base is moved to the package receiver. In this state, the package receiver is moved down to the collection position by the elevation drive unit.

[0013] According to the present invention, wound packages at high positions are easily taken down as the package receiver is moved between a high receiving position and a low collection position. Furthermore, because the main body frame is movable in the direction in

which the package bases are lined up, it is possible to take wound packages P down from plural winding bases by using a single shared package take down apparatus.

[0014] According to the second aspect of the invention, the package take down apparatus of the first aspect is arranged such that, each of the package bases includes the stockers lined up in an up-down direction to form plural stages, and the receiving position of the package receiver is a position where the wound packages are received from a topmost stocker among the stockers forming the plural stages.

[0015] The package take down apparatus of the present invention is configured to take wound packages down from the stockers on the topmost stage which is positionally the highest, when the stockers are lined up in the up-down direction. From the stockers on the lower stages, wound packages may be taken down by the apparatus of the present invention in the same manner as from the topmost stage, or may be manually taken down by an operator because these stockers are positionally lower than the stockers on the topmost stage.

[0016] According to the third aspect of the invention, the package take down apparatus of the second aspect is arranged such that each of the package bases includes the stockers forming three or more stages.

[0017] When the stockers are provided to form three or more stages in the package base, the stockers on the topmost stage are positionally high and an operator cannot easily reach them. On this account, the use of the package take down apparatus of the present invention is particularly preferred.

[0018] According to the fourth aspect of the invention, the package take down apparatus of any one of the first to third aspects further includes a connecting portion which is provided at an upper end portion of the main body frame and is to be connected with the package bases.

[0019] According to the present invention, the upper end portion of the main body frame is connected to the upper part of the package base by the connecting portion. This prevents the main body frame from falling down during an operation of taking down wound packages.

[0020] According to the fifth aspect of the invention, the package take down apparatus of the fourth aspect is arranged such that an upper rail extending in the arrangement direction is provided across upper parts of the package bases, and the connecting portion is connected to the upper rail to be movable in the arrangement direction.

[0021] According to the present invention, the connecting portion of the main body frame is movably connected to the upper rail which extends across the upper parts of the package bases. On this account, falling down of the main body frame is prevented when the main body frame is moved in the direction in which the package bases are lined up.

[0022] According to the sixth aspect of the invention, the package take down apparatus of any one of the first to fifth aspects is arranged such that a lower rail is provided to extend in the arrangement direction across lower parts of the package bases, and the main body frame is movable along the lower rail.

vided to extend in the arrangement direction across lower parts of the package bases, and the main body frame is movable along the lower rail.

[0023] The main body frame is smoothly movable in the direction in which the package bases are lined up, along the lower rail.

[0024] According to the seventh aspect of the invention, the package take down apparatus of any one of the first to sixth aspects further includes a cover which is attached to the main body frame to be switchable between a closed position where the package receiver at the collection position is covered with the cover from a side opposite to the package base and an open position where the package receiver at the collection position is open to the side opposite to the package base.

[0025] As the cover is set at the closed position when the package receiver at the collection position is moved to the upper receiving position, it is possible to prevent an operator from erroneously inserting his/her hand into a part around the package receiver immediately before the upward movement. When the package receiver returns to the collection position after receiving wound packages, the cover is set at the open position to allow the wound packages to be taken out from the package receiver.

[0026] According to the eighth aspect of the invention, the package take down apparatus of the seventh aspect is arranged such that ascending and descending of the package receiver by the elevation drive unit are allowed when the cover is at the closed position, and the ascending and descending of the package receiver by the elevation drive unit are prohibited when the cover is at the open position.

[0027] According to the present invention, the ascending and descending of the package receiver by the elevation drive unit are allowed only when the cover is at the closed position. To put it differently, the package receiver does not move to the receiving position when the cover is at the open position and the package receiver at the collection position is not covered with the cover. This makes it possible to certainly prevent an operator from erroneously inserting his/her hand into a part around the package receiver immediately before the upward movement.

[0028] According to the ninth aspect of the invention, the package take down apparatus of any one of the first to eighth aspects further includes a fixing unit which is configured to fix the main body frame to be immovable in the arrangement direction.

[0029] As the main body frame is immovably fixed by the fixing unit, the movement of the main body frame in the arrangement direction is prohibited during the operations of taking down wound packages.

[0030] According to the tenth aspect of the invention, the package take down apparatus of the ninth aspect is arranged such that, when the main body frame is fixed by the fixing unit, the elevation drive unit is connected to a power supplier which is configured to supply driving

power.

[0031] According to the present invention, the package take down apparatus is connected to the power supplier when the main body frame is fixed by the fixing unit. It is therefore unnecessary to provide a power source for driving the elevation drive unit in the package take down apparatus. Furthermore, because the connection to the power supplier is established at the same time as the fixation of the main body frame, an additional operation for the connection is not required, and hence the processes are simplified.

[0032] According to the eleventh aspect of the invention, the package take down apparatus of any one of the first to tenth aspects is arranged such that the height of the stockers from a floor surface on which the package bases are provided is at least 2.3 meters.

[0033] According to the present invention, it is possible to take packages down from stockers which are 2.3 meters or higher from the floor surface, which are not easily reached by the operator.

[0034] According to the twelfth aspect of the invention, the package take down apparatus of any one of the first to eleventh aspects further includes an operation portion for driving the elevation drive unit.

[0035] According to the present invention, the package receiver is moved up or down as the operator operates the operation portion to drive the elevation drive unit. In short, the package take down apparatus is a semi-automatic apparatus which is driven based on an operation by the operator. According to the arrangement above, wound packages are taken down from the stockers at high positions as the operator operates the operation portion. It is therefore possible to reduce the workload. Furthermore, because the package receiver is moved up or down after the operator checks the surrounding conditions, it is possible to relatively easily deal with sudden troubles, and hence the safety is improved as compared to apparatuses which fully automatically collect wound packages. Furthermore, because only minimum driving units for taking down wound packages such as the elevation drive unit are required, the package take down apparatus is advantageous over the fully-automatic apparatuses in terms of cost and energy saving.

[0036] According to the thirteenth aspect of the invention, the package take down apparatus of any one of the first to twelfth aspects is arranged such that the package receiver includes two or more package placement portions which are lined up in the up-down direction and receive the wound packages from the stockers forming two or more stages in the up-down direction.

[0037] According to the present invention, it is possible to receive wound packages simultaneously from the stockers forming two or more stages in the up-down direction.

[0038] A textile machine of the thirteenth aspect of the invention includes package bases which are lined up in a predetermined arrangement direction, each of the package bases including stockers for storing wound

packages; and the package take down apparatus according to any one of the first to thirteenth aspects of the invention, which is configured to take the wound packages down from the package bases.

[0039] According to the present invention, wound packages at high positions are easily taken down as the package receiver of the package take down apparatus is moved between a high receiving position and a low collection position. Furthermore, because the main body frame is movable in the direction in which the package bases are lined up, it is possible to take wound packages P down from plural winding bases by using a single shared package take down apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

[0040]

FIG. 1 shows a draw texturing machine of an embodiment, which is viewed in the longitudinal direction of a main frame.

FIG. 2 is a perspective view of winding bases.

FIG. 3 is a perspective view of the winding base and a package take down apparatus.

FIG. 4 is a profile of a winding device.

FIG. 5 is a perspective view of the package take down apparatus.

FIG. 6 is a front elevation of the package take down apparatus (on standby).

FIG. 7 is a front elevation of the package take down apparatus (in preparation for package take down).

FIG. 8 is a front elevation of the package take down apparatus (during package take down).

FIG. 9 is a profile of a running unit and a fixing unit which are at a lower end portion of the package take down apparatus.

FIG. 10 is a profile of a connecting portion at an upper end portion of the package take down apparatus.

FIG. 11(a) and FIG. 11(b) are perspective views of the fixing unit of the package take down apparatus.

FIG. 11(a) shows a fixation canceled state, whereas FIG. 11(b) shows a fixed state.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0041] The following will describe an embodiment of the present invention. FIG. 1 shows a draw texturing machine 1 of the present embodiment, which is viewed in the longitudinal direction of a main frame 2 (i.e., in the direction in which winding bases are lined up). FIG. 2 is a perspective view of the winding base 3. Hereinafter, the longitudinal direction of the main frame 2, which is orthogonal to the plane of FIG. 1, is defined as the front-back direction of the draw texturing machine, the left-right direction in FIG. 1 is defined as the left-right direction of the draw texturing machine, and the up-down direction in FIG. 1 is defined as the up-down direction of the draw texturing machine.

(Outline of Draw Texturing Machine)

[0042] As shown in FIG. 1, the draw texturing machine 1 of the present embodiment (a textile machine of the present invention) includes a main frame 2 which is at the center in the left-right direction and extends in the front-back direction, winding bases 3 (package bases of the present invention) which are provided to the left and to the right of the main frame 2 and are lined up in the front-back direction, and creel stands 4 which are on the outer sides of the winding bases 3 and are lined up in the front-back direction.

[0043] In addition to the above, members constituting a later-described false-twisting unit 5 (a feed roller 10, a first heater 11, a twist-stopping guide 12, a cooler 13, a twisting unit 14, a feed roller 15, a second heater 16, a feed roller 17, etc.) are provided in order from an upper part of each winding base 3 to a lower part of the winding base 3 via the main frame 2.

[0044] The entire draw texturing machine 1 is divided into areas B (also called as spans) which are lined up in the front-back direction. In one area B of the draw texturing machine 1, the false-twisting unit 5 for false-twisting 20 yarns Y, one winding base 3, and one creel stand 4 are included. FIG. 2 shows a structure in which one winding base 3 is provided for one area B. To one winding base 3, 20 winding devices 22 configured to wind 20 yarns Y, respectively, are attached. One creel stand 4 supports 20 yarn supply packages S which are respectively configured to supply 20 yarns Y to one false-twisting unit 5.

(False-Twisting Unit)

[0045] From the upstream in the running direction of the yarns Y, the false-twisting unit 5 includes the feed roller 10, the first heater 11, the cooler 13, the twisting unit 14, the feed roller 15, the second heater 16, and the feed roller 17 in this order.

[0046] The feed roller 10 is provided above the winding base 3 and is configured to send the yarn Y unwound from the yarn supply package S toward the first heater 11. The first heater 11 is provided to be close to the center as compared to the feed roller 10, and is configured to heat the yarn Y sent from the feed roller 10. On the immediate upstream of the first heater 11, the twist-stopping guide 12 is provided. The twist-stopping guide 12 is provided to prevent the twist from reaching the upstream of the first heater 11 when the yarn Y is twisted by the twisting unit 14 described below. The cooler 13 is provided to be close to the center as compared to the first heater 11, and is configured to cool the yarn Y heated by the first heater 11.

[0047] The twisting unit 14 is provided at an upper part of the main frame 2 and is configured to twist a part of the yarn Y between the twist-stopping guide 12 and the twisting unit 14. The yarn Y is twisted by the twisting unit 14 while being heated by the first heater 11. The yarn Y

is then thermally set as the yarn Y is cooled by the cooler 13. The thermally-set yarn Y is untwisted between the twisting unit 14 and the feed roller 15. The yarn Y is untwisted in this way. However, because the yarn Y has been thermally set by the first heater 11, each filament in the yarn Y is wavy in shape. A series of these yarn processings is typically called "false twisting".

[0048] The feed roller 15 is provided on the main frame 2 and is configured to convey the yarn Y sent from the twisting unit 14 toward the second heater 16. The yarn feeding speed of the feed roller 15 is higher than the yarn feeding speed of the feed roller 10. On this account, the yarn Y is drawn between the feed roller 10 and the feed roller 15, and is subjected to the above-described false twisting. The second heater 16 is provided at a position below the feed roller 15 in the main frame 2, and is configured to heat the yarn Y sent by the feed roller 15.

[0049] The feed roller 17 is provided in the vicinity of a lower part of the winding base 3, and is configured to send the yarn Y having been subjected to thermal treatment by the second heater 16 to the winding device 22 of the winding base 3. The yarn feeding speed of the feed roller 17 is lower than the yarn feeding speed of the feed roller 15. On this account, thermal treatment is carried out for the yarn Y by the second heater 16, while the yarn Y is relaxed between the feed roller 15 and the feed roller 17.

[0050] In a space above the yarn path between the second heater 16 and the feed roller 17, a working bench and a working wagon, which are not illustrated, are provided. The operator rides on the working bench or the working wagon and performs yarn threading onto the members such as the twisting unit 14 constituting the false-twisting unit 5.

(Winding Base and Winding Device)

[0051] As shown in FIG. 2, plural winding bases 3 are lined up in the front-back direction. For one area B of the draw texturing machine 1, one winding base 3 is provided. To one winding base 3, 20 winding devices 22, which are configured to wind 20 yarns Y false-twisted at the false-twisting unit 5, are attached.

[0052] To begin with, the winding base 3 will be explained. One winding base 3 includes two side plates 20 opposing each other in the front-back direction and five beam members 21 which bridge the two side plates 20. To each beam member 21, later-described four winding devices 22 are attached side by side. Because four winding devices 22 are attached to each of the five beam members 21, 20 winding devices 22 are provided to form five stages in the up-down direction. In the descriptions hereinbelow, the stages of the winding devices 22 are counted upwards from below. For example, the winding devices on the fourth stage indicate the winding devices 22 on the stage which is the fourth stage from below.

[0053] FIG. 3 is a perspective view of the winding base 3 and a package take down apparatus 40. In order to

simplify the drawing, in FIG. 3, the winding devices 22 are omitted and the winding bases 3 are indicated by two-dot chain lines in a simplified manner. As described later, the draw texturing machine 1 of the present embodiment is provided with the package take down apparatus 40 which is configured to take down wound packages P which are formed by the winding devices 22 on the fourth and fifth stages of each winding base 3. Each winding base 3 is provided with an arrangement for moving the package take down apparatus 40 in the front-back direction.

[0054] On the near side of the winding bases 3, a lower rail 30 is provided to extend in the front-back direction across the lower parts of the winding bases 3. As shown in FIG. 2, on the lower rail 30, connecting portions 31 which are to be connected with the package take down apparatus 40 are provided at positions corresponding to the back end portions of the respective winding bases 3. At an upper end portion of the front one of the side plates 20 of each winding base 3, a rail supporting portion 32 is provided. The rail supporting portions 32 of the winding bases 3 support an upper rail 33 which extends in the front-back direction across the upper parts of the winding bases 3. The package take down apparatus 40 is guided by the lower rail 30 and the upper rail 33 and moves in the front-back direction in a space between the winding bases 3. The package take down apparatus 40 will be detailed later.

[0055] Now, the winding device 22 will be described. The winding device 22 forms a wound package P by winding, onto a bobbin 35, the yarn Y conveyed by the feed roller 17. FIG. 4 is a profile of the winding device 22. As shown in FIG. 4, the winding device 22 includes members such as a bobbin storage 23, a cradle 24, a winding roller 25, paired doffing arms 26, a stocker 27, and a regulator 28.

[0056] The bobbin storage 23 stores bobbins 35 before the yarn Y is wound thereon. The cradle 24 rotatably supports the bobbin 35 supplied from the bobbin storage 23. The winding roller 25 frictionally makes contact with the yarn layer on the bobbin 35 (package P) retained by the cradle 24, and rotates the package P. The paired doffing arms 26 move a fully-wound package P from the cradle 24 to the stocker 27. The paired doffing arms 26 are provided so that there is a predetermined distance therebetween in the direction orthogonal to the plane of FIG. 4, and a package P is sandwiched between the upper end portions of the paired doffing arms 26. Each of the paired doffing arms 26 is rotatable about its lower end portion. As the paired doffing arms 26 rotate anticlockwise from the position shown in FIG. 4, the fully-wound package P is doffed to the stocker 27.

[0057] The stocker 27 stores the fully-wound package P. In the present embodiment, the stocker 27 is able to store two packages P. The stocker 27 is provided with paired guide rails 29 extending in a substantially horizontal direction. A fully-wound package P is supported by the paired guide rails 29 at the end portions of the bobbin

35. The paired guide rails 29 are provided so that there is a predetermined distance therebetween in the direction orthogonal to the plane of FIG. 4. The paired guide rails 29 extend obliquely downward toward the left side of the figure. The wound package P doffed to the stocker 27 by the doffing arms 26 moves along the guide rails 29 while rolling leftward in the figure.

[0058] The regulator 28 regulates the rolling of the wound package P in the stocker 27. The regulator 28 includes a first claw portion 28a, a second claw portion 28b, and an operation portion 28c. The regulator 28 is swingably attached to the guide rails 27 and is biased by an unillustrated spring so as to assume a posture shown in FIG. 4. When the operation portion 28c is pushed out against the biasing force of the spring by a later-described air cylinder 59 (see FIGs. 5 to 8) of the package take down apparatus 40, the regulator 28 is swung counterclockwise from the posture shown in FIG. 4.

[0059] When the regulator 28 assumes the posture shown in FIG. 4, the first claw portion 28a protrudes whereas the second claw portion 28b is withdrawn. With this posture, the first claw portion 28a prevents the wound package P (P1) positioned on the outer side in the stocker 27 from rolling out from the stocker 27. As the operation portion 28c is pushed out and the regulator 28 is swung counterclockwise, the first claw portion 28a is withdrawn and hence the wound package P (P1) on the outer side rolls out from the stocker 27. At the same time, the second claw portion 28b protrudes to prevent the wound package P (P2) on the inner side from rolling out together. When the operation by the air cylinder 59 is finished and the regulator 28 returns to the posture shown in FIG. 4, the second claw portion 28b is withdrawn and the inner package P (P2) rolls to the outer side, and is stopped by the first claw portion 28a which has protruded again.

(Package Take Down Apparatus)

[0060] The wound package P doffed to the stocker 27 at each winding device 22 is collected by an operator who is on the near side (right side in FIGs. 2 and 3) of the winding base 3. In the draw texturing machine 1 of the present embodiment, on one winding base 3, the stockers 27 of the winding devices 22 are provided to form five stages in the vertical direction. The stockers 27 on the fourth stage are about 2.3 meters high from the floor surface, and the stockers 27 on the fifth stage (top stage) are about 2.8 meters high from the floor surface. It is quite burdensome for the operator to take wound packages P, each of which is several kilograms in weight, down many times from the stockers 27 at these heights. In this connection, the draw texturing machine 1 of the present embodiment is provided with the package take down apparatus 40 which is used to take down wound packages P from the stockers 27 of the winding devices 22 on the fourth and fifth stages.

[0061] FIG. 5 is a perspective view of the package take down apparatus 40. Each of FIG. 6 to FIG. 8 is a front

elevation of the package take down apparatus 40. FIG. 6 shows the package take down apparatus 40 on stand-by, FIG. 7 shows the package take down apparatus 40 in package take down preparation, and FIG. 8 shows the package take down apparatus 40 during package take down. For the purpose of simplifying the drawings, FIG. 6 to FIG. 8 do not show a net 71 of a cover 45 which is indicated by hatching in FIG. 5. FIG. 9 is a profile of a running unit 48 and a fixing unit 42 at a lower end portion of the package take down apparatus 40, whereas FIG. 10 is a profile of a connecting portion 55 at an upper end portion of the package take down apparatus 40.

[0062] As shown in FIG. 5 to FIG. 8, the package take down apparatus 40 includes members such as a main body frame 41, a package receiver 43, an air hoist 44 (elevation drive unit of the present invention), a fixing unit 42, a cover 45, an operation box 46, and a pendant switch 47. Hereinafter, when the package take down apparatus 40 is described, expressions "near side" and "far side" are appropriately used from the viewpoint of an operator who is on the side opposite to the winding base 3. That is to say, the near side is the side opposite to the winding base 3 whereas the far side is the side on which the winding base 3 is provided.

[0063] The main body frame 41 is a rectangular frame and is long in the up-down direction. At a lower end portion of the main body frame 41, two running units 48 are provided to be distanced from each other in the front-back direction. As shown in FIG. 9, to one running unit 48, a wheel 49 which rotates about a horizontal axis and two guide rollers 50 which rotate about a vertical axis are attached. The wheel 49 is provided on the lower rail 30 which extends over plural winding bases 3 in the front-back direction. Below the wheel 49, the two guide rollers 50 are provided to sandwich the lower rail 30 from the both sides. This allows the main body frame 41 to smoothly move along the lower rail 30, while being guided by the guide rollers 50 on the both sides of the lower rail 30.

[0064] In addition to the above, as shown in FIG. 5 to FIG. 8, a reinforcing guard 51 is provided on the front surface (right side face) of the main body frame 41, whereas an entrance prevention guard 54 is provided on the back surface (left side face) of the main body frame 41. Furthermore, handles 52 and 53 are provided at the front and back side faces of the main body frame 41. By these handles 52 and 53, the main body frame 41 is easily movable in the front-back direction. Alternatively, the guards 51 and 54 may be used as handles.

[0065] At an upper end portion of the main body frame 41, two connecting portions 55 are provided to be connected to the upper rail 33 of the winding base 3 to be movable in the front-back direction. As shown in FIG. 10, one connecting portion 55 is provided with two guide rollers 56 which rotate about a vertical axis. In the meanwhile, the upper rail 33 which extends across the plural winding bases 3 is U-shaped in cross section and is open upward. The two guide rollers 56 are provided to sand-

wich a side wall portion on the near side of the U-shaped upper rail 33.

[0066] The package receiver 43 is attached to the main body frame 41 so as to be movable in the up-down direction between a receiving position (FIG. 5 and FIG. 8) and a collection position (FIG. 6 and FIG. 7) below the receiving position. The package receiver 43 at the upper receiving position receives wound packages P from the stockers 27 on the fourth and fifth stages of the winding base 3.

[0067] The package receiver 43 is provided with a supporting frame 57, eight package placement portions 58 attached to the supporting frame 57, and two air cylinders 59. The eight package placement portions 58 are provided to form two stages in the up-down direction. In each stage, four package placement portions 58 are lined up in the width direction of the package take down apparatus 40 (i.e., the direction in which the winding bases 3 are lined up). The four package placement portions 58 on the upper stage correspond to the four stockers 27 on the fifth stage (top stage), whereas the four package placement portions 58 on the lower stage correspond to the four stockers 27 on the fourth stage.

[0068] Each package placement portion 58 is provided with two rails 60 which are separated from each other in the width direction of the package take down apparatus 40 and a sensor (not illustrated) configured to detect the state of placement of a wound package P. Furthermore, on the supporting frame 57, an indicator lamp 61 is provided in the vicinity of each package placement portion 58 to be turned on when a wound package P is detected by the sensor.

[0069] The two air cylinders 59 are provided to correspond to the upper and lower package placement portions 58, respectively. The air cylinders 59 are provided to operate the regulator 28 (see FIG. 4) of a stocker 27 on the fourth or fifth stage, when receiving a wound package P by the corresponding package placement portion 58.

[0070] The air hoist 44 is attached to the center of an upper end portion of the main body frame 41. The air hoist 44 is driven by air supplied from the winding base 3 side, and moves the package receiver 43 in the up-down direction.

[0071] The fixing unit 42 is attached to a rear part of a lower end portion of the main body frame 41. This fixing unit 42 is provided to fix the package take down apparatus 40 to the connecting portion 31 on the winding base 3 side. FIG. 11(a) and FIG. 11(b) are perspective views of the fixing unit 42 of the package take down apparatus 40. FIG. 11(a) shows a fixation canceled state, whereas FIG. 11(b) shows a fixed state.

[0072] As shown in FIG. 6 to FIG. 8 and FIG. 11, a mark member 75 is provided in the vicinity of the fixing unit 42 of the main body frame 41. This mark member 75 is used for tentatively determining the position of the main body frame 41 in the front-back direction, before the main body frame 41 is fixed by means of the fixing

unit 42.

[0073] As shown in FIG. 9 and FIG. 11, the fixing unit 42 includes an operation lever 63, a connection member 64, and a connection mechanism 65 which connects the operation lever 63 with the connection member 64. As shown in FIG. 9, the operation lever 63 is rotatable between a posture (indicated by full lines) in which the operation lever 63 is tilted to the far side and a posture (indicated by two-dot chain lines) in which the operation lever 63 is tilted to the near side. The connection member 64 includes an air connecting portion 68 and two guide rollers 69 provided to sandwich the air connecting portion 68. The connection mechanism 65 includes three connecting shafts 66 connecting the connection member 64 with the operation lever 63 and a frame 67 which is fixed to the main body frame 41 so that the three connecting shafts 66 are inserted into the same.

[0074] In the meanwhile, the connecting portion 31 on the winding base 3 side is provided with a fixed component 37 having two guide surfaces 37a which are spaced apart from each other in the front-back direction. At a part of the fixed component 37, which is between the two guide surfaces 37a, an air supplier 38 (power supplier of the present invention) connected with an air supply source (not illustrated) of the draw texturing machine 1 is provided.

[0075] When the operation lever 63 is tilted to the near side, as shown in FIG. 11(a), the connection member 64 of the package take down apparatus 40 is separated from the fixed component 37 on the winding base 3 side, and hence the package take down apparatus 40 is not fixed to the connecting portions 31.

[0076] In the meanwhile, when the operation lever 63 is tilted to the far side, as shown in FIG. 11(b), the connection member 64 connected with the operation lever 63 by the three connecting shafts 66 are pushed to the far side. At the same time, the two guide rollers 69 of the connection member 64 move along the front and back guide surfaces 37a, i.e., along the two guide surfaces 37a of the fixed component 37 on the winding base 3 side. In other words, the fixed component 37 is positioned between the two guide rollers 69 of the connection member 64. With this, the main body frame 41 is fixed to be immovable in the front-back direction. At the same time, the air connecting portion 68 of the package take down apparatus 40 is connected to the air supplier 38 on the winding base 3 side. This arrangement makes it possible to supply air from the air supply source on the winding base 3 side to the package take down apparatus 40 to drive the air hoist 44 and the air cylinder 59.

[0077] The package take down apparatus 40 of the present embodiment is able to drive the air hoist 44 and the air cylinder 59 by using the air supplied from the air supply source which is provided on the winding base 3 side. Because a motor driven by electricity is not included, the package take down apparatus 40 is not required to include an electric power source, and power supply from the outside is unnecessary.

[0078] The cover 45 covers the package receiver 43 at the collection position in order to prevent an operator from erroneously inserting his/her hand or the like into the package receiver 43 when the package receiver 43 moves up. As shown in FIG. 5 to FIG. 8, the cover 45 includes a frame 70 and a net 71 attached to this frame 70. In the present embodiment, the cover 45 is a shutter provided on the near side of the main body frame 41, and moves in the up-down direction between a lower closed position (FIGs. 5, 7, and 8) and an upper open position (FIG. 6).

[0079] The cover 45 of the present embodiment is manually moved up and down. To be more specific, a handle 72 is attached to a lower part of the frame 70 of the cover 45, and an operator grips this handle 72 to move up and down the cover 45. Alternatively, the cover 45 may be moved up and down by an air cylinder or the like.

[0080] When the cover 45 is at the lower closed position, as shown in FIG. 7, the package receiver 43 at the collection position is covered with the cover 45 from the near side. Even if the package receiver 43 is covered with the cover 45, it is possible to check the state of the package receiver 43 (e.g., whether a wound package P is placed) through the net 71 (see FIG. 5). In the meanwhile, when the cover 45 is at the upper open position, as shown in FIG. 6, the package receiver 43 at the collection position is open to the near side, thereby allowing a wound package P placed on the package receiver 43 to be taken out.

[0081] As shown in FIG. 6, at a lower portion of the main body frame 41, a switch 73 is provided to make contact with the lower end of the cover 45 when the cover 45 is at the closed position. This switch 73 switches between supply and block of air to the air hoist 44 from the air supplier 38 on the winding base 3 side via the air connecting portion 68.

[0082] When the cover 45 is at the closed position, the switch 73 is turned on and the air supply to the air hoist 44 is possible. In other words, ascending and descending of the package receiver 43 by the air hoist 44 are allowed. When the cover 45 is at the open position, the switch 73 is turned off and the air supply to the air hoist 44 is blocked. In other words, ascending and descending of the package receiver 43 by the air hoist 44 are prohibited.

[0083] The operation box 46 is attached to the rear side face of the main body frame 41. This operation box 46 is provided with a lever 74 by which the air cylinder 59 of the package receiver 43 is operated. Below the operation box 46 of the main body frame 41, a pendant switch 47 (operation portion of the present invention) for operating the air hoist 44 is detachably provided. An operator is able to detach the pendant switch 47 from the main body frame 41 and operate the air hoist 44 while checking the state of the package take down apparatus 40 from a position remote from the main body frame 41.

[0084] Now, a series of operations for collecting a package from the winding base 3 by means of the above-

described package take down apparatus 40 will be described.

[0085] When wound packages P are taken down from the stockers 27 on the fourth and fifth stages of a winding base 3 by using the package take down apparatus 40, to begin with, an operator grips the handles 51 to 54 and moves the package take down apparatus 40 in the front-back direction to a position corresponding to the target winding base 3. Furthermore, the operator stops the package take down apparatus 40 while checking the leading end position of the mark member 75 (see FIG. 11), so as to tentatively determine the position of the package take down apparatus 40 in the front-back direction. Subsequently, as shown in FIG. 9, the operator tilts the operation lever 63 of the fixing unit 42 from the near side to the far side, so as to fix the position of the package take down apparatus 40 in the front-back direction. At this stage, as shown in FIG. 11(b), the air connecting portion 68 of the package take down apparatus 40 is connected to the air supplier 38 on the winding base 3 side.

[0086] Subsequently, as shown in FIG. 7, the cover 45 at the open position is moved down to the closed position. As a result of this, the package receiver 43 at the lower collection position is covered with the cover 45 from the near side. At the same time, the lower end of the cover 45 makes contact with the switch 73 and the switch is turned on, so that the ascending and descending of the package receiver 43 by the air hoist 44 are allowed.

[0087] Subsequently, the operator drives the air hoist 44 by operating the pendant switch 47, so as to move the package receiver 43 up from the collection position to the receiving position as shown in FIG. 8. In so doing, the package placement portion 58 on the upper stage is moved to a position close to the stocker 27 on the fifth stage (top stage), and the package placement portion 58 on the lower stage is moved to a position close to the stocker 27 on the fourth stage. In this state, when the operator drives the air cylinder 59 by operating the lever 74 of the operation box 46, the regulator 28 of each stocker 27 (see FIG. 4) is moved so that the wound package P at each stocker 27 rolls out to the corresponding package placement portion 58. As a result, the package receiver 43 receives eight wound packages P in total from the stockers 27 on the fourth and fifth stages.

[0088] When the wound package P is moved to each package placement portion 58, the wound package P is detected by the sensor and the indicator lamp 61 is turned on. When confirming by this indicator lamp 61 that all wound packages P which are targets of collection have been received, the operator operates the pendant switch 47 to move the package receiver 43 down to the collection position from the receiving position.

[0089] When the package receiver 43 is moved to the collection position, the operator opens the cover 45 to the open position to expose the package receiver 43, and collects the eight wound packages P one by one from the package receiver 43. In this regard, the wound pack-

ages P may not be immediately collected from the package receiver 43, in front of the winding base 3 where the operations have been done. In other words, the package take down apparatus 40 may be moved in the front-back direction while the wound packages P are still mounted on the package receiver 43, and the wound packages P may be collected from the package receiver 43 at a position remote from the winding base 3 where the operations have been done.

[0090] The package take down apparatus 40 of the present embodiment is used for collecting wound packages P on the fourth and fifth stages. Wound packages P on the first to third stages are directly collected from the stockers 27 by the operator, because the first to third stages are lower in height than the fourth and fifth stages. When doing so, the package take down apparatus 40 is preferably moved in advance to a position remote from the winding base 3 which is the target of package collection, in order not to obstruct the collecting operations.

[0091] With the package take down apparatus 40 of the present embodiment, wound packages P at high positions are easily taken down as the package receiver 43 is moved between a high receiving position and a low collection position. Furthermore, because the main body frame 41 is movable in the direction in which the winding bases 3 are lined up, it is possible to take wound packages P down from plural winding bases 3 by using a single shared package take down apparatus 40.

[0092] In addition to the above, in the present embodiment, the upper end portion of the main body frame 41 is connected to the winding base 3 by the connecting portion 55. This prevents the main body frame 41 from falling down during an operation of taking down wound packages P. Furthermore, the connecting portion 55 is movably connected to the upper rail 33 which extends across the upper parts of the winding bases 3. This arrangement prevents the main body frame 41 from falling down when the main body frame 41 is moved in the front-back direction.

[0093] In particular, in the present embodiment, the main body frame 41 is tall (e.g., at least three meters in height) in order to take wound packages P down from the stockers 27 at high positions. In the meanwhile, as shown in FIG. 1, it is difficult to enlarge the space 77 between the winding bases 3 and the creel stand 4, because it is necessary to restrain the size of the draw texturing machine 1 in the left-right direction. To secure a space for package collection in the space 77 which is limited, the depth of the main body frame 41 (in the left-right direction of the draw texturing machine 1) is arranged to be short (e.g., 0.8 meter or shorter).

[0094] In short, the main body frame 41 is a structure which is short in depth and is tall. On this account, when plural wound packages P each of which is heavy are placed on the package receiver 43 at the upper receiving position, the balance may be lost and the package take down apparatus 40 may fall down in the left-right direction. In consideration of this problem, the arrangement

of the present embodiment in which the upper end portion of the main body frame 41 is connected to the winding base 3 is very effective for certainly preventing the main body frame 41 from falling down.

[0095] The main body frame 41 is provided with the cover 45 which moves between the closed position and the open position. As the cover 45 is set at the closed position when the package receiver 43 at the collection position is moved to the upper receiving position, it is possible to prevent an operator from erroneously inserting his/her hand into a part around the package receiver 43 immediately before the upward movement. When the package receiver 43 returns to the collection position after receiving wound packages P, the cover 45 is set at the open position to allow the wound packages P to be taken out from the package receiver 43.

[0096] When the cover 45 is at the closed position, the switch is turned on and the air supply to the air hoist 44 becomes possible. In other words, the ascending and descending of the package receiver 43 by the air hoist 44 are allowed only when the cover 45 is at the closed position. To put it differently, the package receiver 43 does not move to the receiving position when the cover 45 is at the open position and the package receiver 43 at the collection position is not covered with the cover 45. This makes it possible to certainly prevent an operator from erroneously inserting his/her hand into a part around the package receiver 43 immediately before the upward movement.

[0097] The package take down apparatus 40 is provided with the fixing unit 42 which fixes the main body frame 41 not to be movable in the front-back direction. As the main body frame 41 is fixed by the fixing unit 42, the movement of the main body frame 41 in the front-back direction is prohibited during the operations of taking down wound packages P.

[0098] In addition to the above, when the main body frame 41 is fixed by the fixing unit 42, the air connecting portion 68 of the package take down apparatus 40 is connected to the air supplier 38 on the winding base 3 side. It is therefore unnecessary to provide an air supply source for driving the air hoist 44 or the like in the package take down apparatus 40. Furthermore, because the connection to the air supplier 38 is established at the same time as the fixation of the main body frame 41, an additional operation for the connection is not required, and hence the processes are simplified.

[0099] With the package take down apparatus 40 of the present embodiment, it is possible to take packages down from stockers which are 2.3 meters or higher from the floor surface, which are not easily reached by the operator.

[0100] In addition to the above, the package take down apparatus 40 of the present embodiment is arranged such that, as the operator operates the lever 74 of the operation box 46, the pendant switch 47, or the like, the air cylinder 59 of the package receiver 43 and the air hoist 44 for ascending and descending are driven to take

wound packages P down from the stockers 27. In short, the package take down apparatus 40 is a semi-automatic apparatus which is driven based on an operation by the operator.

[0101] According to the arrangement above, wound packages P are taken down from the stockers 27 at high positions as the operator operates the pendant switch 47 or the like. It is therefore possible to reduce the workload. Furthermore, because the package receiver 43 is moved up or down after the operator checks the surrounding conditions, it is possible to relatively easily deal with sudden troubles, and hence the safety is improved as compared to apparatuses which fully automatically collect wound packages P. Furthermore, because only minimum driving units for taking down wound packages P such as the air hoist 44 are required, the package take down apparatus 40 of the present embodiment is advantageous over the fully-automatic apparatuses in terms of cost and energy saving.

[0102] The following will describe modifications of the above-described embodiment of the present invention. The members identical with those in the embodiment above will be denoted by the same reference numerals and the explanations thereof are not repeated.

1] In the embodiment above, the upper rail 33 is provided across the upper parts of the winding bases 3, and the connecting portion 55 of the package take down apparatus 40 is movable along the upper rail 33. In this connection, in terms of the prevention of the falling down of the apparatus during the operation of taking down packages, the upper rail 33 is not prerequisite. When the package take down apparatus is moved to a position in front of the winding base 3 which is the operation target, the package take down apparatus may be connected to the upper end portion of the winding base 3 by a connecting portion. To put it differently, the connection to the winding base 3 and the disconnection therefrom may be performed each time the package take down apparatus moves and stops.

2] The lower rail 30 extending across the lower parts of the winding bases 3 is not prerequisite, either. For example, the package take down apparatus may be provided with plural tires and runnable on the floor by the tires. In such a case, one package take down apparatus may be shared between plural draw texturing machines 1 as the package take down apparatus moves between the draw texturing machines 1.

3] A cover different from the cover of the embodiment above may be employed. For example, instead of moving in the up-down direction like a shutter, the cover may be a door-type cover which swings to the near side of the operator when opening.

4] The package receiver of the package take down apparatus may be modified as below, for example.

[0103] While the package receiver 43 of the embodi-

ment above receives wound packages P from the stockers 27 on the fourth stage and the fifth stage (top stage) of the winding base. The package receiver may receive wound packages P only from the stockers 27 on the top stage.

[0104] While the package receiver 43 of the embodiment above receives wound packages P lined up in the front-back direction on each stage at once, the number of wound packages P that the package receiver receives at once may be suitably changed. For example, even if four stockers 27 are lined up in the front-back direction on each stage of the winding base 3, the package receiver may receive wound packages P from only two stockers 27 at once. In other words, the package receiver may receive the four wound packages P on each stage through two processes.

[0105] While the package receiver 43 of the package take down apparatus 40 of the embodiment above is arranged to be able to receive wound packages P from the stockers 27 on the upper and lower stages of the winding base 3, the package take down apparatus 40 may be arranged to be able to receive wound packages P at once from the stockers 27 on three or more stages. In other words, the package receiver may have three or more package placement portions 58 which are lined up in the up-down direction. On the contrary to this, the package receiver may receive wound packages P only from the stocker 27 on a single stage.

5] The package take down apparatus 40 of the embodiment above is an air-driven apparatus which is driven by air supplied from the air supply source on the winding base 3 side. In this regard, the package take down apparatus may be a motor-driven apparatus which includes a motor for moving up and down the package receiver (i.e., elevation drive unit of the present invention) and drives the motor by receiving electricity from a power source on the winding base 3 side. When the apparatus is a motor-driven apparatus, the package take down apparatus may be provided with a dedicated power source.

6] The fixing unit for fixing the position of the package take down apparatus may not be provided in the package take down apparatus but provided on the winding base 3 or on the floor.

7] The connection of the package take down apparatus with the power supplier on the winding base side (i.e., the air supplier 38 in the embodiment above) in sync with an operation of the fixing unit 42 is not a prerequisite arrangement. The connection with the power supplier may be carried out independent of an operation of the fixing unit 42.

8] The package take down apparatus 40 of the embodiment above receives wound packages P from the winding base 3 to which the winding devices 22 are attached, and takes down the wound packages P. Alternatively, wound packages P formed by the winding devices may be placed on a base (package

base) different from the winding base. In this case, the package take down apparatus receives wound packages P not from the winding base to which the winding device is attached but from the package base.

9] Because a lot of winding bases 3 are lined up in the front-back direction in a typical draw texturing machine 1, the package take down operation may require a long time when only one package take down apparatus 1 is used. For this reason, plural package take down apparatuses may be provided for one draw texturing machine 1.

[0106] While the present invention is applied to the draw texturing machine in the explanations above, the present invention may be applied to a textile machine which is configured to form wound packages by winding yarns onto bobbins but is different from the draw texturing machine.

Claims

1. A package take down apparatus including stockers each of which stores wound packages and being configured to take the wound packages down from package bases which are lined up in a predetermined arrangement direction, the package take down apparatus comprising:

a main body frame configured to be movable in the arrangement direction;
a package receiver provided in the main body frame;
and
an elevation drive unit configured to move up and down the package receiver between a receiving position where the wound packages are received from the stockers and a collection position which is below the receiving position.

2. The package take down apparatus according to claim 1, wherein, each of the package bases includes the stockers lined up in an up-down direction to form plural stages, and the receiving position of the package receiver is a position where the wound packages are received from a topmost stocker among the stockers forming the plural stages.

3. The package take down apparatus according to claim 2, wherein, each of the package bases includes the stockers forming three or more stages.

4. The package take down apparatus according to any one of claims 1 to 3, further comprising a connecting portion which is provided at an upper end portion of the main body frame and is to be connected with the

package bases.

5. The package take down apparatus according to claim 4, wherein, an upper rail extending in the arrangement direction is provided across upper parts of the package bases, and the connecting portion is connected to the upper rail to be movable in the arrangement direction. 5
6. The package take down apparatus according to any one of claims 1 to 5, wherein, a lower rail is provided to extend in the arrangement direction across lower parts of the package bases, and the main body frame is movable along the lower rail. 10
7. The package take down apparatus according to any one of claims 1 to 6, further comprising a cover which is attached to the main body frame to be switchable between a closed position where the package receiver at the collection position is covered with the cover from a side opposite to the package base and an open position where the package receiver at the collection position is open to the side opposite to the package base. 15 20
8. The package take down apparatus according to claim 7, wherein, ascending and descending of the package receiver by the elevation drive unit are allowed when the cover is at the closed position, and the ascending and descending of the package receiver by the elevation drive unit are prohibited when the cover is at the open position. 25 30
9. The package take down apparatus according to any one of claims 1 to 8, further comprising a fixing unit which is configured to fix the main body frame to be immovable in the arrangement direction. 35
10. The package take down apparatus according to claim 9, wherein, when the main body frame is fixed by the fixing unit, the elevation drive unit is connected to a power supplier which is configured to supply driving power. 40
11. The package take down apparatus according to any one of claims 1 to 10, wherein, the height of the stockers from a floor surface on which the package bases are provided is at least 2.3 meters. 45
12. The package take down apparatus according to any one of claims 1 to 11, further comprising an operation portion for driving the elevation drive unit. 50
13. The package take down apparatus according to any one of claims 1 to 12, wherein, the package receiver includes two or more package placement portions which are lined up in the up-down direction and receive the wound packages from the stockers forming 55

two or more stages in the up-down direction.

14. A textile machine comprising:

package bases which are lined up in a predetermined arrangement direction, each of the package bases including stockers for storing wound packages; and the package take down apparatus according to any one of claims 1 to 13, which is configured to take the wound packages down from the package bases.

FIG.1

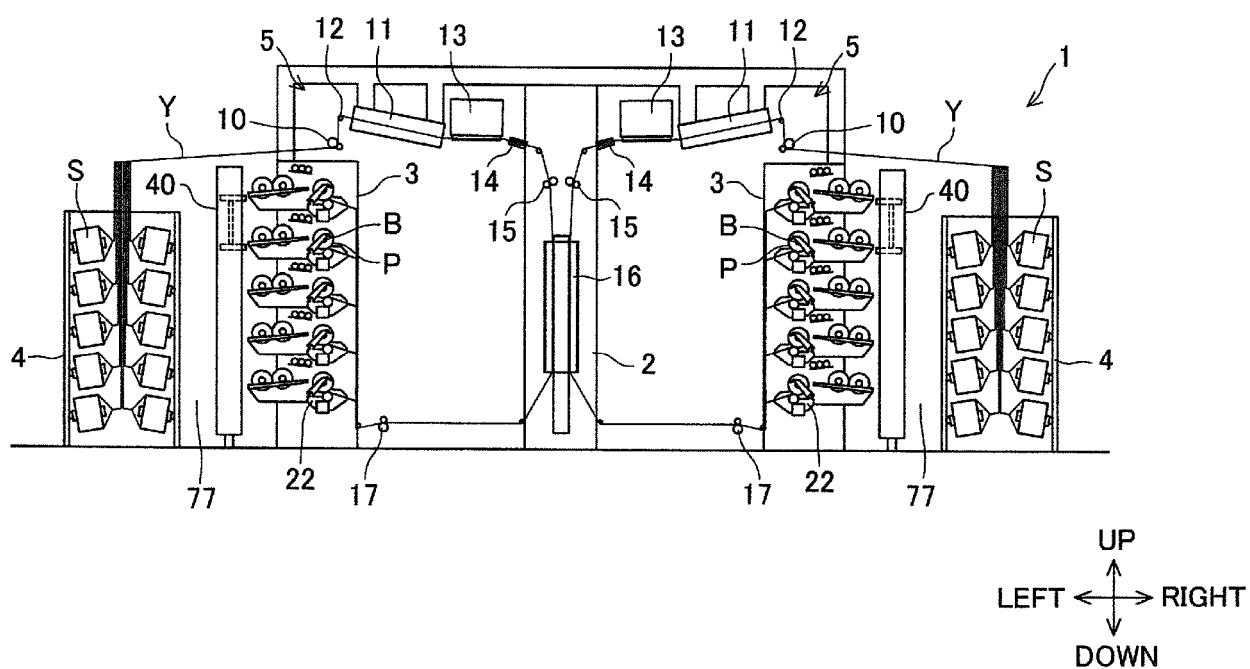


FIG.2

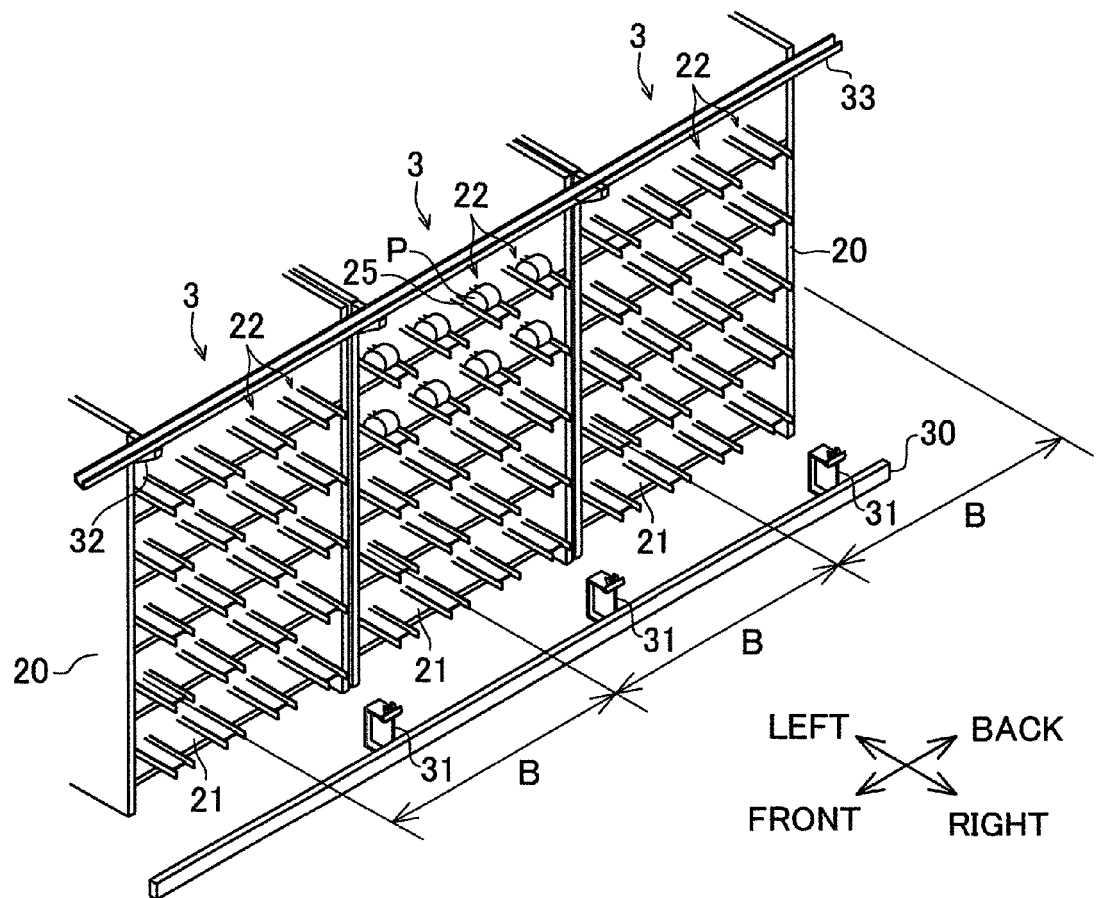


FIG.3

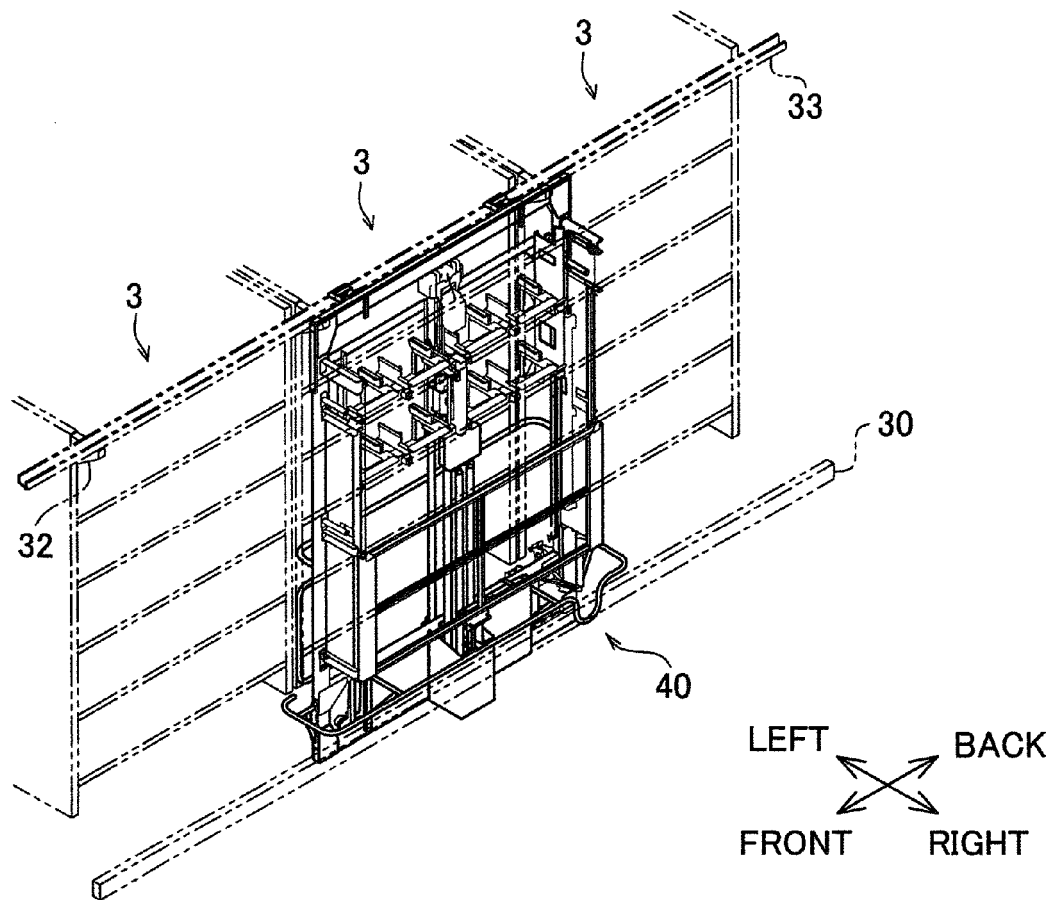


FIG.4

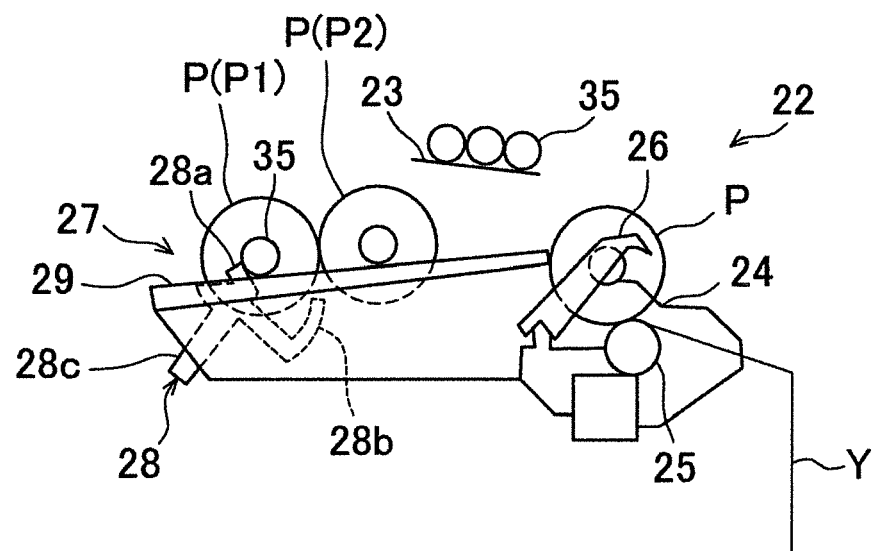


FIG.5

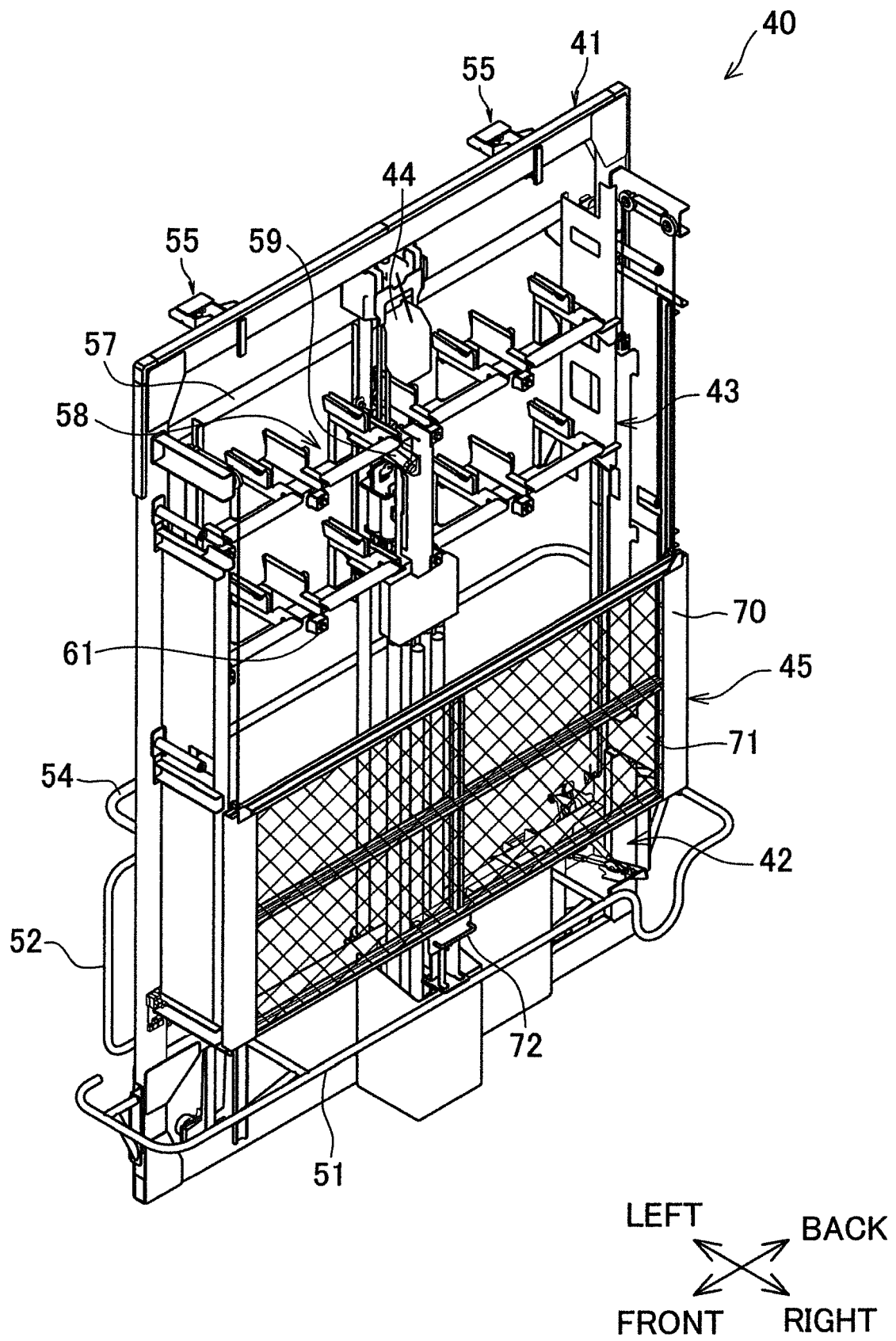


FIG.6

(STANDBY)

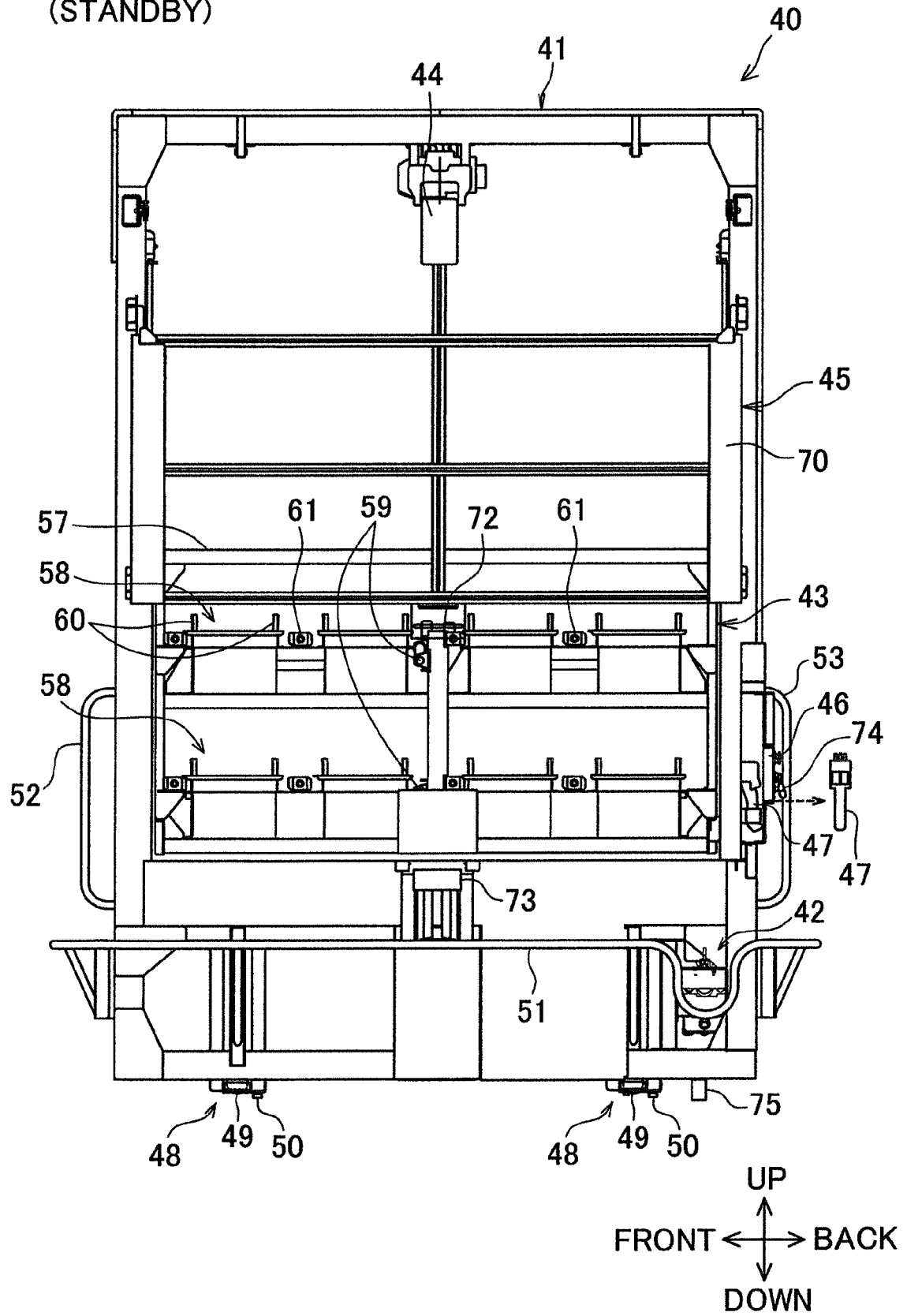


FIG.7
(PACKAGE TAKE DOWN PREPARATION)

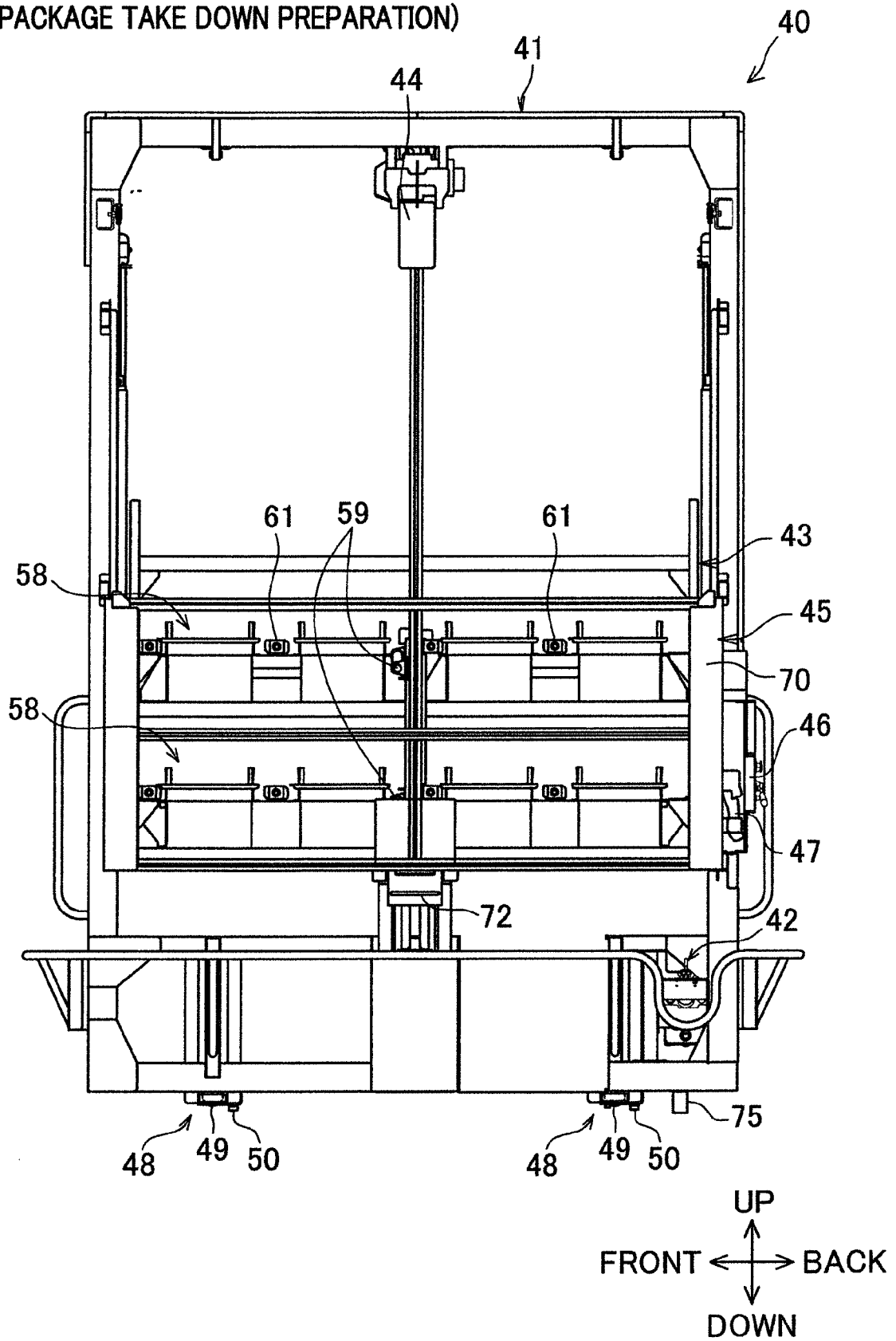


FIG.8

(DURING PACKAGE TAKE DOWN)

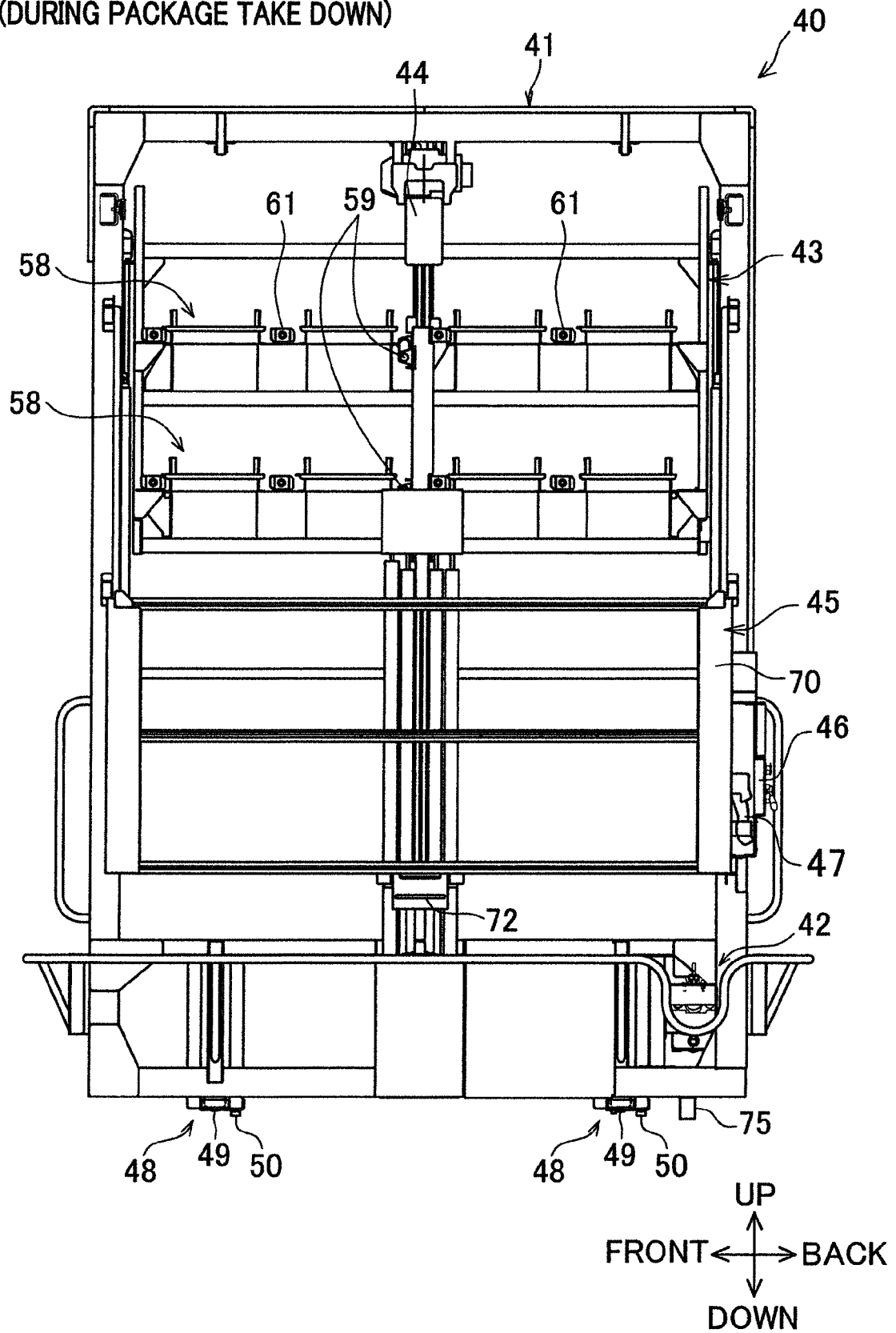


FIG.9

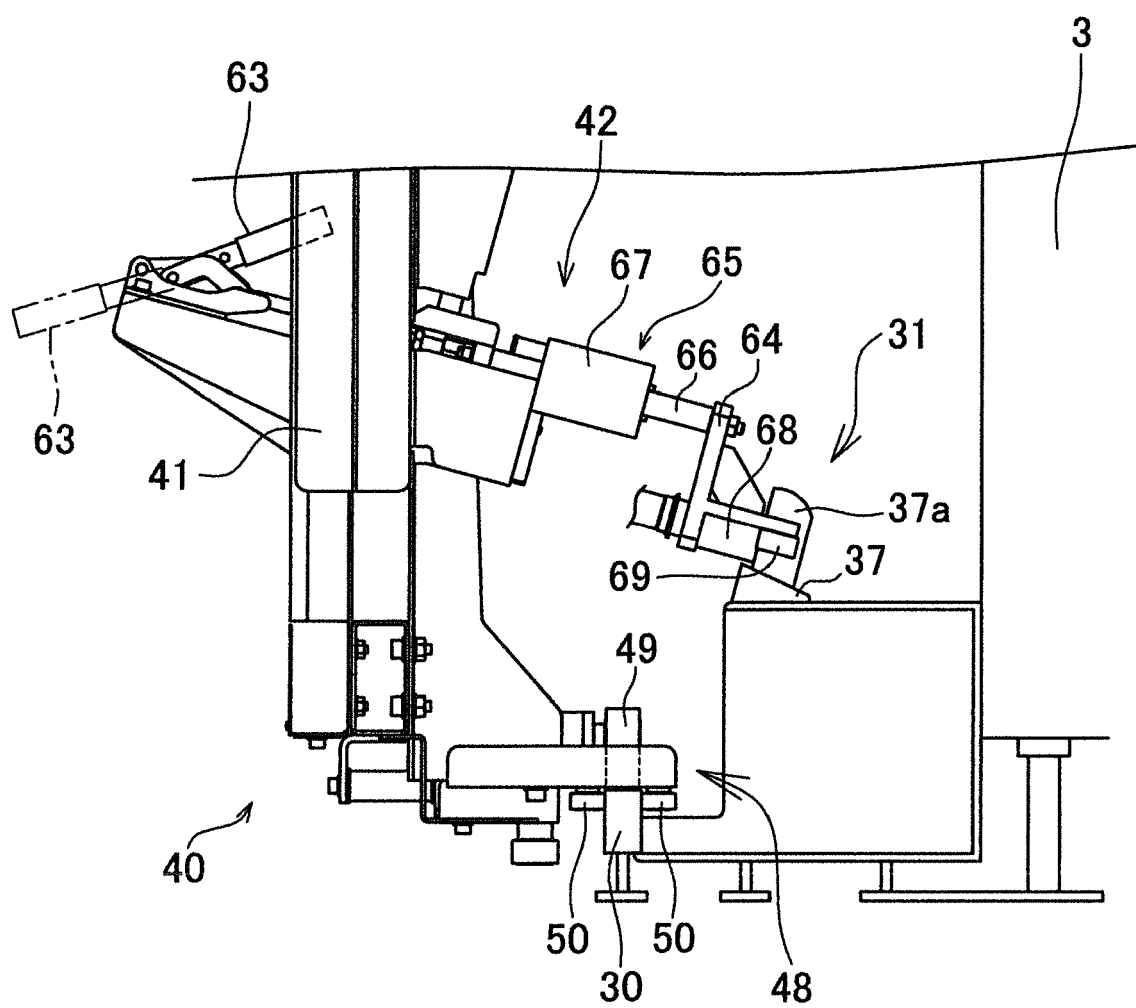


FIG.10

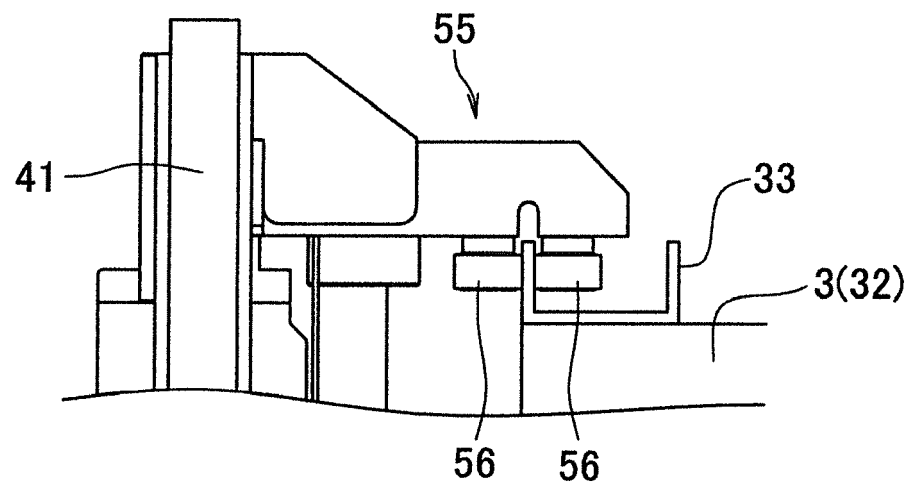
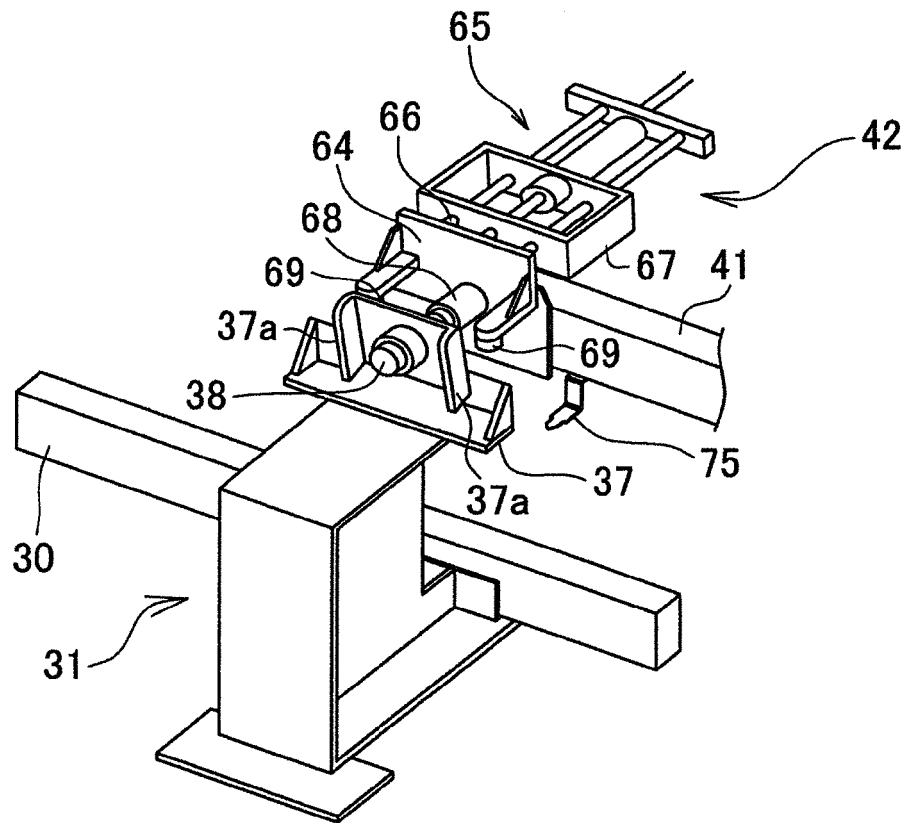
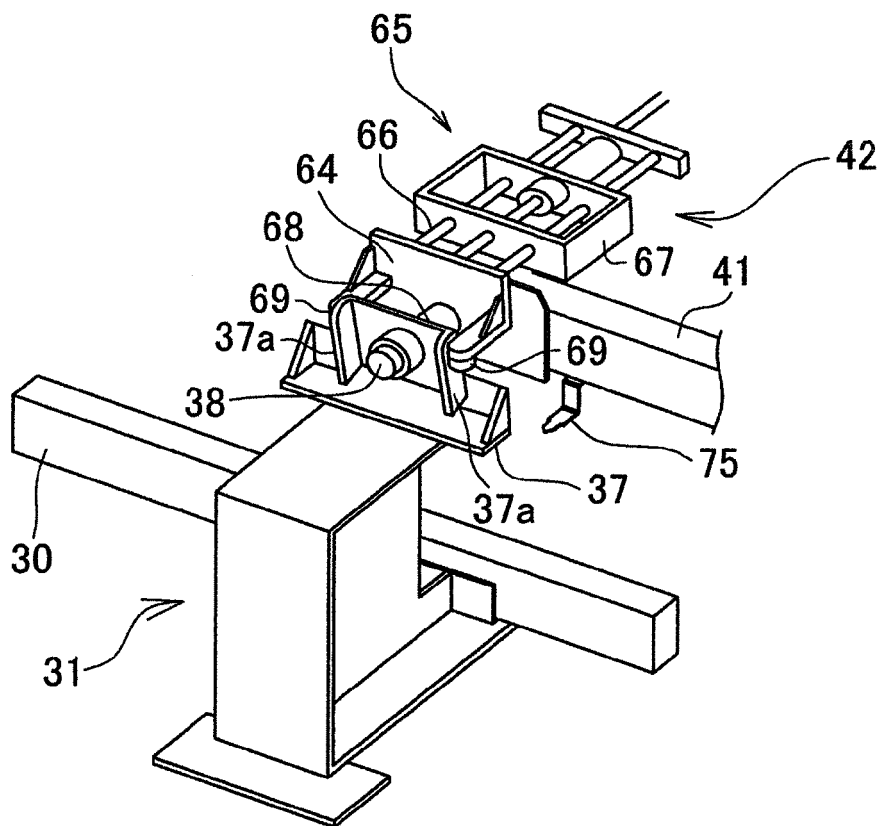


FIG.11

(a)



(b)





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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 July 2017	Examiner Guisan, Thierry
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