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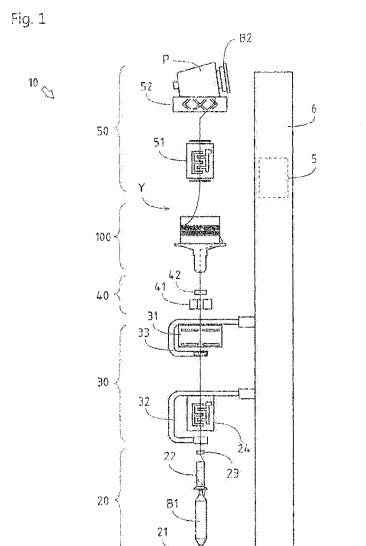
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(54) **THREAD WINDING DEVICE**

(57) Provided is a yarn winding device that can prevent the occurrence of sluffing. A winding unit (10), while eliminating the threading defects of a yarn feeding bobbin (B1) around which is wound a yarn (Y) that is spun by a fine spinning machine, winds a package (P). The winding unit (10) comprises a yarn accumulating device (100) which winds the yarn (Y) from the yarn feeding bobbin (B1) and accumulates the wound yarn. The yarn accumulating device (100) comprises the following: a yarn accumulating part (130) which accumulates the yarn (Y); and a winding part (140) which, while rotating, winds the yarn (Y) around the yarn accumulating part (130). The yarn accumulating part (130) comprises the following: a yarn accumulating body (belt outer side) (132F) around which the yarn (Y) is wound; and a drive pulley (134) which maintains an equidistant space between yarns (Y) to be wound and supplies the yarn (Y) that is wound around the belt outer side (132F) from a winding side (130R) to an unwinding side (130F).



Description

Technical Field

[0001] The present invention relates to an art of a yarn winding device.

Background Art

[0002] A yarn winding device is well known as a device which rewinds a package while eliminating threading defects of a yarn feeding bobbin around which is wound a yarn that is spun by a fine spinning machine. The yarn winding device provided therein with a yarn accumulating device (accumulator) is known (for example, see the Patent Document 1).

[0003] At the time of yarn splicing work of the yarn winding device, the yarn winding device provided therein with the yarn accumulating device can continue yarn winding work without stopping a package winding device. Concretely, at the time of the yarn splicing work of the yarn winding device, at the downstream side of the yarn accumulating device, the package winding device winds a yarn accumulated in the yarn accumulating device and continues the yarn winding work. On the other hand, at the upstream side of the yarn accumulating device, a yarn accumulated in the yarn accumulating device is led out (a yarn end is pulled out) and introduced into a yarn splicing device, and the introduced yarn end is yarn together with a yarn end at the side of the yarn feeding bobbin.

[0004] In the yarn accumulating device, when sloughing (loop cast-off) occurs in a yarn wound out from the yarn accumulating device toward a package, yarn breakage occurs and the winding of the package is stopped. In the conventional yarn accumulating device represented by the Patent Document 1, since a yarn wound former is pushed upward by a yarn wound later, fluffs may be intertwined with each other, thereby causing sloughing at the time of unwinding of the yarn. Since the yarn wound former is pushed upward by the yarn wound later, at the time of pulling out the yarn end accumulated in the yarn accumulating device, the fluffs may be intertwined with each other, thereby causing draw-out defect.

Prior Art Reference

Patent Document

[0005] Patent Document 1: the Japanese Patent Laid Open Gazette 2009-242042

Disclosure of Invention

Problems to Be Solved by the Invention

[0006] The purpose of the present invention is to provide a yarn winding device which can prevent sloughing.

Means for Solving the Problems

[0007] The problems to be solved by the present invention have been described above, and subsequently, the means of solving the problems will be described below.

[0008] In accordance with a first aspect, the invention is a yarn winding device which rewinds a package while eliminating threading defects of a yarn feeding bobbin around which is wound a yarn that is spun by a fine spinning machine, including a yarn feeding part which supports the yarn feeding bobbin, a yarn accumulating device which winds and accumulates the yarn of the yarn feeding bobbin, a winding part which winds the yarn accumulated in the yarn accumulating part for a predetermined winding speed so as to form the package, a threading defect detection part which supervises threading defect, and a yarn splicing part which splices broken yarn ends when the yarn is broken. The yarn accumulating device has a yarn accumulating part accumulating the yarn and a winding part winding the yarn to the yarn accumulating part while rotating, and the yarn accumulating part has a yarn accumulating body to which the yarn is wound and a yarn conveying mechanism applying conveying power from a winding side to a unwinding side on the whole wound yarn.

[0009] In accordance with a second aspect, the invention is the yarn winding device according to the first aspect, wherein the yarn accumulating device has a draw-out part which sucks the yarn end wound to the yarn accumulating part when the yarn is broken.

[0010] In accordance with a third aspect, the invention is the yarn winding device according to the second aspect, wherein the yarn accumulating device has a yarn unwinding assistant part which is attached to the unwinding side of the yarn accumulating part and assists unwinding of the yarn.

[0011] In accordance with a fourth aspect, the invention is the yarn winding device according to the third aspect, wherein the yarn accumulating device has a yarn accumulation amount detection part which detects a accumulation amount of the yarn accumulated in the yarn accumulating device.

[0012] In accordance with a fifth aspect, the invention is the yarn winding device according to the first to fourth aspects, wherein the yarn accumulating body is a belt, and the yarn conveying mechanism is a pulley which drives the belt.

[0013] In accordance with a sixth aspect, the invention is the yarn winding device according to the first to fourth aspects, wherein the yarn conveying mechanism has a swinging member which is swung concerning the yarn accumulating body and a rotation shaft which is rotated eccentrically.

Effect of the Invention

[0014] According to the yarn winding device of the first

aspect, the yarn wound to the yarn accumulating body, that is, the whole yarn wound to the yarn accumulating part can be sent from the winding side toward the unwinding side of the yarn accumulating body, and the wound yarn is conveyed while maintaining equal spaces in the yarn, whereby accumulated yarn layers are not intertwined with each other. Accordingly, sloughing can be prevented.

[0015] According to the yarn winding device of the second aspect, the yarn wound to the yarn accumulating body is sent from the winding side toward the unwinding side of the yarn accumulating part and equal spaces in the wound yarn are maintained, whereby accumulated yarn layers are not intertwined with each other. Accordingly, at the time of sucking and pulling out the yarn end wound to the yarn accumulating body, draw-out defect caused by intertwining of yarns can be prevented.

[0016] According to the yarn winding device of the third aspect, only one yarn Y can pass through the yarn unwinding assistant part, whereby yarn breakage can be prevented.

[0017] According to the yarn winding device of the fourth aspect, correct length of the yarn wound to the yarn accumulating part can be detected.

[0018] According to the yarn winding device of the fifth aspect, the yarn wound to the yarn accumulating body is sent from the winding side toward the unwinding side of the yarn accumulating part and equal spaces in the wound yarn are maintained, whereby accumulated yarn layers are not intertwined with each other. Accordingly, sloughing can be prevented.

[0019] According to the yarn winding device of the sixth aspect, the yarn wound to the yarn accumulating body is sent from the winding side toward the unwinding side of the yarn accumulating part and equal spaces in the wound yarn are maintained, whereby accumulated yarn layers are not intertwined with each other. Accordingly, sloughing can be prevented.

Brief Description of Drawings

[0020]

[Fig. 1] Fig. 1 is a drawing of entire construction of a winding unit which is a first embodiment.

[Fig. 2] Fig. 2 is a drawing of construction of a yarn accumulating device of the first embodiment.

[Fig. 3] Fig. 3 is a drawing of construction of a yarn unwinding assistant part of the first embodiment.

[Fig. 4] Fig. 4 is a drawing of construction of a blowing-down nozzle of the first embodiment.

[Fig. 5] Fig. 5 is a drawing of construction of a yarn accumulating part of the first embodiment.

[Fig. 6] Fig. 6 is a drawing of construction of a yarn accumulating part which is a second embodiment.

[Fig. 7] Fig. 7 is a drawing of construction of a yarn conveying mechanism of the second embodiment.

[Fig. 8] Fig. 8 is a drawing of construction of a round

bar of the second embodiment.

Detailed Description of the Invention

5 [0021] An explanation will be given on a winding unit 10 which is a first embodiment of an automatic winding device of the present invention referring to Fig. 1.

[0022] The winding unit 10 winds a package P while eliminating threading defects of a yarn feeding bobbin B1 around which is wound a yarn Y that is spun by a fine spinning machine. The winding unit 10 is arranged in parallel in a lengthwise direction of a machine bed of an automatic winder.

[0023] An explanation will be given on the construction of the winding unit 10.

[0024] The winding unit 10 has a controller 5, a frame 6, a yarn feeding part 20, a yarn splicing part 30, a threading defect detection part 40, a yarn accumulating device (accumulator) 100, and a winding part 50.

20 [0025] The frame 6 supports the devices constituting the winding unit 10. The frame 6 supports the yarn feeding part 20, the yarn splicing part 30, the threading defect detection part 40, the yarn accumulating device 100 and the winding part 50 along a winding direction from an upstream side to a downstream side.

25 [0026] The controller 5 is housed in the frame 6. The controller 5 is connected electrically to the devices constituting the winding unit 10. The controller 5 has a function for controlling the devices constituting the winding unit 10 so as to wind a package P while eliminating threading defects of a yarn feeding bobbin B1.

30 [0027] The yarn feeding part 20 has a bobbin supply device (not shown), a yarn feeding bobbin holding part 21, a yarn unwinding assistant device 22, a yarn feeler 23, and a first tenser 24. The bobbin supply device supplies a new yarn feeding bobbin B 1 to the yarn feeding bobbin holding part 21. The yarn feeding bobbin holding part 21 receives and holds the yarn feeding bobbin B1 from the bobbin supply device. The yarn unwinding assistant device 22 assists unwinding of a yarn from the yarn feeding bobbin B1. The yarn feeler 23 detects that no yarn Y pulled out from the yarn feeding bobbin B1 exists. The first tenser 24 applies predetermined tension on a running yarn Y.

35 [0028] The yarn splicing part 30 has a splicer device 31, a lower yarn guide pipe 32 and an upper yarn guide pipe 33. The splicer device 31 splices a yarn Y at a side of a yarn feeding bobbin B1 (lower yarn) together with a yarn Y at a side of a package P (upper yarn) at the time of detection of threading defects of a clearer 41 discussed later or at the time of yarn breakage under unwinding from the yarn feeding bobbin B1. The lower yarn guide pipe 32 catches and guides a lower yarn at the side of the yarn feeding bobbin B1. The upper yarn guide pipe 33 catches and guides an upper yarn at the side of the package P.

40 [0029] The threading defect detection part 40 has the clearer 41 and a waxing device 42. The clearer 41 su-

pervises thickness of a yarn Y with a suitable sensor so as to detect defects. The waxing device 42 applies wax on a running yarn Y

[0030] The yarn accumulating device (accumulator) 100 accumulates a yarn Y sent from a yarn feeding bobbin B1. The yarn accumulating device 100 will be explained in detail later.

[0031] The winding part 50 has a second tenser 51 and a winding drum 52. The second tenser 51 controls tension of a yarn Y unwound from the yarn accumulating device 100. The winding drum 52 makes a yarn Y traverse and rotates a winding bobbin B2.

[0032] An explanation will be given on the yarn accumulating device 100 referring to Fig. 2.

[0033] The yarn accumulating device 100 has a yarn unwinding assistant part 110, a yarn accumulation amount detection part 120, a yarn accumulating part 130, a winding part 140 and a draw-out part 150.

[0034] The controller 5 mentioned above is connected to a accumulation upper limit sensor 121, a accumulation lower limit sensor 122, a accumulation lowest limit sensor 123, a motor 143, an electromagnetic valve 152 and a compressed air generator 153.

[0035] The yarn unwinding assistant part 110 will be explained in detail later.

[0036] An explanation will be given on the construction of the yarn accumulation amount detection part 120.

[0037] The yarn accumulation amount detection part 120 has the accumulation upper limit sensor 121, the accumulation lower limit sensor 122 and the accumulation lowest limit sensor 123. The accumulation upper limit sensor 121, the accumulation lower limit sensor 122 and the accumulation lowest limit sensor 123 are arranged on an attachment frame (not shown) of the yarn accumulating device 100.

[0038] The accumulation upper limit sensor 121 is arranged at a position facing an upper end of a yarn Y wound to the yarn accumulating part 130 when yarn accumulation amount of the yarn accumulating part 130 reaches the upper limit yarn accumulation amount. The accumulation lower limit sensor 122 is arranged at a position facing an upper end of a yarn Y wound to the yarn accumulating part 130 when the yarn accumulation amount of the yarn accumulating part 130 reaches the lower limit yarn accumulation amount. The accumulation lowest limit sensor 123 is arranged at a position facing an upper end of a yarn Y wound to the yarn accumulating part 130 when yarn accumulation amount of the yarn accumulating part 130 reaches the lowest limit yarn accumulation amount.

[0039] An explanation will be given on the yarn accumulating part 130.

[0040] The yarn accumulating part 130 has a winding side 130R and a unwinding side 130F. The winding side 130R is the lower side of the yarn accumulating part 130. The unwinding side 130F is the upper side of the yarn accumulating part 130. In the yarn accumulating part 130, a yarn Y is wound from the winding side 130R, and the

yarn Y is unwound from the unwinding side 130F. Though the yarn accumulating part 130 in this embodiment is arranged so that shafts thereof are in parallel to the vertical direction, the shafts may alternatively be arranged aslant concerning the vertical direction. The yarn accumulating part 130 will be explained in detail later.

[0041] An explanation will be given on the construction of the winding part 140.

[0042] The winding part 140 has a winding arm 141, a balancer 142, the motor 143 and an output shaft 145. The winding arm 141 is extended outward and upward from the outer circumference of the output shaft 145 and is curved toward the surface of the yarn accumulating part 130. The winding arm 141 is formed pipe-like and formed therein with a yarn passage in which a yarn Y can run. The winding arm 141 is rotatable concerning the yarn accumulating part 130.

[0043] The balancer 142 is arranged at the side facing the winding arm 141 centering on the output shaft 145 in the axial direction of the output shaft 145. The balancer 142 is formed integrally with the output shaft 145. The motor 143 makes rotate the winding arm 141, the balancer 142 and the output shaft 145. The output shaft 145 is formed pipe-like and formed therein with a yarn passage in which a yarn Y can run. The yarn passage formed in the output shaft 145 is communicated with the yarn passage formed in the winding arm 141.

[0044] An explanation will be given on the construction of the draw-out part 150.

[0045] The draw-out part 150 has a blowing-down nozzle 151, the electromagnetic valve 152, the compressed air generator 153 and a connection pipe 154. The blowing-down nozzle 151 will be explained in detail later. The compressed air generator 153 generates compressed air. The connection pipe 154 connects the compressed air generator 153 to the blowing-down nozzle 151. A flow channel is formed in the connection pipe 154. The electromagnetic valve 152 is provided in the middle of the connection pipe 154. The function of the draw-out part 150 will be explained in detail later.

[0046] An explanation will be given on the yarn unwinding assistant part 110 referring to Fig. 3.

[0047] Fig. 3(A) is a plan view of the yarn unwinding assistant part 110. Fig. 3(B) is an arrow sectional view of the line S1-S1 in Fig. 3(A).

[0048] An explanation will be given on the construction of the yarn unwinding assistant part 110.

[0049] The yarn unwinding assistant part 110 has a guide member 111, a ring member 112 and a rubber member 113. The guide member 111 is arranged above the yarn accumulating part 130. The guide member 111 is a rigid body formed disk-like. A sectional shape of a side surface circumference 111A of the guide member 111 is formed circular arc-like. The ring member 112 is formed ring-like. The rubber member 113 is a flexible elastic member formed ring-like. The outer peripheral side of the rubber member 113 is fixed to the inner peripheral side of the ring member 112. The inner peripheral

side of the rubber member 113 sticks to the side surface circumference 111A of the guide member 111 without a break.

[0050] An explanation will be given on the blowing-down nozzle 151 referring to Fig. 4.

[0051] The blowing-down nozzle 151 connects the output shaft 145 to the connection pipe 154. In the blowing-down nozzle 151, a yarn flow channel 151A and a blowing-down flow channel 151B are formed. The yarn flow channel 151A is communicated with the yarn passage formed in the output shaft 145. The blowing-down flow channel 151B is communicated with the flow channel of the connection pipe 154. The blowing-down flow channel 151B is inclined downward, that is, directed toward the upstream side (the yarn splicing part 30 and the threading defect detection part 40), and is connected to the yarn flow channel 151A.

[0052] An explanation will be given on the yarn accumulating part 130 referring to Fig. 5. An explanation will be given on the construction of the yarn accumulating part 130. The yarn accumulating part 130 has four endless belt conveying devices 131. The endless belt conveying devices 131 can send a yarn Y along a yarn conveying direction from the winding side 130R toward the unwinding side 130F. The endless belt conveying devices 131 are arranged respectively at four corners of a rectangle in the yarn conveying direction. In the yarn accumulating part 130, a yarn Y is wound from the winding side 130R, and the yarn Y is unwound from the unwinding side 130F.

[0053] Each of the endless belt conveying devices 131 has a belt 132, and a driving pulley 134 and a driven pulley 133 as a yarn sending mechanism. The belt 132 is laid across the driving pulley 134 and the driven pulley 133 in a tensioned state. The belt 132 has a belt outer side 132F as a yarn accumulating body and a belt inner side 132E.

[0054] The belt outer side 132F is the belt 132 constituting the four corners of the rectangle of the yarn accumulating part 130 when viewed in plan. A yarn Y is wound to the belt outer side 132F. The belt inner side 132E is the belt 132 not constituting the four corners of the rectangle in the yarn sending direction of the yarn accumulating part 130 (the axial direction of the output shaft 145). Any yarn Y does not touch the belt inner side 132E.

[0055] The driving pulley 134 is driven rotatively by a driving mechanism (not shown). The driving mechanism is connected to the controller 5. The driving pulley 134 drives the belt 132 so that the belt outer side 132F moves from the winding side 130R toward the unwinding side 130F.

[0056] An explanation will be given on the function of the yarn accumulating part 130. Namely, the controller 5 makes the winding arm 141 rotate as mentioned above, and a yarn Y guided into the yarn passage of the winding arm 141 is wound to the circumference of the belt outer side 132F. At this time, the controller 5 drives the driving pulley 134 with the driving mechanism, and drives the

belt 132 so that the belt outer side 132F moves from the winding side 130R toward the unwinding side 130F. The whole yarn Y wound to the circumference of the belt outer side 132F is sent from the winding side 130R toward the unwinding side 130F of the belt outer side 132F while equal spaces in the yarn Y are maintained.

[0057] An explanation will be given on the effect of the yarn accumulating part 130.

[0058] Namely, according to the yarn accumulating part 130, conveying power from the winding side 130R toward the unwinding side 130F can be applied on the whole yarn wound to the belt outer side 132F sequentially, whereby the yarn Y can be sent along the direction from the winding side 130R toward the unwinding side 130F of the belt outer side 132F (the yarn sending direction) while maintaining equal spaces among yarn layers. Accordingly, accumulated yarn layers are not intertwined with each other, whereby sloughing at the time of unwinding of a yarn caused by intertwining of fluffs does not occur.

[0059] An explanation will be given on the function and effect of the yarn accumulation amount detection part 120 (see Fig. 2).

[0060] Namely, the controller 5 receives existence of a yarn Y at positions facing the accumulation upper limit sensor 121, the accumulation lower limit sensor 122 and the accumulation lowest limit sensor 123, thereby detecting the length of the yarn Y wound to the yarn accumulating part 130. Accordingly, by the yarn accumulation amount detection part 120, the correct yarn accumulation amount can be calculated. The yarn accumulating part 130 of this embodiment can convey a yarn Y at equal intervals, whereby the correct yarn accumulation amount can be calculated by calculating the peripheral length and interval of the winding of the yarn Y.

[0061] An explanation will be given on the function and effect of the yarn unwinding assistant part 110 (see Fig. 3).

[0062] Namely, a yarn Y unwound from the yarn accumulating part 130 passes between the inner peripheral side of the rubber member 113 and the side surface circumference 111A of the guide member 111 and is re-wound by the winding part 50. At this time, the guide member 111 which is a rigid body and the rubber member 113 which is an elastic body stick to each other without a break, whereby only one yarn Y can pass therebetween. Then, a plurality of yarns Y are not unwound at once. Accordingly, by the yarn unwinding assistant part 110, yarn breakage can be prevented.

[0063] An explanation will be given on the function of the draw-out part 150 (see Figs. 2 and 4).

[0064] Herein, it is assumed that yarn breakage occurs in the yarn accumulating device 100 and a yarn end exists in the yarn accumulating part 130. The controller 5 operates the compressed air generator 153 and opens the electromagnetic valve 152 so as to communicate the output shaft 145 with the connection pipe 154. By the communication of the output shaft 145 and the connection

pipe 154, in the blowing-down flow channel 151B of the blowing-down nozzle 151, an air flow from the compressed air generator 153 toward the blowing-down nozzle 151 is formed (an arrow B in Fig. 4).

[0065] By the air flow of the blowing-down nozzle 151 from the compressed air generator 153, in the yarn flow channel 151 A of the output shaft 145 and the winding arm 141, an air flow from the downstream toward the upstream is formed (an arrow A in Fig. 4). The air flow from the downstream toward the upstream in the yarn flow channel of the output shaft 145 and the winding arm 141 draws the yarn end of the yarn accumulating part 130. Then, while the winding arm 141 draws the yarn end of the yarn accumulating part 130, the controller 5 makes the winding arm 141 rotate counterclockwise in the axial direction of the output shaft 145 by the motor 143. Furthermore, in the yarn splicing part 30, the yarn end of the yarn accumulating part 130 is caught by the upper yarn guide pipe 33, guided to the splicer device 31, and spliced together with a yarn Y at a side of a yarn feeding bobbin B1 (see Fig. 2).

[0066] An explanation will be given on the effect of the draw-out part 150.

[0067] Namely, according to the draw-out part 150, when yarn breakage occurs in the yarn accumulating device 100, the yarn end of the yarn accumulating part 130 can be pulled out to the upstream side. According to the yarn accumulating part 130 of this embodiment, accumulated yarn layers are not intertwined with each other, whereby draw-out defect caused by intertwining of a yarn is prevented at the time of sucking and pulling out the yarn end wound to the yarn accumulating part 130.

[0068] Though the yarn accumulating part 130 of this embodiment has the rectangular winding shape in which a yarn is wound to the belt constituting the four corners of the rectangle, the present invention is not limited thereto. For example, guides or the like may alternatively be provided between belts so as to make winding shape circular.

[0069] An explanation will be given on a yarn accumulating part 230 of the second embodiment referring to Figs. 6 to 8.

[0070] Since members other than the yarn accumulating part 230 are in common with the first embodiment, explanations thereof are omitted.

[0071] An explanation will be given on the construction of the yarn accumulating part 230 referring to Fig. 6.

[0072] The yarn accumulating part 230 has a yarn conveying mechanism 231 and a yarn accumulating body 236. The yarn conveying mechanism 231 will be explained in detail later. The yarn accumulating body 236 has a body 237 and a plurality of support members 238. The body 237 is disk-like shaped. The support members 238 are rectangular shaped and provided upright around the body 237 at predetermined intervals.

[0073] The yarn conveying mechanism 231 and the yarn accumulating body 236 are arranged substantially coaxially. The yarn conveying mechanism 231 and the

yarn accumulating body 236 are arranged so that round bars 232 of the yarn conveying mechanism 231 are arranged between the support members 238 of the yarn accumulating body 236 discussed later. In the yarn accumulating part 230, a yarn Y is wound from a winding side 230R, and the yarn Y is unwound from an unwinding side 230F.

[0074] An explanation will be given on the yarn conveying mechanism 231 referring to Fig. 7. Figs. 7(A) to 7(C) show a shaft 234A rotated for every 90°.

[0075] An explanation will be given on the construction of the yarn conveying mechanism 231.

[0076] The yarn conveying mechanism 231 has the round bars 232, a body 233, the shaft 234A, a plate 234P, an eccentric shaft 234B, an inclined shaft 234C and a motor 235. The body 233 is disk-like shaped, and arranged above the yarn accumulating body 236 substantially coaxially to the yarn accumulating body 236. The round bars 232 are provided downward around the body 233 at predetermined intervals. The motor 235 is arranged below the body 233 substantially eccentrically from the body 233. The motor 235 is connected to the controller 5. A swinging member of the present invention includes the round bars 232, the body 233 and the inclined shaft 234C. The round bars 232 and the support members 238 may alternatively be flat plates supporting a yarn Y with their surfaces.

[0077] The shaft 234A is driven by the motor 235. The plate 234P is disk-like shaped. The center of the plate 234P is fixed to the shaft 234A. The eccentric shaft 234B is fixed eccentrically to the plate 234P. The inclined shaft 234C is inclined for a predetermined angle concerning the eccentric shaft 234B. The inclined shaft 234C is fixed to the eccentric shaft 234B. The inclined shaft 234C is slidable concerning the body 233 in the peripheral direction. On the other hand, the inclined shaft 234C cannot move concerning the body 233 in the axial direction.

[0078] An explanation will be given on the function of the yarn conveying mechanism 231. Firstly, an explanation will be given on the function of the inclined shaft 234C to the eccentric shaft 234B. As mentioned above, the inclined shaft 234C is inclined for the predetermined angle concerning the eccentric shaft 234B. Accordingly, when the eccentric shaft 234B is rotated, the inclined shaft 234C is swung.

[0079] Next, an explanation will be given on the function of the eccentric shaft 234B to the shaft 234A. As mentioned above, the eccentric shaft 234B is fixed eccentrically via the plate 234P. Accordingly, when the shaft 234A is rotated, the eccentric shaft 234B is rotated eccentrically.

[0080] An explanation will be given on the function of the body 233 to the shaft 234A. As mentioned above, the inclined shaft 234C is swung when the eccentric shaft 234B is rotated, and the eccentric shaft 234B is rotated eccentrically when the shaft 234A is rotated. Accordingly, when the shaft 234A is rotated, the body 233 becomes eccentric while being swung.

[0081] An explanation will be given on the function of the round bars 232 referring to Fig. 8.

[0082] Fig. 8(A) shows the function of the round bars 232 in the axial direction. Fig. 8(B) shows the function of the round bars 232 in a side view. Furthermore, Fig. 8(C) shows the function of the round bars 232 in an arrow sectional view of the line S2-S2 in Fig. 6.

[0083] As mentioned above, each of the round bars 232 is arranged between the adjacent two support members 238. When the shaft 234A is rotated, the body 233 becomes eccentric while being swung. Accordingly, when the shaft 234A is rotated, the round bar 232 is rotated between the support members 238 following the eccentric rotation of the body 233. Simultaneously, when the shaft 234A is rotated, the round bar 232 is swung between the adjacent two support members 238 following the swinging of the body 233.

[0084] Actually, when the shaft 234A is rotated, the lower end of the round bar 232 is rotated so as to draw an inclined ellipse (hereinafter, referred to as virtual ellipse R) by combining the above-mentioned rotation and swinging between the adjacent two support members 238. By the rotation of the lower end of the round bar 232, a yarn Y is conveyed upward aslant. More concretely, by the rotation of the lower end of the round bar 232, the yarn Y at a position P of the state of the round bar 232A is conveyed to a position P of the state of the round bar 232B (see Fig. 8(B)). Accordingly, the yarn Y is conveyed upward aslant in the yarn accumulating body 236. Furthermore, the yarn Y is spanned on the support members 238 before the state of the round bar 232C. Simultaneously, the virtual ellipse R is inclined so that the side toward the outer side of the yarn accumulating body 236 becomes higher in the arrow sectional view of the line S2-S2 in Fig. 6 (see Fig. 8(C)). Arrows along the virtual ellipse R show the moving direction of the round bar 232.

[0085] An explanation will be given on the function of the yarn accumulating part 230.

[0086] Namely, the controller 5 makes the winding arm 141 rotate as mentioned above, and a yarn Y guided into the yarn passage of the winding arm 141 is wound to the circumference of the support members 238 of the yarn accumulating body 236. At this time, the controller 5 makes the shaft 234A rotate with the motor 235, whereby the round bar 232 is rotated between the two support members 238 so as to draw an ellipse whose outer side toward the moving direction is higher.

[0087] At this time, the yarn Y wound to the circumference of the support members 238 is picked up by the round bar 232, sent for a predetermined distance from the winding side 230R toward the unwinding side 230F of the yarn accumulating part 230, and spanned on the support members 238. Namely, the whole yarn Y wound to the circumference of the support members 238 is sent from the winding side 230R toward the unwinding side 230F of the yarn accumulating part 230 while maintaining equal spaces.

[0088] An explanation will be given on the effect of the

yarn accumulating part 230.

[0089] Namely, according to the yarn accumulating part 230, conveying power from the winding side 230R to the unwinding side 230F can be applied on the whole yarn wound to the support members 238 sequentially, whereby the yarn Y can be sent from the winding side 230R to the unwinding side 230F of the yarn accumulating part 230 while maintaining equal spaces among yarn layers. Accordingly, accumulated yarn layers are not intertwined with each other, whereby sloughing at the time of unwinding of a yarn caused by intertwining of fluffs does not occur. Yarn breakage does not occur when the winding part 50 unwinds a yarn Y from the yarn accumulating part 230. Furthermore, when the draw-out part 150 pulls out a yarn end from the yarn accumulating part 230, accumulated yarns Y are not intertwined with each other, whereby draw-out defect caused by intertwining of the yarns Y is prevented at the time of sucking and pulling out the yarn end wound to the yarn accumulating part 230.

Industrial Applicability

[0090] The yarn winding device of the present invention can prevent draw-out defect caused by intertwining of yarns at the time of sucking and pulling out an yarn end wound to a yarn accumulating part, thereby being useful industrially.

Description of Notations

[0091]

10	winding unit (yarn winding device)
100	yarn accumulating device
110	yarn unwinding assistant part
120	yarn accumulation amount detection part
130	yarn accumulating part
130F	unwinding side
130R	winding side
140	winding part
150	draw-out part

Claims

1. A yarn winding device which rewinds a package while eliminating threading defects of a yarn feeding bobbin around which is wound a yarn that is spun by a fine spinning machine, comprising:

a yarn feeding part which supports the yarn feeding bobbin;

a yarn accumulating device which winds and accumulates the yarn of the yarn feeding bobbin;

a winding part which winds the yarn accumulated in the yarn accumulating part for a predetermined winding speed so as to form the package;

a threading defect detection part which supervises threading defect; and
 a yarn splicing part which splices broken yarn ends when the yarn is broken,

characterized in that

the yarn accumulating device has a yarn accumulating part accumulating the yarn and a winding part winding the yarn to the yarn accumulating part while rotating, and
 the yarn accumulating part has a yarn accumulating body to which the yarn is wound and a yarn conveying mechanism applying conveying power from a winding side to a unwinding side on the whole wound yarn.

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2. The yarn winding device according to claim 1, wherein the yarn accumulating device has a draw-out part which sucks the yarn end wound to the yarn accumulating part when the yarn is broken.

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3. The yarn winding device according to claim 2, wherein the yarn accumulating device has a yarn unwinding assistant part which is attached to the unwinding side of the yarn accumulating part and assists unwinding of the yarn.

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4. The yarn winding device according to claim 3, wherein the yarn accumulating device has a yarn accumulation amount detection part which detects a accumulation amount of the yarn accumulated in the yarn accumulating device.

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5. The yarn winding device according to any one of claims 1 to 4, wherein the yarn accumulating body is a belt, and wherein the yarn conveying mechanism is a pulley which drives the belt.

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6. The yarn winding device according to any one of claims 1 to 4, wherein the yarn conveying mechanism has a swinging member which is swung concerning the yarn accumulating body and a rotation shaft which is rotated eccentrically.

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Fig. 1

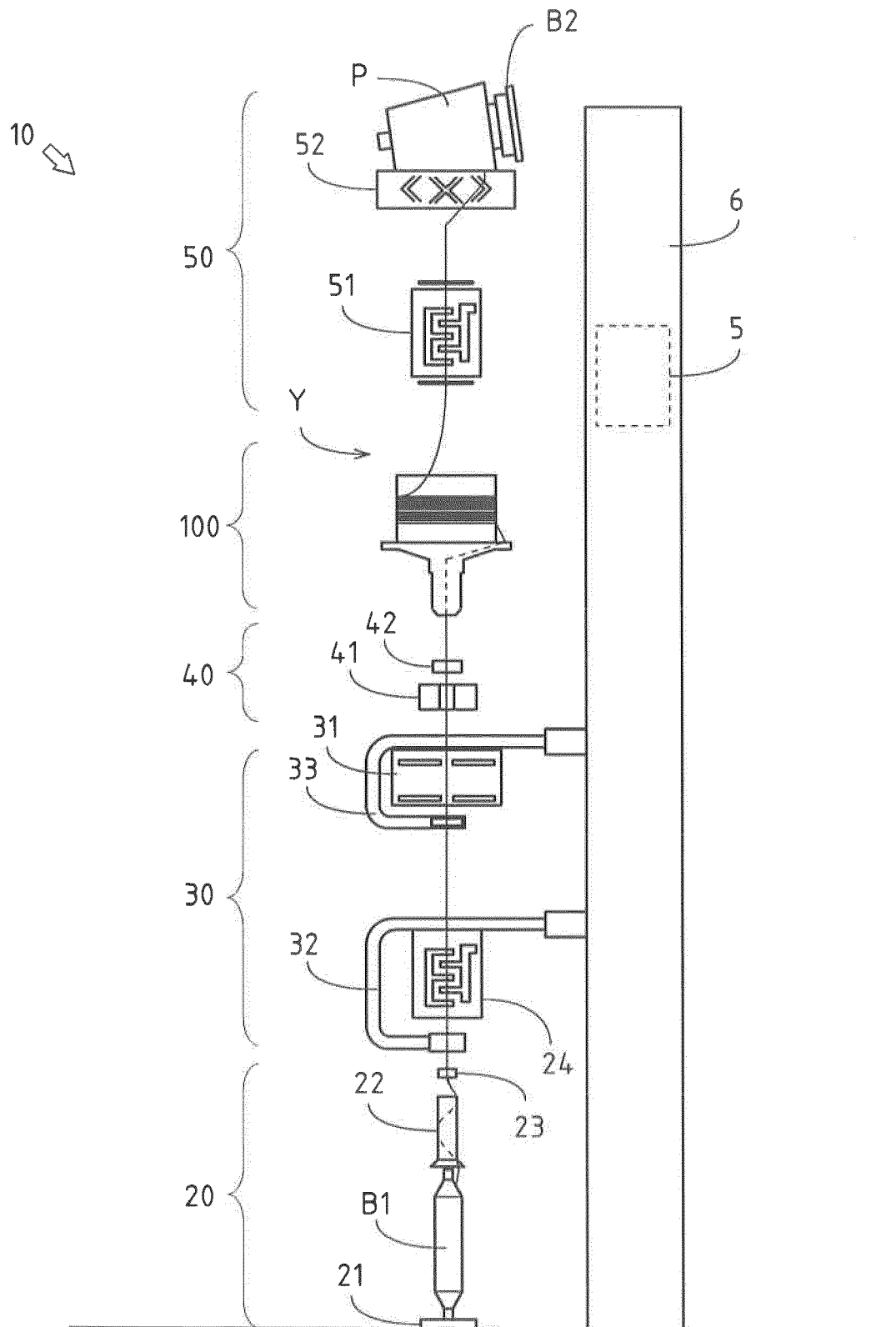


Fig. 2

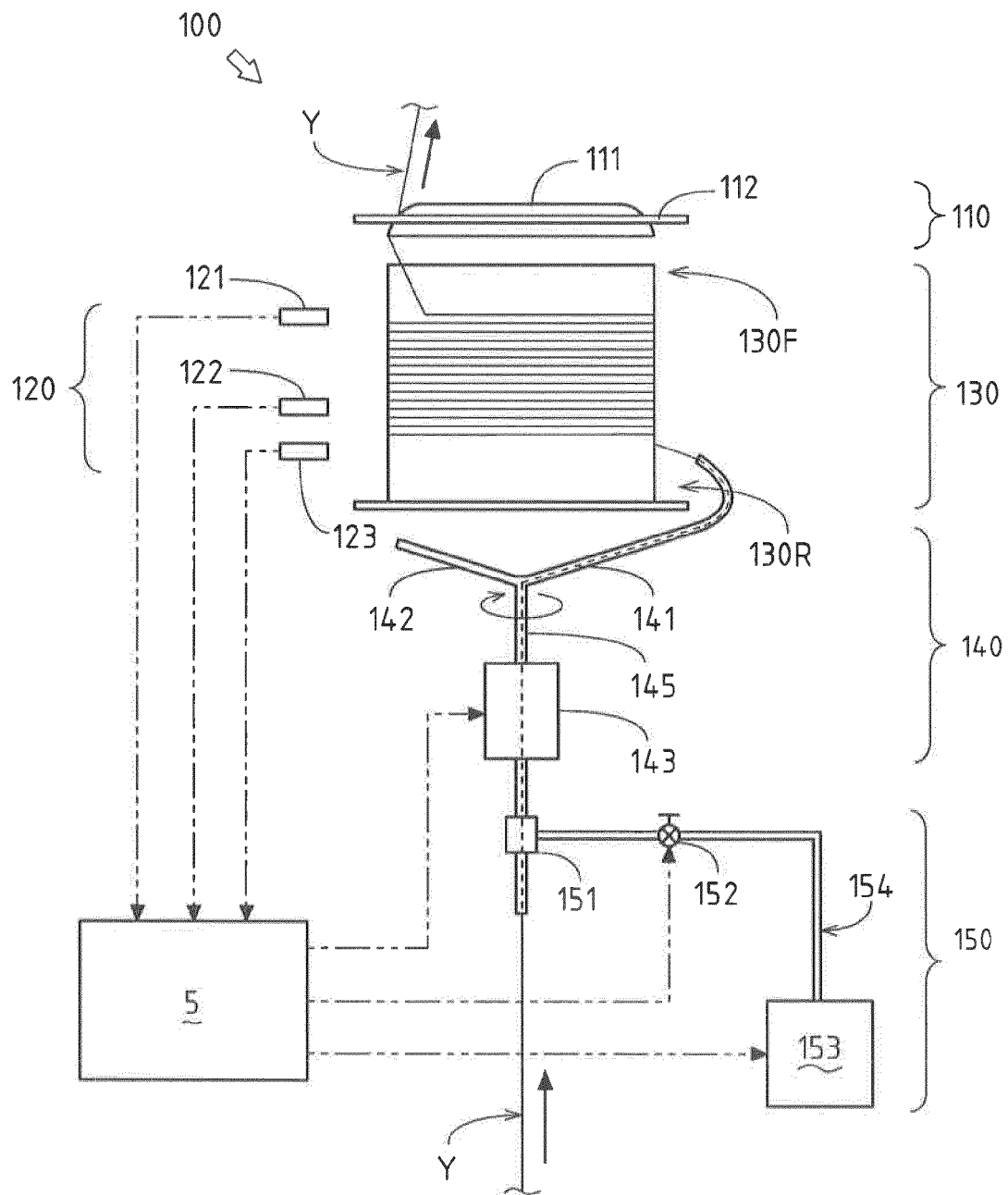


Fig. 3

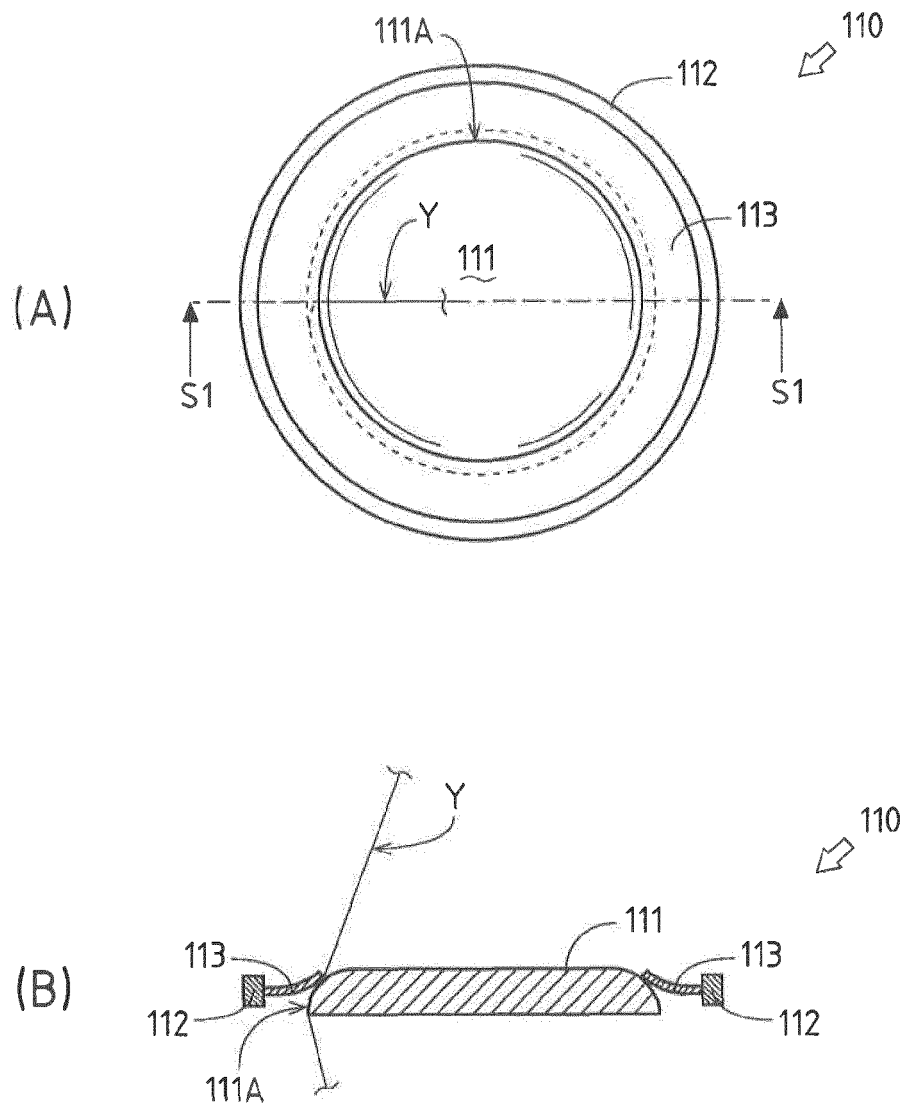


Fig. 4

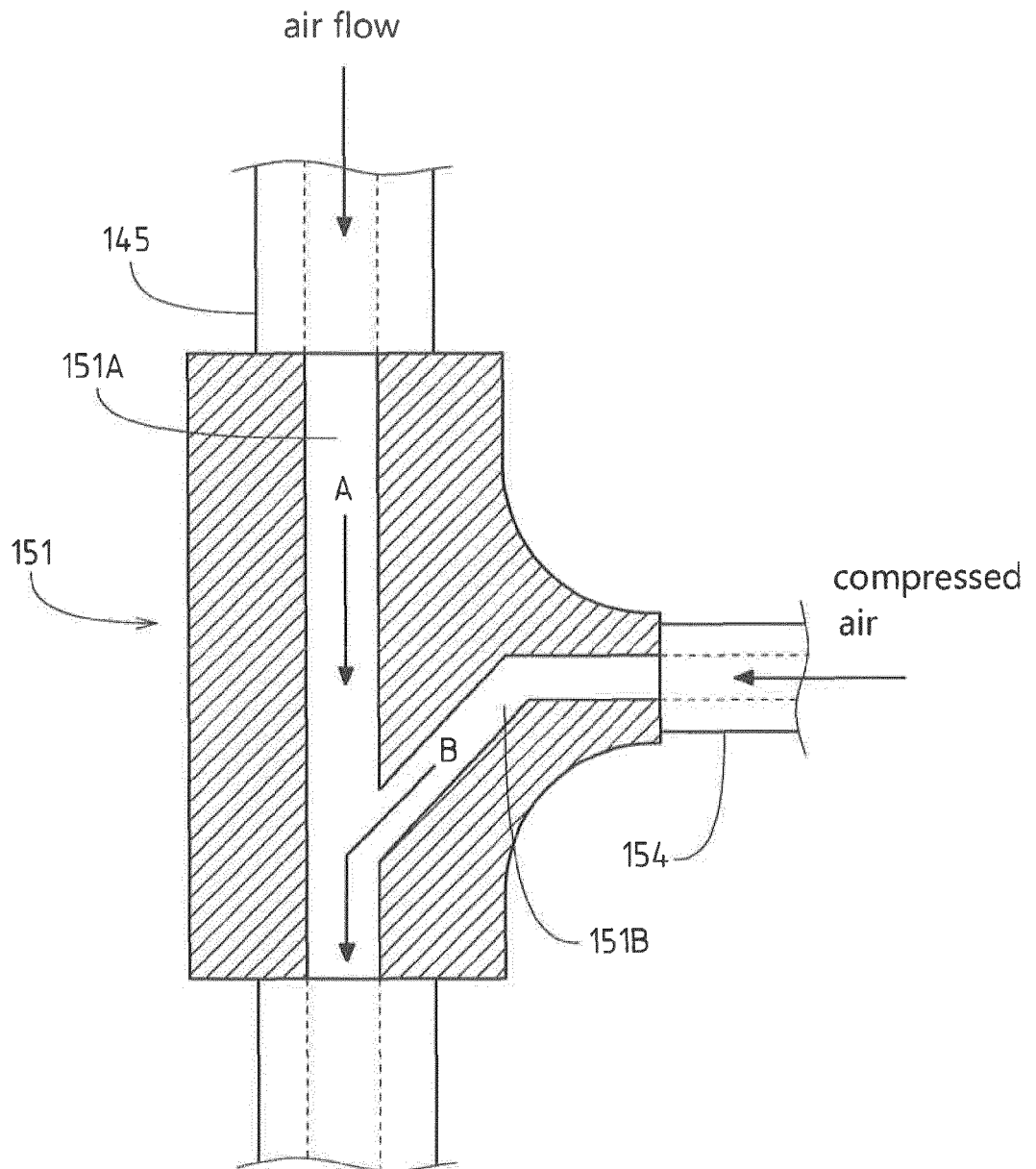


Fig. 5

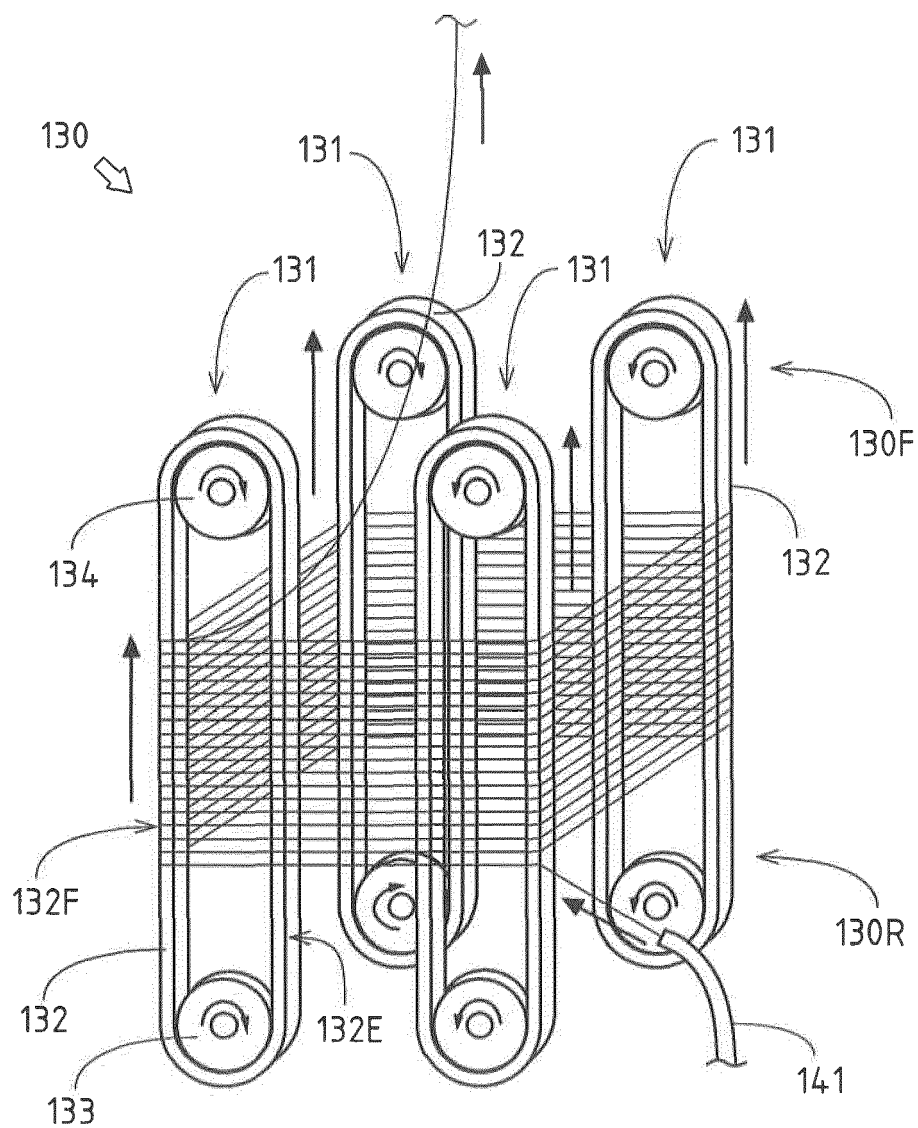
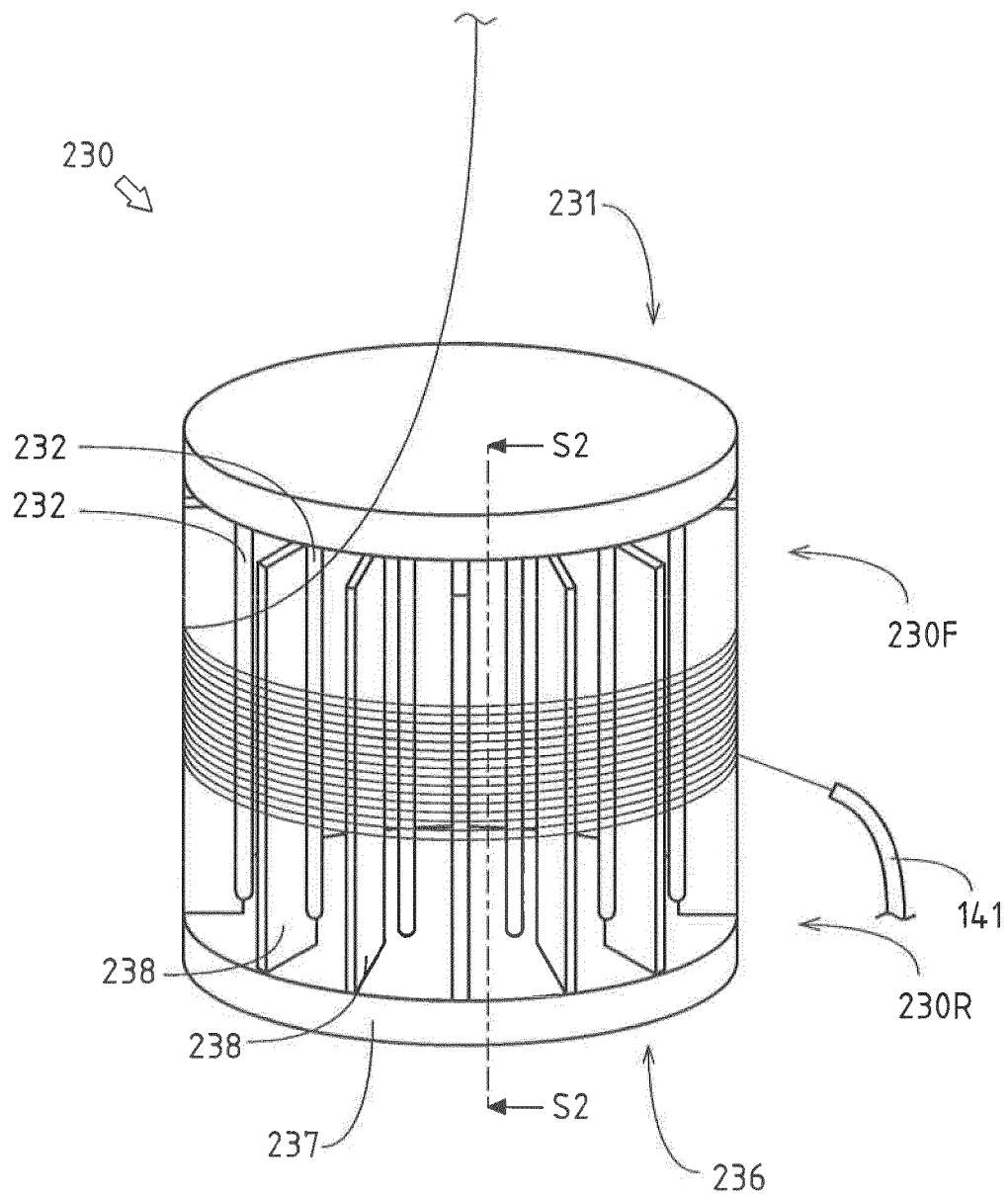


Fig. 6



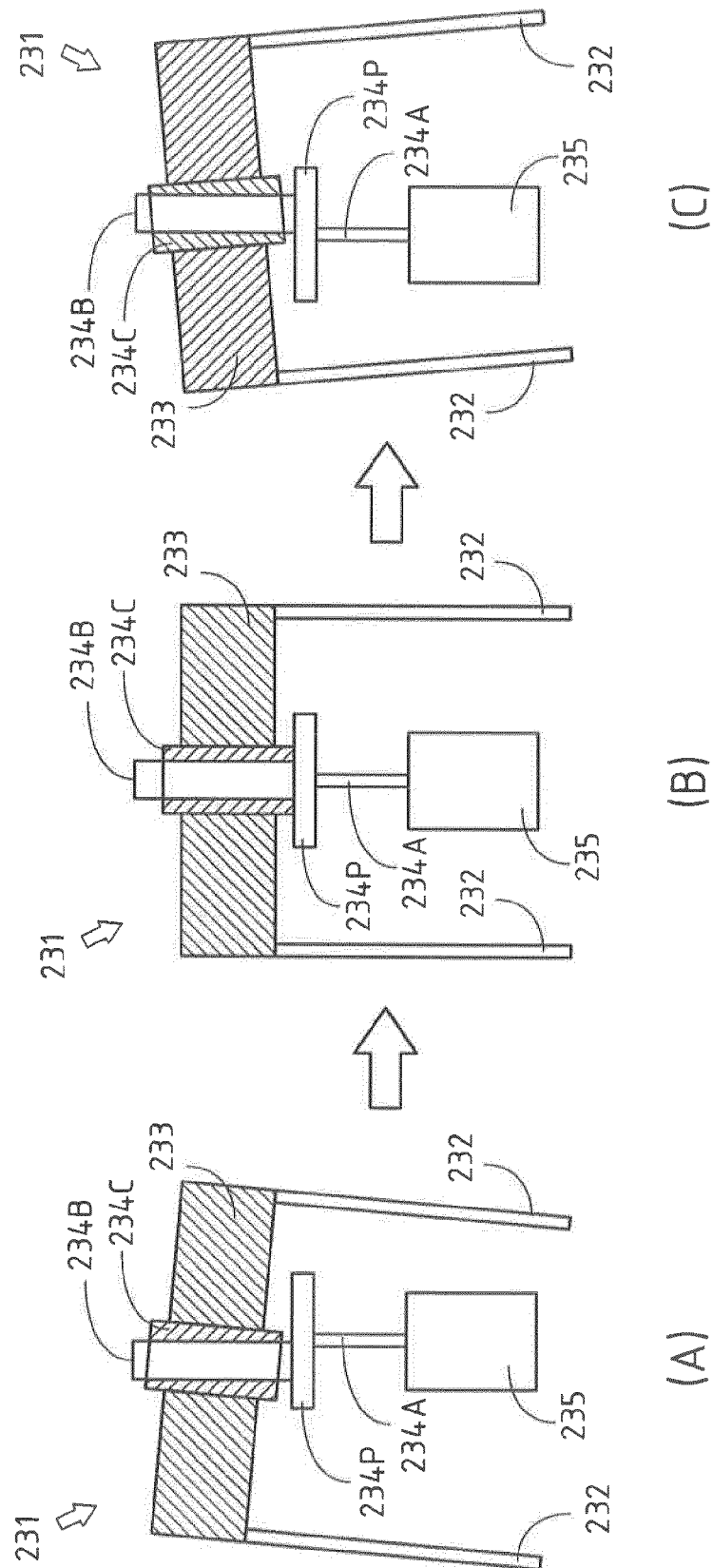
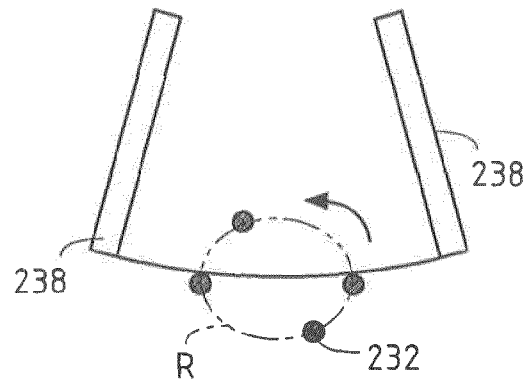
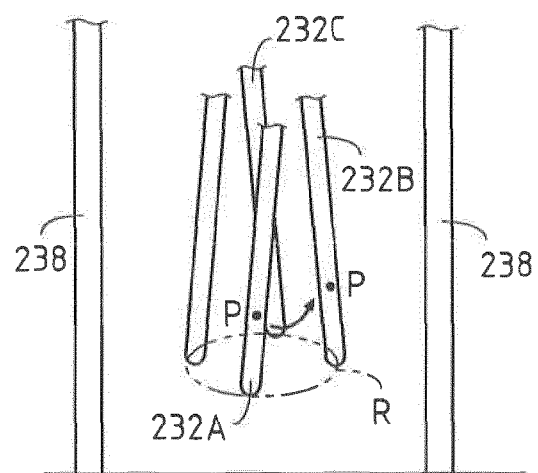


Fig. 8

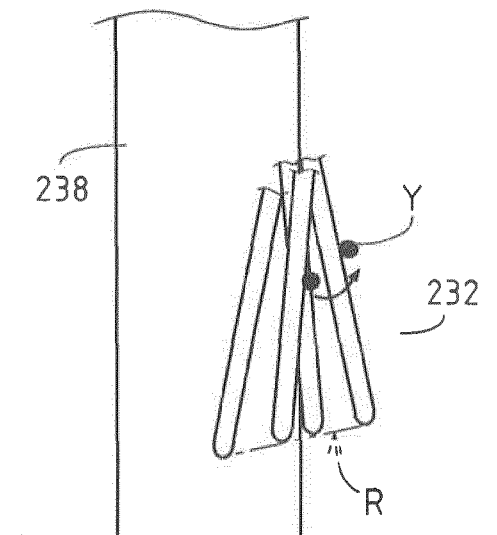
(A)



(B)



(C)



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/055929

A. CLASSIFICATION OF SUBJECT MATTER B65H51/20(2006.01) i, B65H63/06(2006.01) i		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) B65H51/20, B65H63/06		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2012 Kokai Jitsuyo Shinan Koho 1971-2012 Toroku Jitsuyo Shinan Koho 1994-2012		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2009-242042 A (Murata Machinery Ltd.), 22 October 2009 (22.10.2009), paragraphs [0030] to [0099] & EP 2107025 A2	1-4, 6 5
Y A	JP 48-44557 A (Teijin Ltd.), 26 June 1973 (26.06.1973), page 2, upper left column, line 13 to page 5, upper left column, line 13; fig. 3 (Family: none)	1-4, 6 5
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 28 March, 2012 (28.03.12)		Date of mailing of the international search report 10 April, 2012 (10.04.12)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2009242042 A [0005]