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(54) **Yarn unwinding assisting device for automatic winder**

Garnabwickel-Hilfsvorrichtung für eine automatische Wickelmaschine

Dispositif d'assistance de déroulement de fil pour enrouleur automatique

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a yarn unwinding assisting device which is applied to an automatic winder to assist to unwind a yarn from a bobbin.

2. Description of the Related Art

[0002] As illustrated in Fig. 1, an automatic winder includes a plurality of winding devices 2 to unwind a yarn Y from a bobbin B and to wind the yarn on a winding cylinder, a doffing device 7 to doff a package fully wound with each winding device 2, and the like. Each winding device 2 is provided with a yarn unwinding assisting device to assist to unwind the yarn Y by regulating a balloon which is formed when the yarn Y is unwound from the bobbin B and by applying a proper tension thereto.

[0003] As illustrated in Fig. 8, a conventional yarn unwinding assisting device 9 includes, for example, a fixed cylinder 90 that is held in a fixed condition when a yarn Y is unwound from a bobbin B, a movable cylinder 91 that is fit onto the fixed cylinder 90 and moves in response to the unwinding of the yarn Y, an elevating/lowering machinery 92 to elevate and lower the movable cylinder 91. A holder 93 supporting the fixed cylinder 90 is attached to a frame 95 of the winding device 2 with a mounting bolt 94 so that the yarn unwinding assisting device 9 is fixed above the bobbin B. In order to function the yarn unwinding assisting device 9 properly, a height position thereof needs to be set in accordance with a vertical size of the bobbin B. When the vertical size of the bobbin B changes, the height position of the yarn unwinding assisting device 9 also needs to be adjusted.

[0004] With the conventional yarn unwinding assisting device 9, when adjusting the height position thereof with respect to the bobbin B according to a vertical size of the bobbin B, an operator first needs to hold the yarn unwinding assisting device 9 in one hand, and then to hold tools, such as, a wrench or a screwdriver in the other hand. Next, the operator looses the mounting bolt 94 using such tools to release the fixed state of the yarn unwinding assisting device 9. Subsequently, the operator moves the yarn unwinding assisting device 9, which the operator is holding in one hand, to a desired height position according to the vertical size of the bobbin B. At this time, in response to movement of the yarn unwinding assisting device 9, the holder 93 and the mounting bolt 94 slide along a sliding groove (not illustrated) which is formed on the frame 95 in a vertical direction. Then, the mounting bolt 94 which has been moved to the desired height position is tightened using such a tool to reattach the yarn unwinding assisting device 9 thereto. In this way, the height position of the yarn unwinding assisting device 9 with respect to the bobbin B is conventionally adjusted using tools.

[0005] However, as illustrated in Fig. 1, the automatic winder is provided with the plurality of winding devices 2, and therefore a great deal of time and effort are necessary for operators to adjust the height position of the yarn unwinding assisting device 9 using such tools as described above. In addition, if winding devices 2 are arranged without any interval as in the automatic winder illustrated in Fig. 1, working space is limited, which makes it difficult to adjust the height position using tools.

[0006] In particular, where a magazine-type supplying device is employed as a bobbin supplying device for supplying a bobbin B to the winding device 2, working space is hardly secured. Thus, it is difficult for an operator to use such a tool at a position where the mounting bolt 94 is located, which further increases the burden of the operator.

[0007] Further, in a yarn unwinding assisting device disclosed in e.g. Japanese Unexamined Patent Application Publication No. 2009-242028, an elevating/lowering machinery exclusive to a fixed cylinder to elevate and lower the fixed cylinder by a motor is provided apart from an elevating/lowering machinery exclusive to a movable cylinder so as to automatically adjust the height position of the fixed cylinder with respect to a bobbin according to a vertical size of the bobbin.

[0008] However, installing the elevating/lowering machinery exclusive to the fixed cylinder provided with a motor or the like in each winding device of the automatic winder will increase costs of the automatic winder as a whole.

SUMMARY OF THE INVENTION

[0009] An object of the present invention is to provide a yarn unwinding assisting device whose height position with respect to a bobbin can be easily adjusted without using a tool.

[0010] In order to achieve the above object, a yarn unwinding assisting device of an automatic winder according to the present invention is a yarn unwinding assisting device that is provided with a yarn unwinding assisting unit including a first regulating cylinder that assists to unwind a yarn from a bobbin in a fixed condition, a second regulating cylinder that moves according to the unwinding of the yarn from the bobbin to assist the unwinding and, a moving structure for moving the second regulating cylinder, and a height adjusting structure that adjusts a height position of the yarn unwinding assisting unit in the direction of a yarn path. The height adjusting structure includes a guiding member extendedly fixed in a vertical direction, a clamping member that is attached to the yarn unwinding assisting unit, moves along the guiding member and is capable of clamping the guiding member, and an operation lever to manipulate the clamping member to clamp the guiding member or release a clamping state.

[0011] Preferably, the guiding member is a shaft, and includes a rotation regulating member which is extend-

edly arranged parallel to the shaft, guides the clamping member in the direction of a yarn path and also regulates rotation of the yarn unwinding assisting unit around the shaft.

[0012] Preferably, the rotation regulating member is provided within a range of predetermined height positions with respect to the shaft. When located outside the range of the predetermined height positions, the clamping member will be removed from the rotation regulating member, which allows the yarn unwinding assisting unit to rotate around the shaft.

[0013] A mark to position the yarn unwinding assisting unit is preferably provided on the guiding member.

[0014] Preferably the yarn unwinding assisting unit and the clamping member are connected to each other with one attachable member.

[0015] In the yarn unwinding assisting device of the automatic winder according to the present invention, the above configuration allows operators to adjust a height position of the yarn unwinding assisting unit with respect to the bobbin by only manipulating the operation lever provided in the height adjusting structure to clamp the guiding member with the clamping member or to release the clamping state. That is, the height position of the yarn unwinding assisting unit can be easily adjusted with respect to the bobbin without using tools as in the conventional unit, which lessens the burdens of operators.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Fig. 1 is a front view illustrating an overall configuration of an automatic winder.

Fig. 2 is a schematic side view illustrating a configuration of a winding device.

Fig. 3 is a partially cutaway side view of a yarn unwinding assisting device according to the present invention.

Figs. 4A and 4B are partially cutaway side views of a yarn unwinding assisting unit; Fig. 4A shows a state in which a movable cylinder is lowered and Fig. 4B shows a state in which the movable cylinder is elevated.

Fig. 5 is a front view of the yarn unwinding assisting device according to the present invention.

Fig. 6 is a partially cutaway top view of the yarn unwinding assisting device according to the present invention.

Figs. 7A and 7B are partially cutaway side views according to another embodiment of the present invention; Fig. 7A shows a state in which the movable cylinder is lowered and Fig. 7B shows a state in which the movable cylinder is elevated.

Fig. 8 is a side view illustrating a conventional yarn unwinding assisting device.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0017] A yarn unwinding assisting device of an automatic winder (hereinafter simply referred to as a "yarn unwinding assisting device") according to the present invention will be described.

[0018] As illustrated in Fig. 1, the automatic winder includes a plurality of winding devices 2 arranged in a straight line. The automatic winder includes a bobbin supplying device 6 that supplies a bobbin B to each winding device 2, and a doffing device 7 that performs a doffing operation. The automatic winder 2 also includes a machine control device 8 that controls each of the winding devices 2, the bobbin supplying device 6, and the doffing device 7.

[0019] As illustrated in Fig. 2, the winding device 2 is provided with a yarn unwinding assisting device 1, a tension applying device 22, a yarn joining device 23, and a slub catcher 24, which are sequentially arranged upward from downward in this order. The winding device 2 also includes a traverse drum 25 that traverses a yarn Y in a given wide range, a guide plate 26 arranged to face to a traverse area of the traverse drum 25, and a cradle 27 that rotatably supports a package P.

[0020] The winding device 2 includes a relay pipe 28 and a suction mouth 29 that suck and catch a broken yarn to relay the yarn to a yarn joining device 23. The yarn Y drawn out of the bobbin B is inspected to determine whether the yarn contains any yarn defect while passing through from the tension applying device 22 to the slub catcher 24. If a yarn defect is detected in the yarn Y, the defective portion will be cut with a cutter provided in the yarn joining device 23 and a cutter provided in the slub catcher 24, and be sucked and removed.

[0021] As illustrated in Fig. 3, the yarn unwinding assisting device 1 is attached to a frame 21 of the winding device 2 with a mounting member 20, and above the bobbin, assists to unwind the bobbin B, which is erectly fixed onto a conveying tray 61. The yarn unwinding assisting device 1 is provided with the yarn unwinding assisting unit U including a fixed cylinder (first regulating cylinder) 11, a movable cylinder (second regulating cylinder) 13 and the like, all of which will be described below. The yarn unwinding assisting unit U regulates a size of a balloon which is formed with the yarn Y unwound form the bobbin B with the yarn unwinding assisting unit U, and applies a proper tension to the yarn Y. An embodiment of the present invention describes the movable cylinder and the fixed cylinder as a cylindrical tube. However, it may be acceptable to employ a cylindrical member having a slit on a part thereof for introducing a yarn, or a cylindrical member having a narrow portion whose diameter is narrower than the diameter of the cylindrical member on a certain portion so as to regulate the balloon.

[0022] The yarn unwinding assisting unit U includes the fixed cylinder 11 supported by a first holder 10 and the movable cylinder 13 supported by a second holder

12. In order to assist to unwind the yarn Y, the fixed cylinder 11 regulates the spread of the balloon in a fixed state, and the movable cylinder 13 moves in response to the unwinding of the yarn Y from the bobbin to regulate the spread of the balloon.

[0023] The fixed cylinder 11 and the movable cylinder 13 are both cylindrical bodies whose upper and lower ends are opened. The movable cylinder 13 is fit onto the fixed cylinder 11. A lower end portion of the fixed cylinder 11 is provided with a yarn guide 14. A tapered introducing port 15 expanding downward is formed at a lower end of the movable cylinder 13. A central axis line of the bobbin B aligns with a central axis line of the fixed cylinder 11 and the movable cylinder 13.

[0024] A pair of supporting arms 16 which face each other are fixed to the movable cylinder 13, and a sensor 17 to sense a chase portion 60 of the bobbin B is arranged on each of the supporting arms 16. The sensors 17 are optical sensors including a light receiving portion and a floodlighting portion to sense the height of the chase portion 60.

[0025] Further, as illustrated in Fig. 4A, the yarn unwinding assisting unit U includes an elevating/lowering mechanism 3 (moving structure) for moving the movable cylinder 13 in the direction of a yarn path. The entire elevating/lowering mechanism 3 is completely surrounded by a surrounding structure 4 to keep out dust so that fluff or fly waste generated in an unwinding process will not adhere to the inside of the elevating/lowering mechanism 3. The elevating/lowering mechanism 3 is provided with a screw member 30 extendedly fixed in a vertical direction, an elevating/lowering guide 31 extendedly arranged parallel to the screw member 30, and a slider 32 to be guided by the elevating/lowering guide 31.

[0026] The screw member 30 and the elevating/lowering guide 31 are supported by an upper supporting member 33 on an upper end side and supported by a lower supporting member 34 on a lower end side. The screw member 30 is inserted into a bearing 35 provided on both the upper supporting member 33 and the lower supporting member 34 to be supported to rotate around a screw axis. The screw member 30 is screwed with a nut member 36 capable of ascending and descending in response to the rotation of the screw member 30. The nut member 36 is fixed to the slider 32. The upper supporting member 33 is fixed to the surrounding structure 4, but the lower supporting member 34 is not fixed thereto.

[0027] The elevating/lowering mechanism 3 includes a motor M as a driving source to rotationally drive the screw member 30 and a toothed belt 37 as a conveying member to convey power of the motor M. The toothed belt 37 is engaged with a pulley attached to an output shaft of the motor M and a pulley attached to the screw member 30 to convey the power of the motor M to the screw member 30. With the above described configuration, the screw member 30 is driven to rotate around the screw axis according to the rotation of the motor M in either normal or reverse direction, which elevates or lowers the nut member 36 screwed with the screw member 30 and accordingly elevates and lowers the slider 32.

[0028] The surrounding structure 4 surrounds the entire elevating/lowering mechanism 3 so as to prevent fluff or fly waste, which is generated in the unwinding process, from adhering thereto. The surrounding structure 4 includes an upper cover portion 40 to cover the motor M or the like to keep out dust or fly waste. The upper supporting member 33 is fixed to the upper cover portion 40, and a first holder 10 to support the fixed cylinder 11 is fixed to an outer surface thereof.

[0029] In order to keep out dust and fly waste, the surrounding structure 4 is provided with an accordion member 41 (stretchable member) that covers the screw member 30, the elevating/lowering guide 31, the slider 32 and the like, and a non-stretchable cup-shaped member 42. The accordion member 41 is cylindrical and stretchable. The accordion member 41 is arranged so as to stretch in a vertical direction to cover the periphery of the screw member 30 and the elevating/lowering guide 31. The upper end of the accordion member 41 is connected to the upper cover portion 40 and the lower end thereof is connected to the cup-shaped member 42 through a ring-shaped connecting member 43.

[0030] The cup-shaped member 42 arranged at the lower end of the accordion member 41 is made of hard materials, such as, resin or metal, and is non-stretchable. The cup-shaped member 42, whose upper end and lower end is respectively opened and closed, is connected to the connecting member 43 to cover the screw member 30, the elevating/lowering guide 31 and the like from the lower side. In this way, the surrounding structure 4 completely covers the entire elevating/lowering mechanism 3 so that dust or fly waste will not enter inside thereof.

[0031] The slider 32 is fixed to an inner surface of the ring-shaped connecting member 43, and a second holder 12 to support the movable cylinder 13 is fixed to an outer surface of the ring-shaped connecting member 43. Therefore, as the slider 32 is elevated and lowered by the motor M, the connecting member 43, the second holder 12, and the cup-shaped member 42 are integrally elevated and lowered, which also elevates and lowers the movable cylinder13.

[0032] Since the upper end side of the accordion member 41 is fixed to the upper cover portion 40, the upper end side thereof will not move upward and downward when the movable cylinder 13 is elevated and lowered. However, the lower end side of the accordion member 41 will move upward and downward since the lower end side thereof is attached to the connecting member 43, which stretches the accordion member 41 in the vertical direction in accordance with the upward and downward movement of the movable cylinder 13. As the movable cylinder 13 is lowered, the accordion member 41 will be extended (Fig. 4A). Meanwhile, as the movable cylinder 13 is elevated, the accordion member 41 will be shrunk (Fig. 4B). The surrounding structure 4 is configured so that any gap where dust or fly waste can enter there into

will not be formed even if the movable cylinder 13 is elevated or lowered by extending and shrinking the accordion member 41 in response to the upward and downward movement of the movable cylinder 13.

[0033] As described above, the accordion member 41 (stretchable member) covering the elevating/lowering mechanism 3 is mounted so as to be stretched in the vertical direction. The second holder 12 supporting the movable cylinder 13 is fixed to the outer surface of the connecting member 43, which is elevated and lowered together with the slider 32 on an outer surface of the surrounding structure 4, to elevate and lower (move) the movable cylinder 13. This configuration allows the elevating/lowering mechanism 3 to elevate and lower the movable cylinder 13 via the second holder 12 while the elevating/lowering mechanism 3 is completely protected from dust or the like. Therefore, fluff or fly waste made in unwinding the yarn Y will not adhere to the inside of the elevating/lowering mechanism 3. Even when the elevating/lowering mechanism 3 is suspended in the vicinity of the bobbin B as in an embodiment of the present invention, the elevating/lowering mechanism 3 will not malfunction due to fluff or fly waste. Furthermore, it will not be necessary to conduct maintenance for the elevating/lowering mechanism 3, which is conventionally required to regularly conduct to eliminate fluff or fly waste.

[0034] Where the surrounding structure 4 is arranged in the vicinity of the bobbin B as in an embodiment of the present invention, the yarn Y drawn out of the bobbin B which is being conveyed on the conveying tray 61 sometimes comes into contact with a lower portion of the surrounding structure 4, which may make a split on a portion thereof and consequently the capability to keep out dust or fly waste deteriorates. However, in the embodiment of the present invention, the lower side portion of the surrounding structure 4 is formed with the hard cup-shaped member 42 which is non-stretchable, and therefore the lower portion thereof will not be torn even when the yarn Y comes into contact therewith. Accordingly, the capability of the surrounding structure 4 to keep out dust or fly waste will not deteriorate.

[0035] Further, as Figs. 4A and 4B clearly indicate, when the movable cylinder 13 is lowered, the cup-shaped member 42 also moves downward. Thus, the height position H of the surrounding structure 4 from a base surface 62 also gradually descends according to the downward movement. Therefore, attention must be paid so that the cup-shaped member 42 will not come into contact with the base surface 62 when the movable cylinder 13 is lowered according to the unwinding of the yarn Y.

[0036] The yarn unwinding assisting unit U is provided with the above described fixed cylinder 11, movable cylinder 13, elevating/lowering mechanism 3 and surrounding structure 4, all of which are integrally connected using the first holder 10, the second holder 12 and the like.

[0037] As illustrated in Fig. 5, the yarn unwinding assisting device 1 includes a casing 18, where a control section 19 to control the yarn unwinding assisting unit U is stored. The casing 18 is fixed to the frame 21 of the winding device 2. The control section 19 includes a driving circuit to drive the motor M, a power supply or the like. As illustrated in Fig. 6, a cover 18a is attached to the rear of the casing 18, and the cover 18a is removed to store the control section 19 therein.

[0038] Further, one side face of the casing 18 and one side face of the upper cover portion 40 are respectively provided with a rubber bush 38, which connects a wiring 39 from the control section 19 to the motor M. Thereby, the control section 19 is electrically connected to the motor M. Furthermore, the wiring 39 from the control section 19 is also connected to a sensor 17 (this wiring connection is not illustrated).

[0039] The yarn unwinding assisting device 1 with the above-described configuration assists to unwind the yarn Y from the bobbin B. As the yarn Y is being unwound from the bobbin B, the chase portion 60 of the bobbin B gradually descends. When detecting the descent of the chase portion 60, the sensor 17 transmits a detection signal to the control section 19. Subsequently, the control section 19 that has received the detection signal drives the motor M of the elevating/lowering mechanism 3 covered with the above surrounding structure 4 to lower the slider 32 to the predetermined position and also lower the movable cylinder 13 to a new operating position according to the height change of the chase portion 60. The movable cylinder 13 is repeatedly lowered according to the height change of the chase portion 60 until the amount of the yarn wound onto the bobbin B is reduced to about one third.

[0040] Positioning adjustment of the entire yarn unwinding assisting unit U is carried out along a yarn path which is formed while the yarn Y unwound from the bobbin B is wound into a package P. In an embodiment of the present invention, since a yarn path extends vertically upward from a yarn supplying bobbin, the positioning adjustment of the entire yarn unwinding assisting unit U is described as height adjustment. Where a yarn path is formed in an oblique upward direction, the position of the yarn unwinding assisting unit U is adjusted to be disposed obliquely above the yarn path. The height position of the entire yarn unwinding assisting unit U will be set according to a vertical size of the bobbin B. Therefore, if the vertical size of the bobbin B to be used changes, the height position of the yarn unwinding assisting unit U needs to be adjusted. Thus, as illustrated in Fig. 5, the yarn unwinding assisting device 1 includes a height adjusting structure 5 for adjusting the height position of the yarn unwinding assisting unit U with respect to the bobbin B.

[0041] The height adjusting structure 5 includes a shaft 50 as a guiding member to guide the yarn unwinding assisting unit U in the vertical direction, a clamping member 51 capable of clamping the shaft 50 and releasing a clamping state, and an operation lever 52 to manipulate the clamping member 51 to clamp the shaft 50 or to release the clamping state. An upper end and a lower end

of the shaft 50 are respectively fixed to a pair of upper and lower projected portions 53 horizontally extending from a side face of the casing 18.

[0042] The clamping member 51 is attached to the yarn unwinding assisting unit U at a back side thereof. The yarn unwinding assisting unit U is supported with the shaft 50 and the clamping member 51, and is suspended above the bobbin B. The clamping member 51 is movable along the shaft 50 when the shaft 50 is not clamped thereby. Since the yarn unwinding assisting unit U integrally moves with the clamping member 51, the yarn unwinding assisting unit U is guided in the vertical direction along the shaft 50.

[0043] The yarn unwinding assisting unit U and the clamping member 51 are connected to each other with a detachable member (not illustrated), such as a screw. Therefore, an operator can remove the suspended yarn unwinding assisting unit U at once by simply removing such a detachable member, which makes it easy to carry out maintenance.

[0044] The operation lever 52 attached to the clamping member 51 enables the clamping member 51 to clamp the shaft 50 when rotating in one direction, and also enables the clamping member 51 to release the shaft 50 when rotating in the other direction. Once the clamping member 51 clamps the shaft 50 by manipulating the operation lever 52, a tightening force is applied thereto, and accordingly the clamping member 51 is fixed to the shaft 50. Thereby the yarn unwinding assisting unit U is positioned and fixed.

[0045] When adjusting the height position of the yarn unwinding assisting unit U with respect to the bobbin B according to a change of a vertical size of the bobbin B, an operator first manipulates the operation lever 52 to release the clamping state of the clamping member 51, and then moves the yarn unwinding assisting unit U along the shaft 50 to a desired location according to the vertical size of the bobbin B. Then, by manipulating the operation lever 52 once again so that the clamping member 51 can clamp the shaft 50 to position and fix the yarn unwinding assisting unit U at the desired location.

[0046] By simply manipulating the operation lever 52 on the front side of the yarn unwinding assisting device 1 to clamp the shaft with the clamping member 51 or release the shaft, operators can adjust the height position of the yarn unwinding assisting unit U with respect to the bobbin B. That is, the height position of the yarn unwinding assisting unit U can be easily adjusted with respect to the bobbin B without using tools.

[0047] Marks (not illustrated) may be made on the shaft 50 so as to position the yarn unwinding assisting unit U. The marks may be, for example, scales on the shaft 50 made in regular intervals in a vertical direction. Such scales may be directly made on the shaft 50 if doing so will not damage the clamping member 51 when it clamps the shaft 50. Making such scales on the shaft 50 enables operators to adjust the height position of the yarn unwinding assisting unit U more easily.

[0048] In an embodiment of the present invention, a guiding member for guiding the clamping member 51 in the vertical direction is configured with the shaft 50 only. Therefore, with the above-described configuration, the clamping member 51 rotates around the shaft 50. Accordingly, when the clamping member 51 rotates around the shaft 50, the yarn unwinding assisting unit U also rotates around the shaft 50. If the yarn unwinding assisting unit U rotates even slightly even if the yarn unwinding assisting unit U is positioned to the desired height position, a central axial line of the fixed cylinder 11 and the movable cylinder 13 will depart from a central axial line of the bobbin B.

[0049] For this reason, the height adjusting structure 5 includes a rotation regulating member 54 to regulate the rotation of the yarn unwinding assisting unit U around the shaft 50. The rotation regulating member 54 is extendedly arranged parallel to the shaft 50, and fixed to the side face of the casing 18. As illustrated in Figs. 5 and 6, the rotation regulating member 54 is engaged with a concavity 55 formed in a vertical direction on the clamping member 51, and thus the clamping member 51 slides in the vertical direction guided by the rotation regulating member 54.

[0050] With this engagement, the clamping member 51 will not be rotated around the shaft 50. Consequently, the rotation of the yarn unwinding assisting unit U around the shaft 50 is regulated. Accordingly, the yarn unwinding assisting unit U is moved and positioned at the desired location while the central axis line of the bobbin B aligns with the central axis line of the fixed cylinder 11 and the movable cylinder 13.

[0051] Further, as illustrated in Fig. 5, a vertical size of the rotation regulating member 54 is made shorter than the one of the shaft 50, and is fixed to the side face of the casing 18 to be located within the range of desired height positions with respect to the shaft 50. Therefore, by moving the clamping member 51 upward or downward along the shaft 50 to be located outside the range of the desired height positions, the engagement of the rotation regulating member 54 with the concavity 55 is released and the clamping member 51 can be removed from the rotation regulating member 54. In other words, operators can release the regulation on rotation of the yarn unwinding assisting unit U around the shaft 50.

[0052] When an operator releases the regulation on rotation of the yarn unwinding assisting unit U to rotate around the shaft 50 as indicated with an arrow in Fig. 6, the surrounding structure 4 provided backward the casing 18 is moved, and consequently working space is secured therein. Thus, the operator can remove the cover 18a on the back of the casing 18 and take the control section 19 out of the casing 18 to carry out maintenance. That is, the above configuration allows operators to intentionally release the regulation on rotation that is required to adjust the height position of the yarn unwinding assisting unit U, which eventually secures working space for maintenance.

[0053] The yarn unwinding assisting device 1 according to the present invention is not limited to the above described embodiment. In the above embodiment of the present invention, the bobbin supplying device 6 of the automatic winder is a tray-type supplying device. However, a magazine-type supplying device may be employed. Further, scales for positioning the yarn unwinding assisting unit U are made on the shaft 50, but may be made in the front or the side face of the rotation regulating member 54 or the casing 18 where operators can visually confirm a position easily when adjusting the height position thereof.

[0054] The accordion member 41 (stretchable member) is adapted to cover the elevating/lowering mechanism 3 to keep out dust, such as fluff and fly waste. However, the stretchable member is not limited to this and may be other members that can protect the elevating/lowering mechanism 3 from dust, such as fluff and fly waste, and is stretchable in the vertical direction according to the upward and downward movement of the movable cylinder. For example, the stretchable member may be a plurality of connected cylinders which are configured to be stretchable in the vertical direction by fitting the plurality of cylinders, whose diameters are different, in order of diameter.

[0055] Fig. 4 illustrates the surrounding structure 4 including the accordion member 41 and the cup-shaped member 42. However, the surrounding structure 4 is not limited to this configuration. Fig. 7 illustrates an explanatory configuration. In Fig. 7, the upper side of the connecting member 43 is structured with a first accordion member 41a as in the configuration in Fig. 4, and the lower side of the connecting member 43 is structured with a second accordion member 42b whose lower end is closed, not with the cup-shaped member 42. An upper end of the second accordion member 41b is attached to the connecting member 43. A lower supporting member 34 to support both the screw member 30 and the elevating/lowering guide 31 is fixed to a lower end of the second accordion member 41b. Other configurations are the same as in Fig. 4.

[0056] According to this configuration, when the movable cylinder 13 is elevated or lowered by elevating and lowering the slider 32 by the motor M, the upper end of the second accordion member 41b moves upward and downward but the lower end thereof does not move upward and downward because the lower end thereof is fixed to the lower supporting member 34. Therefore, according to the upward and downward movement of the movable cylinder 13, not only the first accordion member 41a but also the second accordion member 41b is stretchable in the vertical direction. When the movable cylinder 13 is lowered, the first accordion member 41a extends and the second accordion member 41b shrinks (Fig. 7A). When the movable cylinder 13 is elevated, the first accordion member 41a shrinks and the second accordion member 41b extends (Fig. 7B). Also with this configuration, a gap where fluff or fly waste can enter into will not be formed on the surrounding structure 4 even if the movable cylinder 13 is elevated and lowered, which maintains the capability to keep out fluff or fly waste.

[0057] As Figs. 7A and 7B clearly indicate, with this configuration, the lower position of the second accordion member 41b will not fluctuate even if the movable cylinder 13 is elevated and lowered, and accordingly the height position H of the surrounding structure 4 from the base surface 62 will not fluctuate. Unlike an embodiment illustrated in Fig. 4, there is no need to pay attention to the height position H from the base surface 62 to suspend the elevating/lowering mechanism 3. However, unlike the embodiment illustrated in Fig. 4, the second accordion member 41b forming the lower end of the surrounding structure 4 is stretchable, and thus could tear due to a contact of the yarn Y therewith. Since fluff and fly waste might enter into from the torn portion, attention needs to be paid to this point.

Claims

1. A yarn unwinding assisting device (1) of an automatic winder comprising:

   a yarn unwinding assisting unit (U) including a first regulating cylinder (11) that assists to unwind a yarn from a bobbin in a fixed state, a second regulating cylinder (13) that assists to unwind the yarn by moving in response to the unwinding of the yarn from the bobbin, and a moving structure that moves the second regulating cylinder (13), **characterized by**
   a height adjusting structure (5) that adjusts a height position of the yarn unwinding assisting unit (U) in a direction of a yarn path; wherein the height adjusting structure (5) includes a guiding member (50) extendedly fixed in the direction of a yarn path, a clamping member (51) that is attached to the yarn unwinding assisting unit (U), moves along the guiding member (50) and can clamp the guiding member (50), and an operation lever (52) to manipulate the clamping member (51) to clamp or release the guiding member (50).

2. The yarn unwinding assisting device (1) of the automatic winder according to claim 1, wherein the guiding member (50) is structured with a shaft, **characterized by**
   a rotation regulating member (54) extendedly arranged parallel to the shaft, guiding the clamping member (51) in the direction of a yarn path, and also regulating rotation of the yarn unwinding assisting unit (U) around the shaft.

3. The yarn unwinding assisting device (1) of the automatic winder according to claim 2, **characterized in**

that the rotation regulating member (54) is arranged within a range of predetermined height positions with respect to the shaft, when located outside the range of the predetermined height positions, the clamping member (51) is removed from the rotation regulating member (54), and consequently the yarn unwinding assisting unit (U) is then rotatable around the shaft.

4. The yarn unwinding assisting device (1) of the automatic winder according to any one of claims 1, 2 and 3, **characterized in that** a mark to position the yarn unwinding assisting unit (U) is made on the guiding member (50).

5. The yarn unwinding assisting device (1) of the automatic winder according to any one of claims 1, 2, 3 and 4, **characterized in that** the yarn unwinding assisting unit (U) and the clamping member (51) are connected to each other with one detachable member.

Patentansprüche

1. Garnabspulunterstützungseinrichtung (1) eines Spulautomaten, enthaltend:

eine Garnabspulunterstützungseinheit (U), die einen ersten Regulierzylinder (11) aufweist, der das Abspulen eines Garns von einer Spule in einem feststehenden Zustand stützt, einen zweiten Regulierzylinder (13), der das Abspulen des Garns durch Bewegung in Reaktion auf das Abspulen des Garns von der Spule unterstützt, und einen Bewegungsmechanismus, der den zweiten Regulierzylinder (13) bewegt, **gekennzeichnet durch**
einen Höheneinstellmechanismus (5), der eine Höhenposition der Garnabspulunterstützungseinheit (U) in Richtung eines Garnweges einstellt; wobei der Höheneinstellmechanismus (5) ein Führungselement (50), welches in Richtung eines Garnweges vorstehend befestigt ist, ein Klemmelement (51), welches an der Garnabspulunterstützungseinheit (U) angebracht ist, sich entlang dem Führungselement (50) bewegt und das Führungselement (50) klemmen kann, und einen Betätigungshebel (52) enthält, um das Klemmelement (51) zu betätigen, um das Führungselement (50) zu klemmen oder freizugeben.

2. Garnahspulunterstützungseinrichtung (1) des Spulautomaten nach Anspruch 1, wobei das Führungselement (50) mit einem Schaft gebildet ist, **gekennzeichnet durch**
ein Drehregulierelement (54), welches vorstehend entlang dem Schaft angeordnet ist und das Klemmelement (51) in Richtung eines Garnweges führt und ebenso die Drehung der Garnabspulunterstützungseinheit (U) um den Schaft reguliert.

3. Garnabspulunterstützungseinrichtung (1) des Spulautomaten nach Anspruch 2, **dadurch gekennzeichnet, dass** das Drehregulierelement (54) innerhalb eines Bereichs von vorbestimmten Höhenpositionen in Bezug auf den Schaft angeordnet ist, wobei dann, wenn es außerhalb des Bereichs der vorbestimmten Höhenpositionen befindlich ist, das Klemmelement (51) von dem Drehregulierelement (54) entfernt wird und folglich die Garnabspulunterstützungseinheit (U) dann um den Schaft drehbar ist.

4. Garnabspulunterstützungseinrichtung (1) des Spulautomaten nach einem der Ansprüche 1, 2 und 3, **dadurch gekennzeichnet, dass** eine Markierung zur Positionierung der Garnabspulunterstützungseinheit (U) an dem Führungselement (50) angebracht ist.

5. Garnabspulunterstützungseinrichtung (1) des Spulautomaten nach einem der Ansprüche 1, 2, 3 und 4, **dadurch gekennzeichnet, dass** die Garnabspulunterstützungseinheit (U) und das Klemmelement (51) durch ein lösbares Element miteinander verbunden sind.

Revendications

1. Dispositif d'assistance au déroulement de fil (1) d'une bobineuse automatique, comprenant :

une unité d'assistance au déroulement de fil (U) comprenant un premier cylindre régulateur (11), qui aide au déroulement d'un fil d'une bobine à l'état fixe, un second cylindre régulateur (13) qui aide au déroulement du fil par déplacement en réponse au déroulement du fil de la bobine, et une structure mobile qui déplace le second cylindre régulateur (13), **caractérisé par** :
une structure d'ajustement en hauteur (5) qui ajuste une position en hauteur de l'unité d'assistance au déroulement de fil (U) dans la direction d'un trajet du fil ; dans lequel la structure d'ajustement en hauteur (5) comprend un élément de guidage (50) fixé allongé dans la direction d'un trajet de fil, un élément de blocage (51) qui est fixé à l'unité d'assistance au déroulement de fil (U), se déplace le long de l'élément de guidage (50) et peut bloquer l'élément de guidage (50), et un levier de manoeuvre (52) pour manipuler l'élément de blocage (51) afin de bloquer ou de libérer l'élément de guidage (50).

2. Dispositif d'assistance au déroulement de fil (1) de

la bobineuse automatique selon la revendication 1, dans lequel l'élément de guidage (50) est structuré avec un arbre, **caractérisé par** :

un élément régulateur de rotation (54) aménagé allongé parallèlement à l'arbre, guidant l'élément de blocage (51) dans la direction d'un trajet de fil et régulant également la rotation de l'unité d'assistance au déroulement de fil (U) autour de l'arbre.

3. Dispositif d'assistance au déroulement de fil (1) de la bobineuse automatique selon la revendication 2, **caractérisé en ce que** l'élément régulateur de rotation (54) est aménagé dans une plage de positions en hauteur prédéterminées par rapport à l'arbre, tandis que, lorsqu'il est situé en dehors de la plage des positions en hauteur prédéterminées, l'élément de blocage (51) est séparé de l'élément régulateur de rotation (54) et, par suite, l'unité d'assistance au déroulement de fil (U) peut ensuite tourner autour de l'arbre.

4. Dispositif d'assistance au déroulement de fil (1) de la bobineuse automatique selon l'une quelconque des revendications 1, 2 et 3, **caractérisé en ce qu'**une marque permettant de positionner l'unité d'assistance au déroulement de fil (U) est faite sur l'élément de guidage (50).

5. Dispositif d'assistance au déroulement de fil (1) de la bobineuse automatique selon l'une quelconque des revendications 1, 2, 3 et 4, **caractérisé en ce que** l'unité d'assistance au déroulement de fil (U) et l'élément de blocage (51) sont raccordés l'un(e) à l'autre avec un élément détachable.

FIG. 1

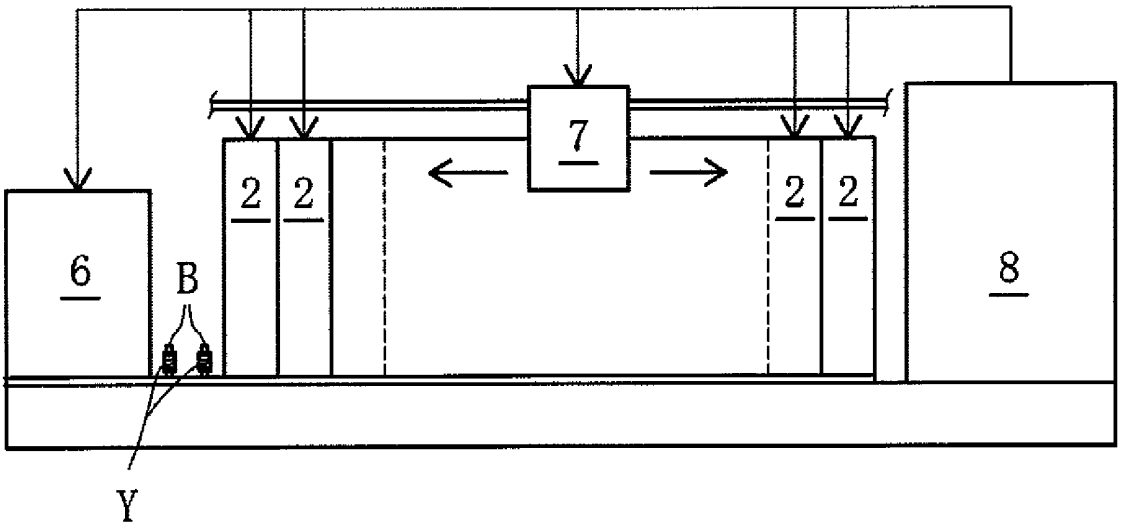


FIG. 2

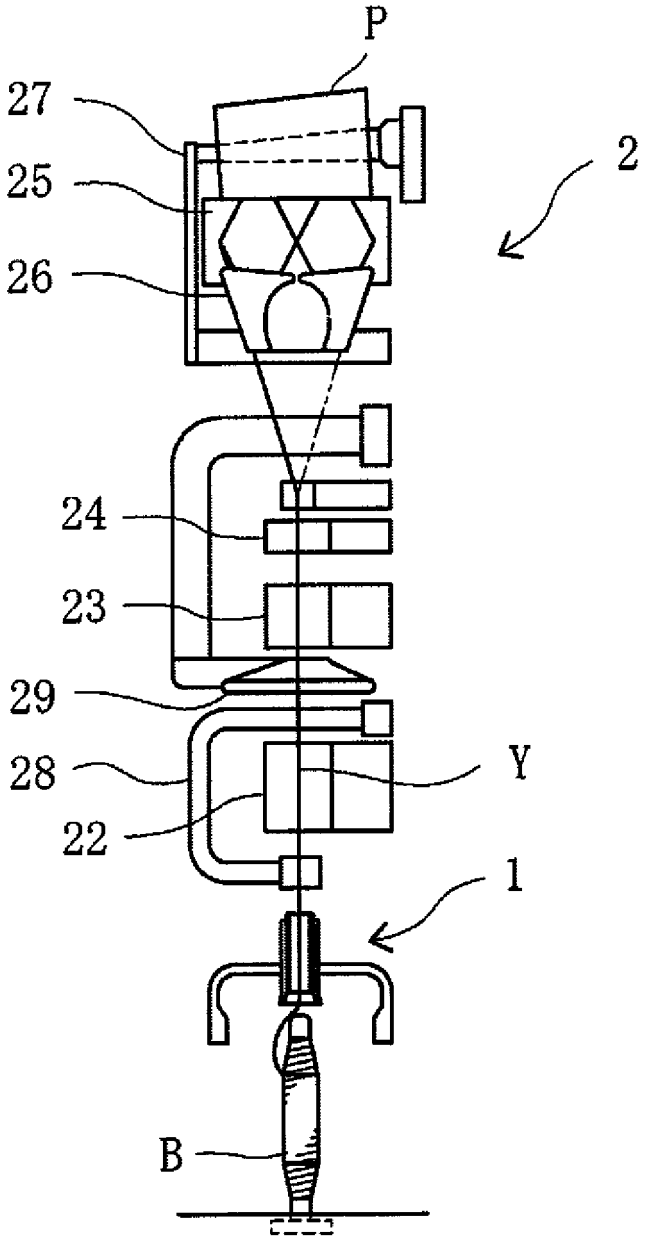


FIG. 3

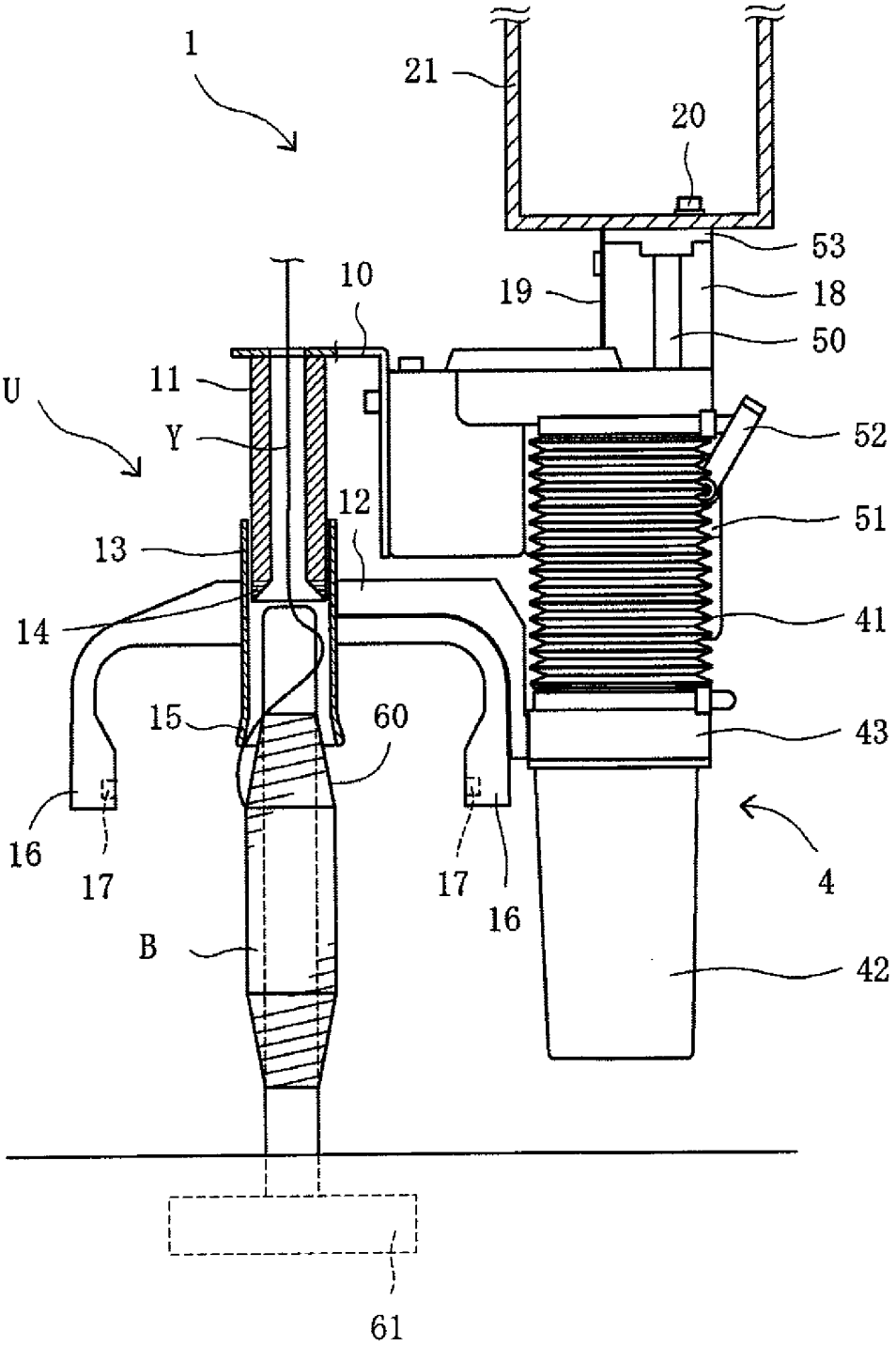

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FIG. 4

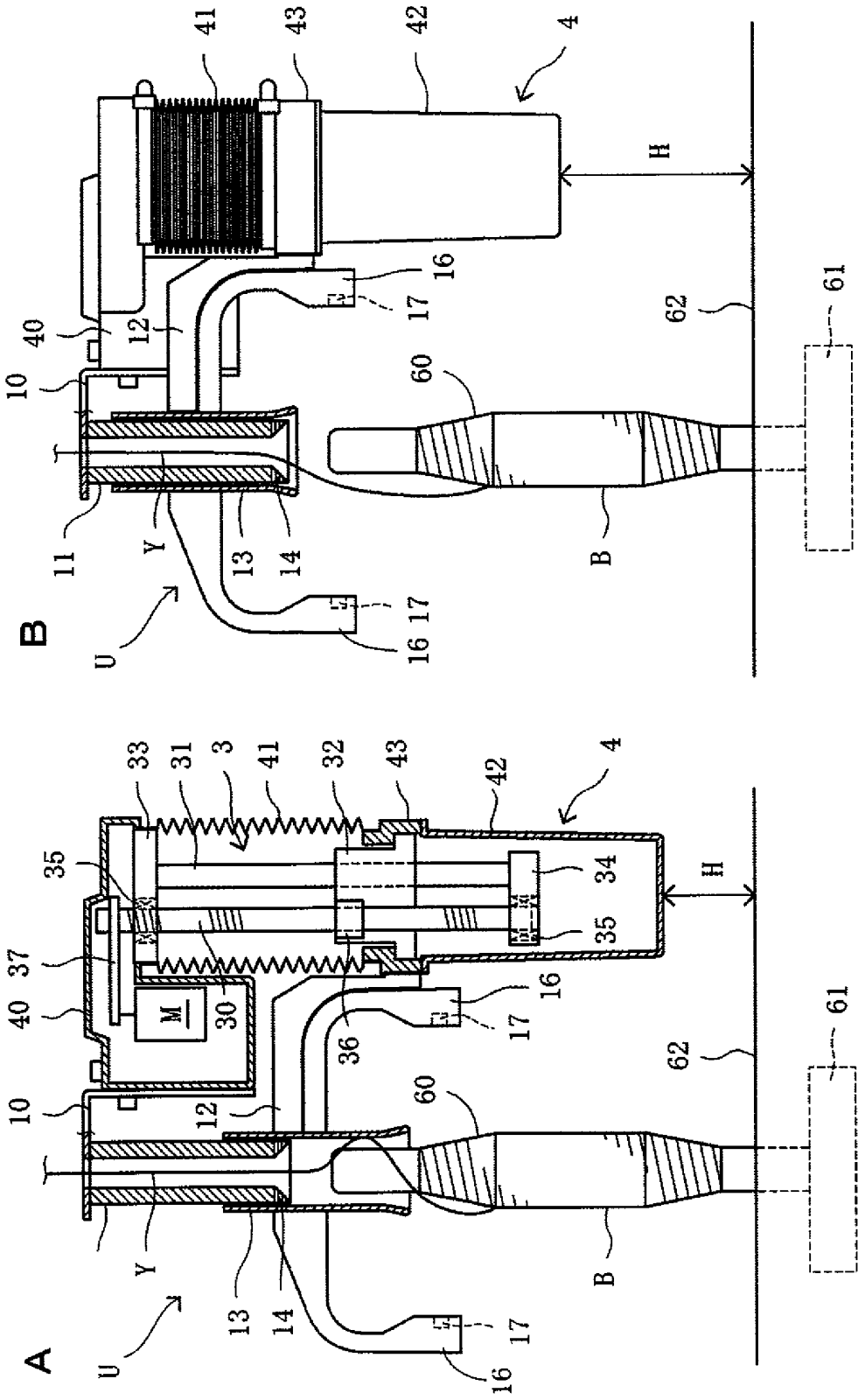

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FIG. 5

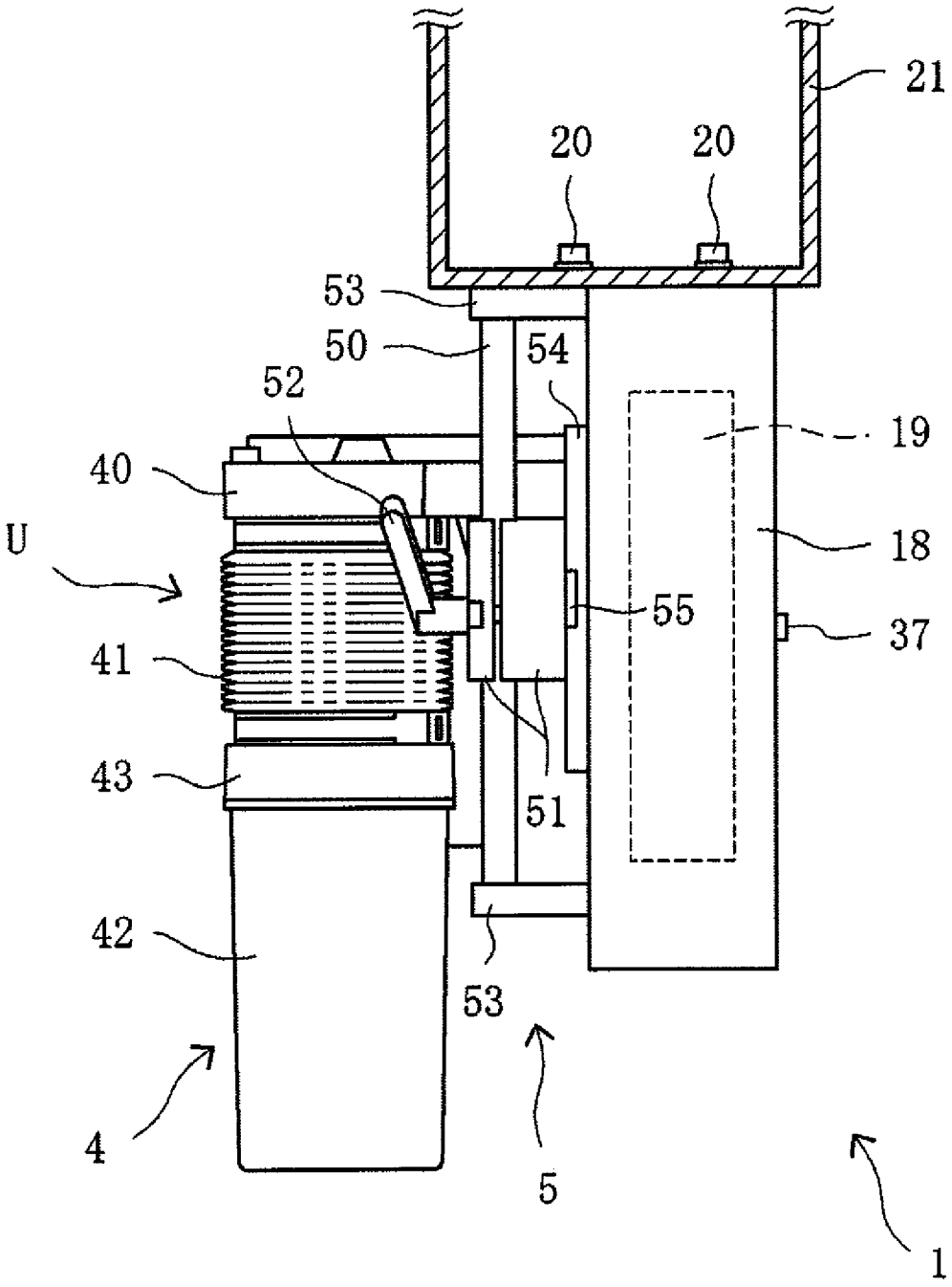


FIG. 6

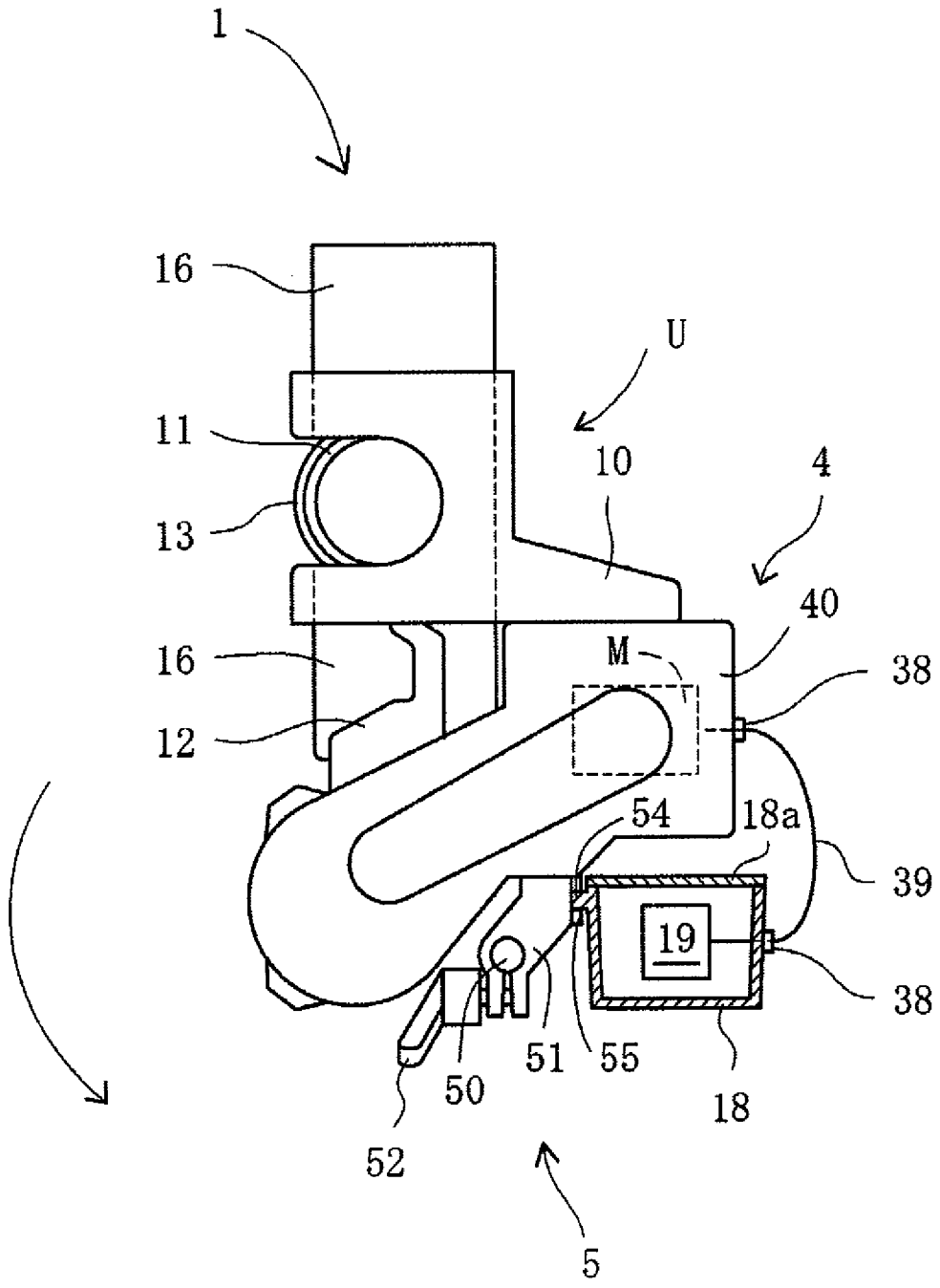


FIG. 7

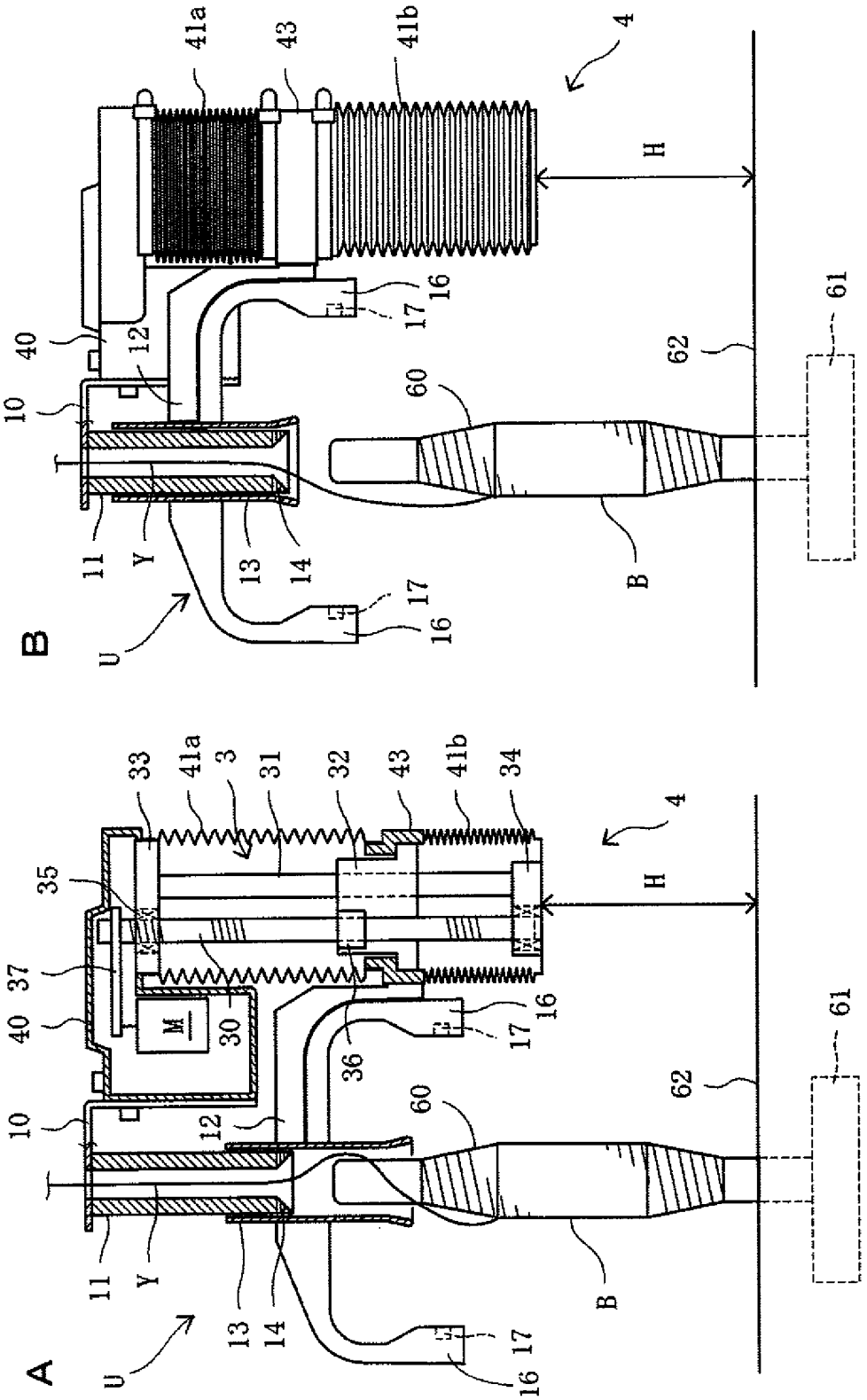
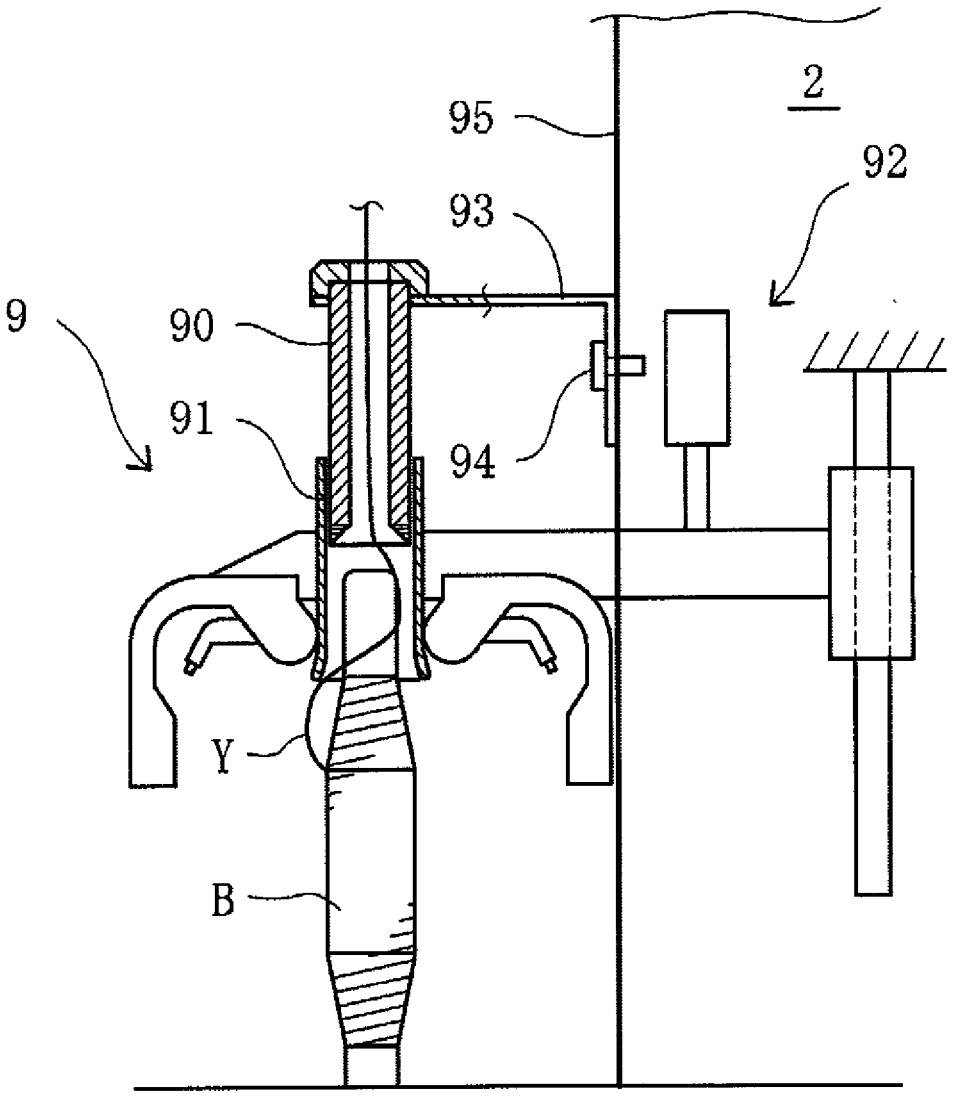

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FIG. 8



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2009242028 A **[0007]**