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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a winder winding yarns onto bobbins.

[0002] The winder of Japanese Unexamined Patent Publication No. 8-310723 is arranged so that bobbins attached to a cantilevered bobbin holder are caused to contact a contact roller (touch roller) extending in parallel to the bobbin holder, and yarns are wound onto the bobbins while a pressure is applied to the bobbins by the contact roller.

[0003] In such a winder, as an amount of yarns wound onto the bobbins by the contact roller increases, the bobbin holder is warped downward toward the leading end which is distanced from the supported part of the bobbin holder, on account of the weight of the yarns.

[0004] In this regard, the winder of Japanese Unexamined Patent Publication No. 8-310723 is arranged so that, by detecting the contact pressure to each bobbin and by elongating or shortening an adjusting cylinder based on the detection result, the pressure applied to the contact roller is changed to tilt the contact roller to be substantially in parallel to the warped bobbin holder. As such, the contact pressures to the bobbins applied from the contact roller are equalized therebetween.

SUMMARY OF THE INVENTION

[0005] However, when as in Japanese Unexamined Patent Publication No. 8-310723 the contact pressure to each bobbin is detected and the contact roller is tilted by changing the pressure applied to the contact roller by the adjusting cylinder based on the detection result, the pressure applied to the contact roller by the adjusting cylinder is rapidly changed if the adjusting cylinder is broken during the winding of yarns, with the result that the yarns may not be properly wound on account of a rapid change in the contact pressure from the contact roller to each bobbin, or the contact roller may be broken at its attachment portion on account of the vibration of the contact roller.

[0006] An object of the present invention is to provide a winder in which improper winding of yarns and the breakdown of portions around the contact roller hardly occur even if a tilt unit by which the contact roller is tilted is broken.

[0007] A winder according to the first aspect of the invention includes: a bobbin holder which is cantilevered at a main body and to which a bobbin for winding yarns is attached; a contact roller which contacts the bobbin attached to the bobbin holder; and a tilt mechanism which tilts the contact roller in a vertical direction, wherein, the tilt mechanism is mechanically interlocked with a moving member which moves in accordance with a change in an amount of the yarns wound onto the bobbin, and the contact roller is tilted by utilizing the movement of the moving

member.

[0008] According to the present invention, the tilt mechanism is mechanically interlocked with the moving member which is moved in accordance with a change in the amount of the yarns wound onto the bobbin, and the contact roller is tilted by utilizing the movement of the moving member. For this reason, even if a breakdown occurs, only the mechanical interlocking with the moving member becomes inactive and the tilting of the contact roller by utilizing the movement of the moving member is no longer possible, and hence the tilting angle of the contact roller is not rapidly changed. Therefore the above-described problems such as improper winding of yarns and the vibration of the contact roller hardly occur.

[0009] According to the second aspect of the invention, the winder of the first aspect further includes a turret table which cantilevers the bobbin holder and moves the bobbin holder by rotating about a rotation axis which is in parallel to the axis of the bobbin holder, wherein, when the yarns are wound, the contact roller is maintained at a predetermined position, the turret table functions as the moving member in which the bobbin holder moves away from the contact roller as an amount of the yarns wound onto the bobbin increases, and the tilt mechanism is mechanically interlocked with the turret table and tilts the contact roller by utilizing the rotation of the turret table.

[0010] According to the present invention, during the winding of the yarns, the contact roller is maintained at a predetermined position. Furthermore, when the turret table is arranged to rotate in accordance with the increase in the amount of yarns on the bobbin so as to function as the moving member, the contact roller is tilted by utilizing the rotation of the turret table functioning as the moving member.

[0011] According to the third aspect of the invention, the winder of the second aspect is arranged so that the tilt mechanism tilts the contact roller by transferring the rotation of the turret table to the contact roller and including: a cam which is provided on the turret table and has a cam surface which extends in a direction of the rotation of the turret table; and a cam rod which contacts the cam surface.

[0012] According to the present invention, the contact roller is tilted by transferring the rotation of the turret table to the contact roller via components such as the cam on the turret table and the cam rod on the cam surface.

[0013] According to the fourth aspect of the invention, the winder of any one of the first to third aspects further includes a guide shaft which elevatably supports the contact roller, wherein, the tilt mechanism tilts the contact roller by tilting the guide shaft.

[0014] According to the present invention, when the contact roller is elevatably supported by the guide shaft, the contact roller is tilted by tilting the guide shaft.

[0015] According to the fifth aspect of the invention, the winder of the first aspect is arranged so that the contact roller is arranged to be moved by being pushed by the bobbin to which the yarns are wound, so as to function

as the moving member, and the tilt mechanism is mechanically interlocked with the contact roller, and tilts the contact roller by utilizing the movement of the pushed contact roller.

[0016] According to the present invention, during the winding of the yarn, when the contact roller is arranged to be moved by being pushed by the yarn wound onto the bobbin so as to function as the moving member, the contact roller is tilted by utilizing the movement of the contact roller which is the moving member.

[0017] According to the sixth aspect of the invention, the winder of the fifth aspect is arranged so that the tilt mechanism includes a guide member which has a guide being tilted with respect to the vertical direction and tilts the contact roller by guiding the moving contact roller along the guide.

[0018] According to the present invention, the contact roller is tilted by guiding the contact roller, which is moved by being pushed by the yarns wound onto the bobbin, along the guide of the guide member which is tilted in the vertical direction.

[0019] According to the present invention, the tilt mechanism is mechanically interlocked with the moving member which is moved in accordance with a change in the amount of the yarns wound onto the bobbin, and the contact roller is tilted by utilizing the movement of the moving member. For this reason, even if a breakdown occurs, only the mechanical interlocking with the moving member becomes inactive and the tilting of the contact roller by utilizing the movement of the moving member is no longer possible, and hence the tilting angle of the contact roller is not rapidly changed. Therefore the above-described problems such as improper winding of yarns and the vibration of the contact roller hardly occur.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

Fig. 1 is an elevation of a winder according to an embodiment of the present invention.

Fig. 2A shows the winder of Fig. 1 viewed in the direction of the arrow IIA.

Fig. 2B shows the winder of Fig. 1 viewed in the direction of the arrow IIB.

Fig. 3A shows the winder of Fig. 1 viewed in the direction of the arrow III.

Fig. 3B shows the winder of Fig. 3A from which the mounting member and the swing axis are removed.

Fig. 4 is a cross section taken along the IV-IV line of Fig. 3A.

Fig. 5A is equivalent to Fig. 2A and shows the state during the winding.

Fig. 5B is equivalent to Fig. 2B and shows the state during the winding.

Fig. 6 is equivalent to Fig. 4 and shows the state during the winding.

Fig. 7 is equivalent to Fig. 3B and shows the state

during the winding.

Fig. 8 is equivalent to Fig. 1 and shows the state during the winding.

Fig. 9 relates to a modification 1 and is equivalent to Fig. 1.

Fig. 10 relates to the modification 1 and is equivalent to Fig. 2A.

Fig. 11 relates to the modification 1 and is equivalent to Fig. 8.

Fig. 12 relates to a modification 2 and is equivalent to Fig. 1.

Fig. 13 relates to the modification 2 and is equivalent to Fig. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] The following will describe a preferred embodiment of the present invention.

[0022] Fig. 1 is an elevation of a winder of the present embodiment. Fig. 2A shows the winder of Fig. 1 viewed in the direction of the arrow IIA. Fig. 2B shows the winder of Fig. 1 viewed in the direction of the arrow IIB. Fig. 3A shows the winder of Fig. 1 viewed in the direction of the arrow III. Fig. 3B shows the winder of Fig. 3A from which the mounting member 22a and the swing axis 36 are removed. Fig. 4 is a cross section taken along the IV-IV line of Fig. 3A. It is noted that, in Fig. 1, a part of a base 10 of the winder 1 is indicated by a two-dot chain line to show the components inside the part indicated by the two-dot chain line. In Fig. 3B, the position of the mounting member 22a is indicated by a two-dot chain line for easily understanding the positional relations of the components. Hereinafter, as indicated in each drawing, the descriptions will be given with reference to front-back directions, crosswise directions, and vertical directions which are orthogonal to one another.

[0023] As shown in Fig. 1 to Fig. 4, the winder 1 includes components such as a base 10, two bobbin holders 2 attached to the base 10, a turret table 3, a contact pressure applying mechanism 4, and a tilt mechanism 5.

[0024] Each of the two bobbin holders 2 is a substantially column shaped member cantilevered at the turret table 3. To each bobbin holder 2, a plurality of substantially cylindrical bobbins B are attached. Each bobbin holder 2 is rotated about a rotation axis 2a by an unillustrated motor, thereby yarns Y are wound onto the bobbins B attached to the bobbin holder 2 as described later. Above the bobbins B attached to the bobbin holders 2, traverse units 7 are provided. Above each traverse unit 7 is provided a yarn guide 8. The yarns Y are therefore wound onto the bobbins B while being traversed on these yarn guides 8 in the crosswise directions by the traverse units 7. The traverse units 7 and the yarn guides 8 are provided on a later-described supporting member 12, and these components 7 and 8 are disposed at regular intervals.

[0025] The turret table 3 is a substantially circular plate and cantilevers the two bobbin holders 2 as described

above and moves these bobbin holders 2 as the turret table 3 rotates about a rotation axis 3a which is in parallel to the axes of the bobbin holders 2. In the winder 1 arranged as described above, the positions of the two bobbin holders 2 are interchangeable. It is therefore possible to continuously wind yarns in such a way that the bobbins B attached to one bobbin holder 2 are replaced with new ones while yarns are wound onto the bobbins B attached to the other bobbin holder 2. Furthermore, as described later, the turret table 3 rotates during the winding of the yarns Y onto the bobbin B, in accordance with the increase in the amount of wound yarns Y.

[0026] The contact pressure applying mechanism 4 includes components such as a contact roller 11 and a supporting member 12. The contact roller 11 extends substantially in parallel to the bobbin holders 2, and contacts the outer circumference of each bobbin holder 2 attached to one of the two bobbin holders 2, which is at a winding position. With this, a contact pressure is applied to the bobbins B by the contact roller 11, when the yarn Y are wound thereon.

[0027] The supporting member 12 rotatably supports the both ends of the contact roller 11. At around the both ends of the supporting member 12, linear motion bearings 19 are provided, respectively. Into the linear motion bearings 19 are inserted vertically-extending guide shafts 13. The supporting member 12 is elevatable by an unillustrated elevator mechanism. As the supporting member 12 is vertically moved, the supporting member 12 and the contact roller 11 are also vertically moved along the guide shafts 13.

[0028] Each guide shaft 13 is inserted into linear motion bearings 21a and 21b at the respective ends. The linear motion bearings 21a and 21b are attached to mounting members 22a and 22b fixed to the frame 6, respectively.

[0029] Each of the linear motion bearings 21a and 21b has an internal diameter slightly larger than the diameter of each guide shaft 13. Between the linear motion bearing 21a and the guide shaft 13 inserted thereto, an O-ring 23 is provided. Similarly, between the linear motion bearing 21b and the guide shaft 13 inserted thereto, an O-ring 23 is provided. With this arrangement, the guide shafts 13 are swingable with respect to the linear motion bearings 21a and 21b fixed to the frame 6 (mounting members 22a and 22b).

[0030] Now, the arrangement of the tilt mechanism 5 will be described. The tilt mechanism 5 is a mechanism for tilting the contact roller 11, and includes components such as cams 31, a cam rod 32, a force multiplying arm 33, a tie rod 34, and a tilt arm 35.

[0031] The two cams 31 are provided on the side face of the turret table 3 to correspond to the respective bobbin holders 2. Each cam 31 extends along the circumferential direction of the turret table 3 as shown in Fig. 2B. The outer circumference of each cam 31, i.e. the cam surface 31a is arranged to be away from the rotation axis 3a of the turret table 3, toward the upstream in the clockwise

direction in Fig. 2B.

[0032] The cam rod 32 has at its lower end portion a roller 41 which contacts the cam surface 31a, and the upper end portion of the cam rod 32 is connected to the force multiplying arm 33. The cam rod 32 further includes a rod forming member 32a having the roller 41 and a rod forming member 32b connected to the force multiplying arm 33, and these two rod forming members 32a and 32b are vertically movable relative to each other. Between the rod forming member 32a and the rod forming member 32b, a spring 42 is provided. As a bolt 43 provided immediately above the spring 42 of the rod forming member 32b is tightened, the spring 42 is compressed. With this arrangement, to what extent the movement of the rod forming member 32a is absorbed by the spring 42 and is transferred to the rod forming member 32b is determined by the degree of tightening of the bolt 43. Alternatively, the spring 42 may not be provided. In such a case, a single component substitutes for the two rod forming members 32a and 32b of the cam rod 32.

[0033] The force multiplying arm 33 is a substantially rectangular plate whose one end is attached to the cam rod 32 whereas the other end is attached to a swing axis 36 inserted into a bearing 37, so as to be swingable about the swing axis 36.

[0034] At the lower end portion of the swing axis 36, a mounting shaft 38 is attached for mounting the tie rod 34. As such, in the force multiplying arm 33, the tie rod 34 is mounted to be closer to the center of the swing axis 36 than the cam rod 32. The tie rod 34 is mounted between the force multiplying arm 33 and the tilt arm 35 to connect the force multiplying arm 33 with the tilt arm 35.

[0035] The bearing 37 to which the swing axis 36 is inserted is fixed, in front of the tie rod 34, to a mounting plate 39 which is substantially C-shaped to sandwich the tie rod 34 from the front and rear sides. The mounting plate 39 is fixed to the frame 6 on the side opposite to the side where the bearing 37 is fixed, over the tie rod 34. Also at the portion where the frame 6 is fixed to the mounting plate 39, a swing axis and a bearing similar to the swing axis 36 and the bearing 37 are provided. This swing axis is attached to the end of the mounting shaft 38 which end is opposite to the swing axis 36.

[0036] The tilt arm 35 is a plate extending in the front-back directions, and is swingably supported at its substantially central portion by the swing axis 24 which is provided on the mounting member 22a. The tilt arm 35 is attached to the tie rod 34 at the trailing end portion, whereas a through hole 35a is formed at the leading end portion. To the through hole 35a is inserted the above-described guide shaft 13.

[0037] Now, the operation to wind the yarns Y in the winder 1 will be described. Fig. 5 to Fig. 9 show the states during the yarn winding and are equivalent to Fig. 2, Fig. 4, Fig. 3B, and Fig. 1, respectively.

[0038] When yarns Y are wound onto the bobbins B in the winder 1, yarns Y produced by an unillustrated spinning apparatus above the winder 1 are placed onto the

bobbins B. As the bobbin holder 2 is rotated in this state, the yarns Y are wound onto the bobbins B while a contact pressure is applied to the bobbins B.

[0039] As the winding of the yarns Y onto the bobbins B progresses, the diameter of each bobbin B gradually increases in accordance with the increase in the amount of the wound yarns Y. Taking into consideration of this, it is necessary to gradually increase the distance between the bobbin holder 2 and the contact roller 11.

[0040] In this state, the supporting member 12 is not moved (i.e. the contact roller 11 is retained at a predetermined position) in the present embodiment. As shown in Fig. 5A, the distance between the bobbin holder 2 and the contact roller 11 is gradually increased by rotating the turret table 3 in the direction away from the contact roller 11 (i.e. the anticlockwise direction in Fig. 5A and the clockwise direction in Fig. 5B) as the amount of yarns Y wound onto the bobbins B increases.

[0041] When the turret table 3 rotates in this way, as shown in Fig. 5B, the cams 31 on the side wall of the turret table 3 also rotate about the rotation axis 3a. As described above, each cam 31 is arranged so that the cam surface 31a is away from the rotation axis 3a of the turret table 3, toward the upstream in the clockwise direction in Fig. 2B. For this reason, as each cam 31 rotates, the cam rod 32 contacting the cam surface 31a of the cam 31 is pushed upward by the cam 31 as indicated by the arrow a.

[0042] As the cam rod 32 moves, as shown in Fig. 6, the force multiplying arm 33 rotates anticlockwise about the swing axis 36, thereby pulling the tie rod 34 attached to the force multiplying arm 33 toward the force multiplying arm 33 (i.e. rightward in the figure) as indicated by the arrow b. In this regard, since in the force multiplying arm 33 the tie rod 34 is attached to be closer to the swing axis 36 than the cam rod 32 as described above, the moving distance of the tie rod 34 in response to the rotation of the force multiplying arm 33 caused by the movement of the cam rod 32 is shorter than the moving distance of the cam rod 32. Therefore, the force exerted from the force multiplying arm 33 to the tie rod 34 is greater than the force exerted from the cam rod 32 to the force multiplying arm 33.

[0043] As the tie rod 34 is pulled toward the force multiplying arm 33, as shown in Fig. 7, the trailing end portion of the tilt arm 35 connected to the tie rod 34 is also pulled toward the force multiplying arm 33 as indicated by the arrow b, with the result that the tilt arm 35 rotates clockwise about the swing axis 24. This rotation of the tilt arm 35 causes the leading end portion of the tilt arm 35, to which the guide shaft 13 is inserted, to move in the direction (leftward in the figure) opposite to the movement of the trailing end portion, as indicated by the arrow c.

[0044] When the leading end portion of the tilt arm 35 moves in this way, as shown in Fig. 6 and Fig. 8, the guide shaft 13 is pressed by the tilt arm 35 (i.e. the wall of the through hole 35a) and tilted. Therefore the supporting member 12 is elevatable along the guide shaft 13

and the contact roller 11 supported by the supporting member 12 are tilted. In this state, the contact roller 11 is tilted in such a way that the part thereof corresponding to the leading end side of the bobbin holder 2 is positioned downward (in Fig. 8, the tilting angle immediately before the completion of the winding is denoted as α).

[0045] In other words, in the present embodiment, the turret table 3 is the moving member of the present invention, and the tilt mechanism 5 constituted by the cams 31, the cam rod 32, the force multiplying arm 33, the tie rod 34, and the tilt arm 35 is mechanically interlocked with the turret table 3. The tilt mechanism 5 tilts the contact roller 11 by using the rotation of the turret table 3 which is the moving member. In addition to the above, as the amount of yarns Y wound onto the bobbins B increases and the degree of the rotation of the turret table 3 increases, the tilting angle of the contact roller 11 increases.

[0046] Now, as the amount of yarns Y wound onto the bobbins B increases, the bobbin holder 2 is warped downward toward the leading end remote from the part supported by the turret table 3, on account of the weight of the yarns Y. The degree of this warping increases as the amount of yarns Y wound onto the bobbins B increases. Provided that, on the contrary to the arrangement above, the contact roller 11 is not tilted, the bobbin B attached at the most leading end side of the bobbin holder 2 receives the least contact pressure from the contact roller 11, with the result that the diameters of the bobbins B are irregular between the left ones and the right ones when the winding of the yarns Y is completed.

[0047] In this regard, according to the present embodiment described above, as the amount of yarns Y wound onto the bobbins B increases, the contact roller 11 is tilted so that the part corresponding to the leading end side of the bobbin holder 2 is positioned downward, with the result that the bobbin holder 2 and the contact roller 11 are maintained to be more or less in parallel to each other and the distance between them is constant at all parts. The contact pressure between the contact roller 11 and each bobbin B is therefore constant and the diameter of each bobbin after the winding is constant.

[0048] In addition to the above, according to the present embodiment, the tilt mechanism 5 mechanically interlocked with the turret table 3 tilts the contact roller 11 by transferring, to the guide shaft 13, the rotation of the turret table 3 which rotates in accordance with the increase in the amount of yarns Y wound onto the bobbins B. Because of this arrangement, even if a part of the tilt mechanism 5 is broken, merely the rotation of the turret table 3 is not transferred to the guide shaft 13 (i.e. the tilt mechanism 5 is no longer mechanically interlocked with the turret table 3) and the contact roller 11 is not tilted any more, and hence the contact roller 11 is maintained to have the position immediately before the breakdown of the tilt mechanism 5.

[0049] For this reason, even if the tilt mechanism 5 is broken, it is possible to restrain problems such as im-

proper winding of yarns Y on the bobbins B on account of a rapid change in the tilting angle of the contact roller 11 and the breakdown of the part of the supporting member 12 at which the contact roller 11 is supported, on account of the vibration of the contact roller 11.

[0050] In addition to the above, the contact roller 11 has a certain amount of weight and hence a sufficiently large force is required to tilt the contact roller 11. In this regard since the force applied from the force multiplying arm 33 to the tie rod 34 is larger than the force applied from the cam rod 32 to the force multiplying arm 33 as described above, it is possible to tilt the heavy contact roller 11 even if the force by which the cams 31 push the cam rod 32 is not so large.

[0051] Now, various modifications of the embodiment will be described. It is noted that the descriptions of the same components as in the embodiment will be suitably omitted.

[0052] While the embodiment above is arranged so that the rotation of the turret table 3 is transferred to the guide shaft 13 by using the tilt mechanism 5 having the cams 31, the cam rod 32, the force multiplying arm 33, the tie rod 34, and the tilt arm 35, the rotation of the turret table 3 may be transferred to the guide shaft 13 by using a different mechanism.

[0053] In addition to the above, while the embodiment above is arranged so that the supporting member 12 and the contact roller 11 are tilted by tilting the guide shaft 13 elevatably supporting the supporting member 12 supporting the contact roller 11, the contact roller 11 may be directly tilted without tilting the guide shaft 13 and the supporting member 12.

[0054] In addition to the above, the embodiment above is arranged so that, since the supporting member 12 supporting the contact roller 11 is elevatable, the contact roller 11 is caused to contact the bobbins B when the yarns Y are wound whereas the contact roller 11 is moved away from the bobbin holder 2 in cases such as the placement of the yarns. In this regard, a different structure may be used for moving the contact roller 11 to contact or to be away from the bobbin holder 2.

[0055] According to a modification (modification 1), as shown in Fig. 9 and Fig. 10, the supporting member 51 supporting the contact roller 11 is provided with a swing axis 52. The respective ends of the swing axis 52 are inserted into bearings 53a and 53b, thereby allowing the supporting member 51 to be swingable about the swing axis 52. By swinging the supporting member 51, the contact roller 11 is moved between the position which is indicated by the full line in Fig. 10 and where the contact roller 11 contacts the bobbins B and the position which is indicated by the two-dot chain line in Fig. 10 and where the contact roller 11 is away from the bobbin holder 2.

[0056] The bearings 53a and 53b are ball bearings, and the swing axis 52 is arranged to be swingable with respect to the bearings 53a and 53b.

[0057] The bearing 53a is attached to an unillustrated frame or the like which is fixed to the base 10, whereas

the bearing 53b is attached to the arm 54. The arm 54 is supported to be swingable about a swing axis 55 at an end thereof. This arm 54 is provided with the bearing 53b substantially at the center thereof, and is connected to the cam rod 32 at the end opposite to the swing axis 55. In other words, the arm 54 is arranged so that the bearing 53b is closer to the swing axis 55 than the cam rod 32.

[0058] Also in this case, in the same manner as the embodiment above, the turret table 3 rotates as the amount of yarns Y wound onto the bobbins B increases, with the result that the cams 31 rotate and the cam rod 32 is pressed by the cams 31 and moved upward. In the modification 1, however, as the cam rod 32 is moved upward, as shown in Fig. 11, the arm 54 is swung about the swing axis 55 and the bearing 53b attached to the arm 54 is pushed upward. This tilts the swing axis 52 which is inserted into the bearings 53a and 53b, the supporting member 51 supported by the swing axis 52, and the contact roller 11 supported by the supporting member 51. Also in this case, the contact roller 11 is tilted so that the part corresponding to the leading end side of the bobbin holder 2 is positioned downward. In the modification 1, the cams 31, the cam rod 32, and the arm 54 for tilting the contact roller 11 are the tilt mechanism of the present invention.

[0059] Also in the modification 1, in the arm 54 the bearing 53b is attached to be closer to the swing axis 55 than the cam rod 32, and hence the moving distance of the bearing 53b in response to the rotation of the arm 54 is shorter than the moving distance of the cam rod 32. Therefore the force applied from the arm 54 to the bearing 53b is larger than the force applied from the cam rod 32 to the arm 54, and hence the heavy contact roller 11 is tilted even if the force by which the cams 31 push the cam rod 32 is not so large.

[0060] Furthermore, the embodiment above is arranged so that the distance between the bobbin holder 2 and the contact roller 11 is gradually increased by rotating the turret table 3 in accordance with the increase in the amount of yarns Y wound onto the bobbins B, and the contact roller 11 is tilted by transferring the rotation of the turret table 3 thereto. The present invention, however, is not limited to this arrangement.

[0061] According to another modification (modification 2), as shown in Fig. 12, a linear motion bearing 62 is provided at one end of a supporting member 61 supporting the both ends of the contact roller 11. The winder of the modification 2 is provided with a guide shaft 63 which is fixed to an unillustrated frame of the base 10 and extends in the vertical directions. The guide shaft 63 is inserted into the linear motion bearing 62. With this arrangement, the supporting member 61 and the contact roller 11 are supported by the guide shaft 63 and are arranged to be elevatable along the guide shaft 63.

[0062] In connection with the above, O-rings 64 are provided between the respective ends of the linear motion bearing 62 and the supporting member 61. This allows the supporting member 61 and the contact roller 11 to

be swingable with respect to the guide shaft 63 fixed to the base 10.

[0063] In addition to the above, at an end of the supporting member 61 is provided a roller 61a. Furthermore, beside the supporting member 61 is provided a tilt mechanism 65 fixed to the unillustrated frame of the base 10, to correspond to the roller 61a.

[0064] The tilt mechanism 65 has a vertically extending groove 66. To this groove 66, the roller 61a of the supporting member 61 is fit. The roller 61a vertically moves along the groove 66 as the supporting member 61 vertically moves along the guide shaft 63. Furthermore, inside the groove 66 is provided a guide member 67 which contacts the leading end portion of the roller 61a. The guide member 67 is tilted with respect to the vertical directions such that the guide surface 67a (guide) contacting the leading end portion of the roller 61a is closer to the supporting member 61 (i.e. is tilted leftward) toward the upper end of the surface.

[0065] In this case, the turret table 3 does not rotate when the amount of yarns Y wound onto the bobbins B is increased. Instead, the contact roller 11 and the supporting member 61 are pressed upward by the bobbins B having larger diameters because of the winding of the yarns Y and move along the guide shaft 63, and this increases the distance between the bobbin holder 2 and the contact roller 11.

[0066] As the amount of yarns Y wound onto the bobbins B is increased, the contact roller 11 and the supporting member 61 are pushed and moved upward by the bobbins B and the roller 61a is moved upward along the groove 66 as shown in Fig. 13. As a result, the roller 61a is guided along the guide surface 67a of the guide member 67 and hence the supporting member 61 and the contact roller 11 are tilted. Also in this case, the contact roller 11 is tilted so that the part corresponding to the leading end side of the bobbin holder 2 is positioned downward.

[0067] That is to say, in the modification 2, the contact roller 11 is equivalent to the moving member of the present invention and the contact roller 11 is mechanically interlocked with the tilt mechanism 65 such that the leading end portion of the roller 61a of the supporting member 61 supporting the contact roller 11 contacts the guide member 67 (guide surface 67a). Furthermore, the tilt mechanism 65 tilts the contact roller 11 by utilizing the movement of the contact roller 11 caused by the increase in the amount of yarns Y wound onto the bobbins B.

[0068] In addition to the above, while the modification 2 is arranged so that the contact roller 11 is tilted by guiding the supporting member 61 along the guide surface 67a of the guide member 67, the contact roller 11 may be tilted by another tilt mechanism which is mechanically interlocked with the contact roller 11 and utilizes the movement of the contact roller 11 in a different manner.

[0069] In addition to the above, while in the arrangement above the tilt mechanism tilts the contact roller 11 by utilizing the rotation of the turret table 3 or the move-

ment of the contact roller 11, the present invention is not limited to this. For example, when the winder includes a moving member which moves in accordance with the increase in the amount of yarns Y on the bobbins B and is different from the turret table 3 and the contact roller 11, the tilt mechanism may be mechanically interlocked with this moving member and tilt the contact roller 11 by utilizing the movement of the moving member. The features of the dependent claims as well as all features of preferred embodiments mentioned above can be combined with each other as long as they do not contradict each other.

15 Claims

1. A winder comprising:

a bobbin holder which is cantilevered at a main body and to which a bobbin for winding yarns is attached;
a contact roller which contacts the bobbin attached to the bobbin holder; and
a tilt mechanism which tilts the contact roller in a vertical direction, wherein,
the tilt mechanism is mechanically interlocked with a moving member which moves in accordance with a change in an amount of the yarns wound onto the bobbin, and the contact roller is tilted by utilizing the movement of the moving member.

2. The winder according to claim 1, further comprising:

a turret table which cantilevers the bobbin holder and moves the bobbin holder by rotating about a rotation axis which is in parallel to the axis of the bobbin holder, wherein,
when the yarns are wound,
the contact roller is maintained at a predetermined position,
the turret table functions as the moving member in which the bobbin holder moves away from the contact roller as an amount of the yarns wound onto the bobbin increases, and
the tilt mechanism is mechanically interlocked with the turret table and tilts the contact roller by utilizing the rotation of the turret table.

3. The winder according to claim 2, wherein, the tilt mechanism tilts the contact roller by transferring the rotation of the turret table to the contact roller and including:

a cam which is provided on the turret table and has a cam surface which extends in a direction of the rotation of the turret table; and
a cam rod which contacts the cam surface.

4. The winder according to any one of claims 1 to 3, further comprising:

a guide shaft which elevatably supports the contact roller, wherein, 5
the tilt mechanism tilts the contact roller by tilting the guide shaft.

5. The winder according to claim 1, wherein, 10
the contact roller is arranged to be moved by being pushed by the bobbin to which the yarns are wound, so as to function as the moving member, and the tilt mechanism is mechanically interlocked with the contact roller, and tilts the contact roller by utilizing the movement of the pushed contact roller. 15

6. The winder according to claim 5, wherein, 20
the tilt mechanism includes a guide member which has a guide being tilted with respect to the vertical direction and tilts the contact roller by guiding the moving contact roller along the guide. 25

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FIG.2A

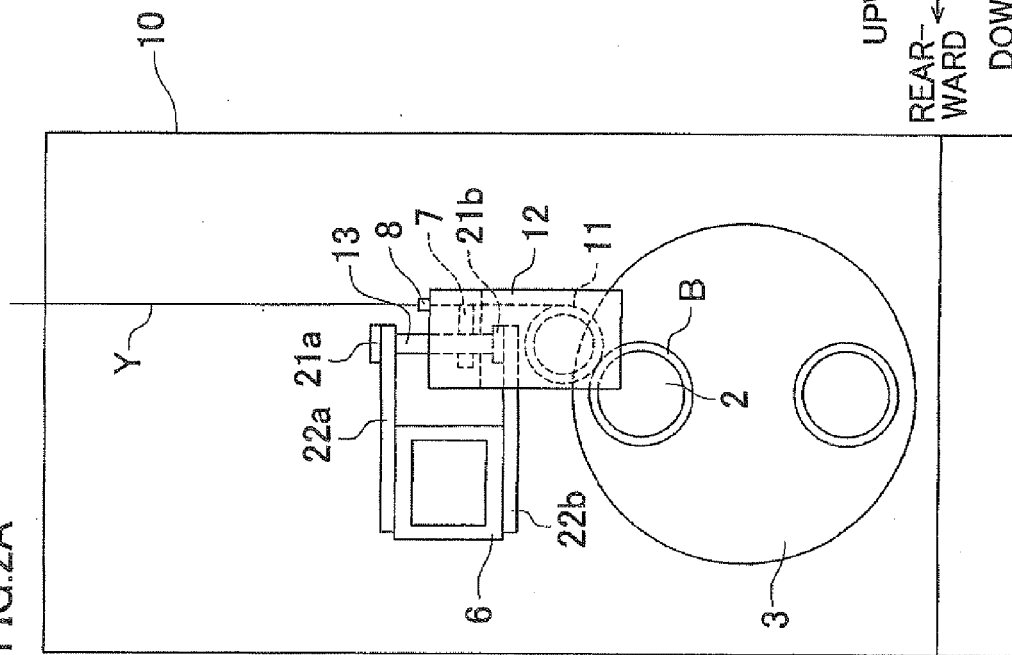


FIG.2B

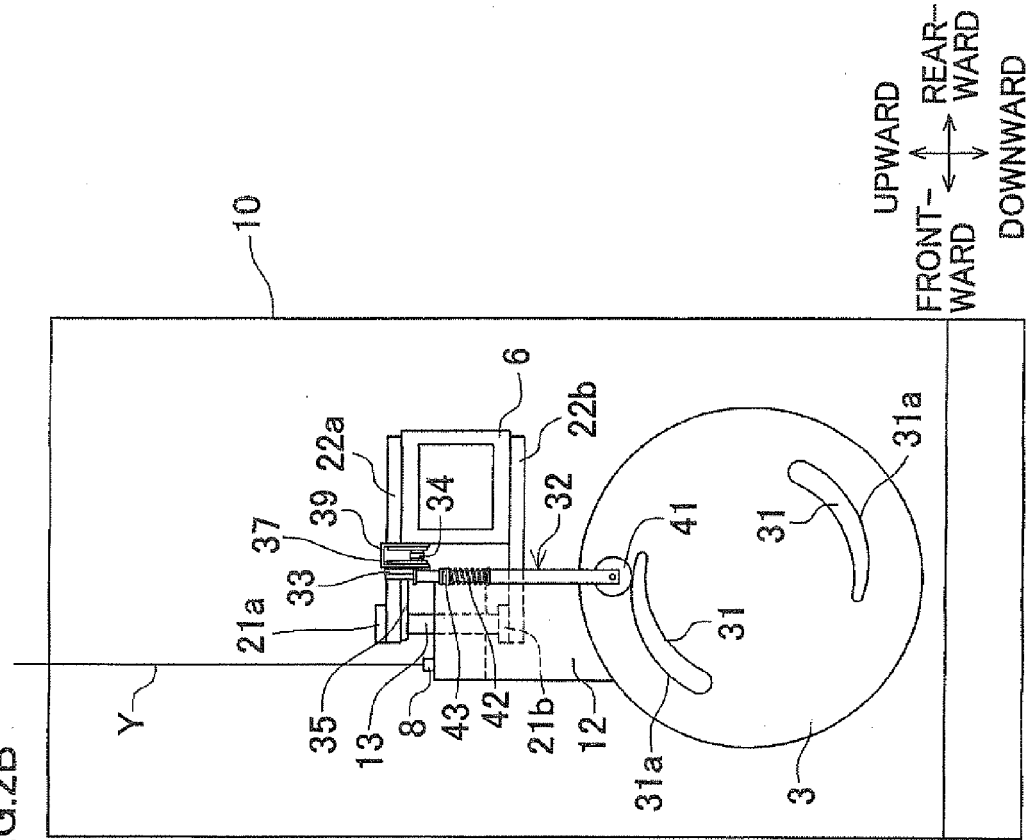


FIG.3A

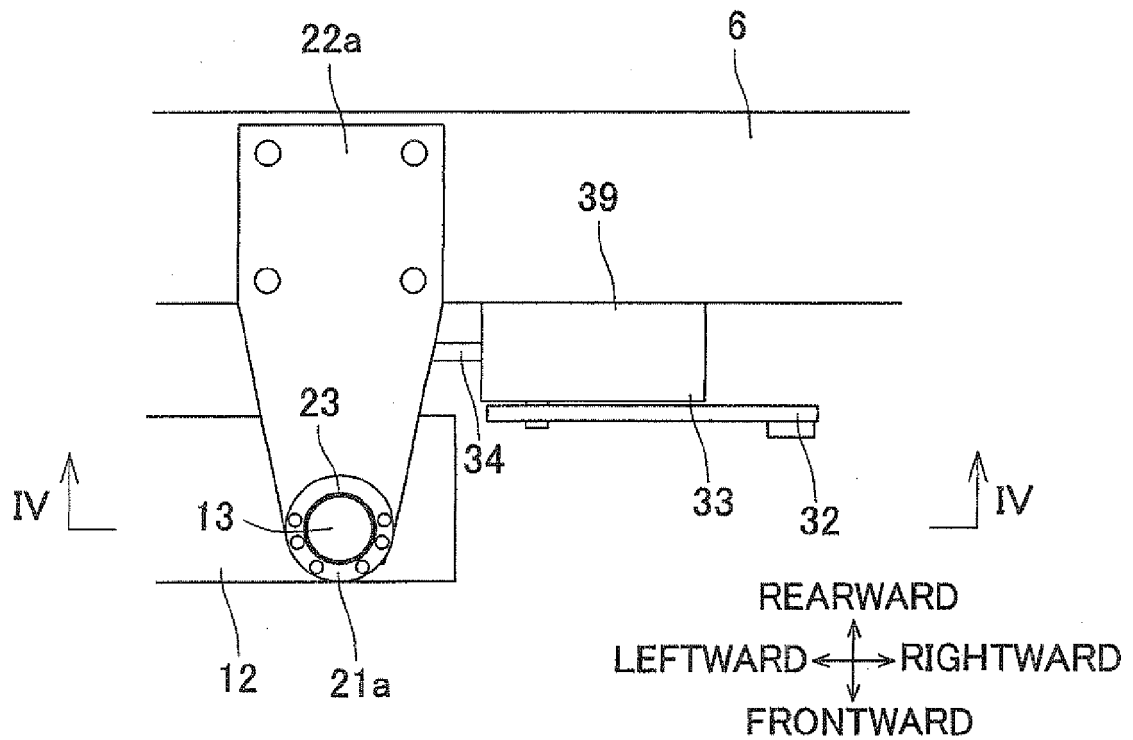
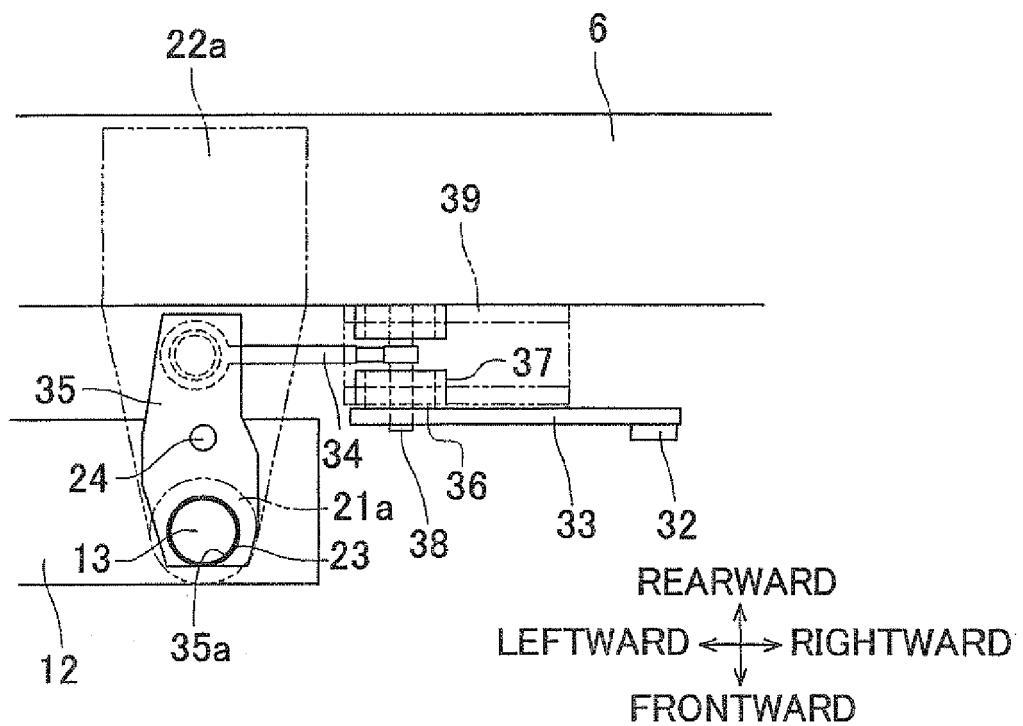


FIG.3B



4. G. E.

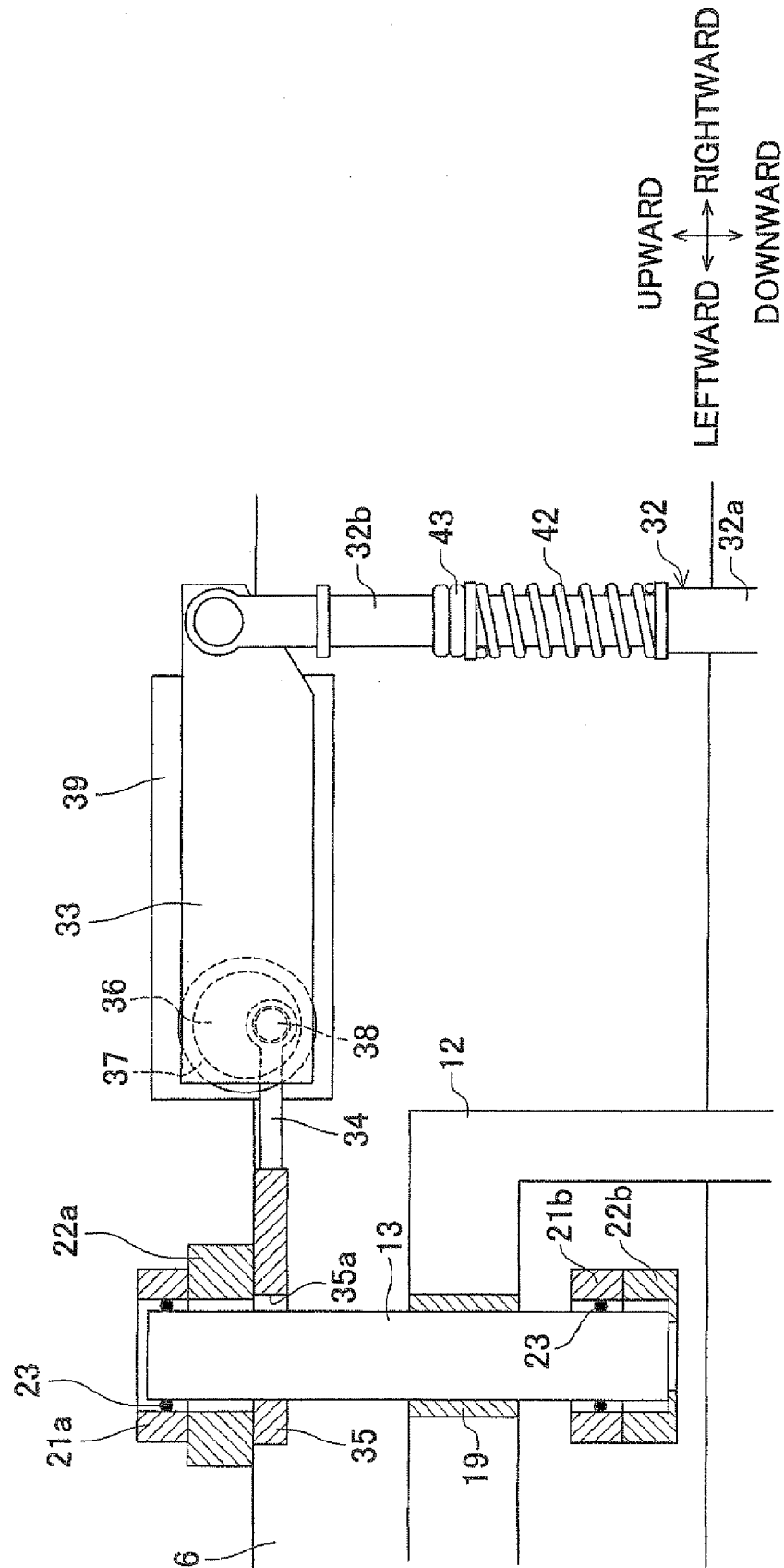


FIG.5A

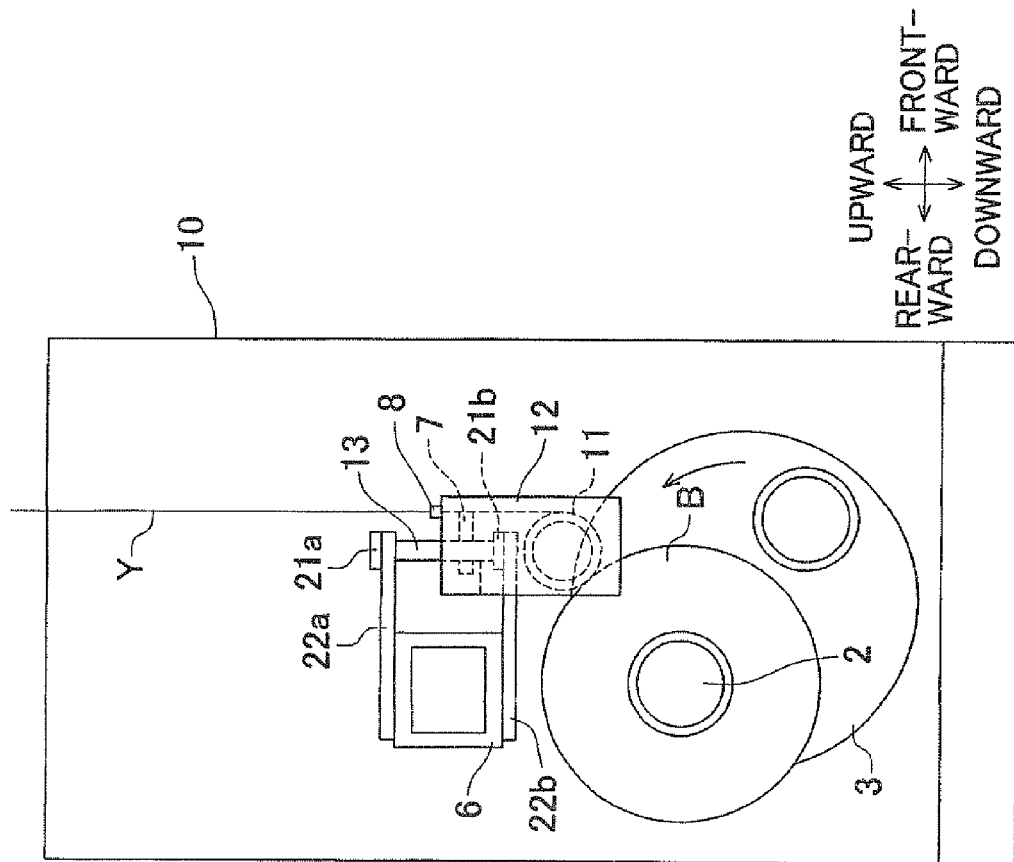
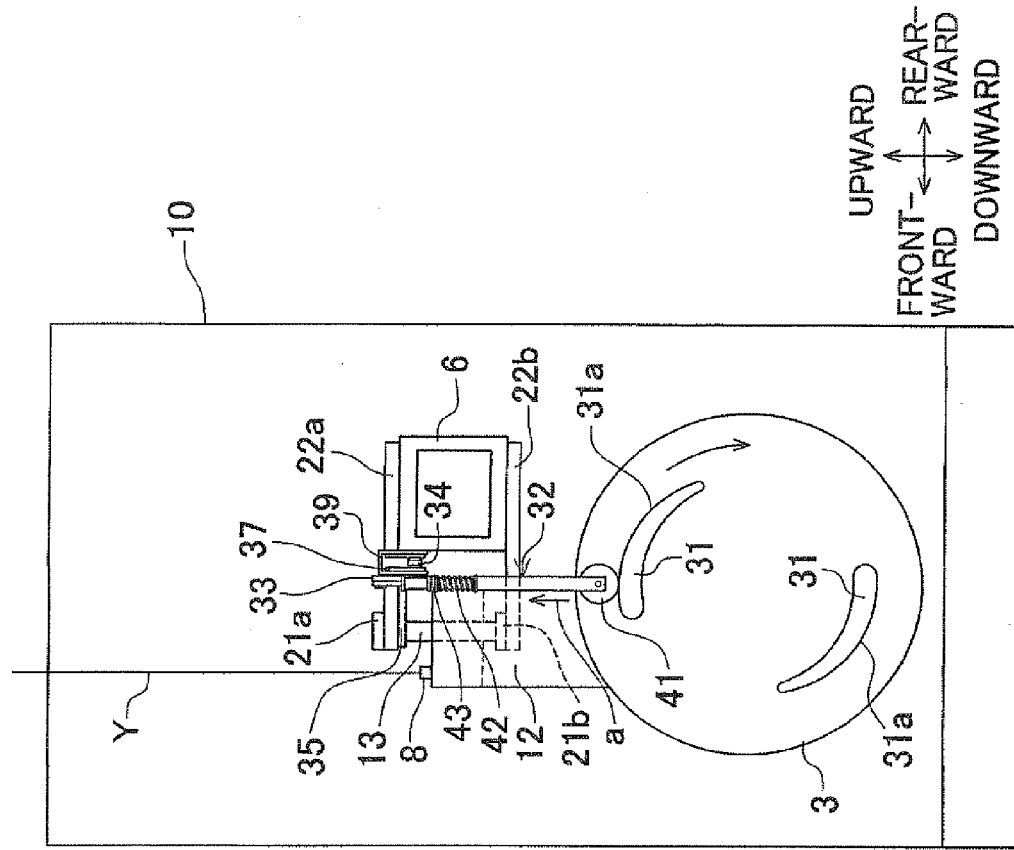


FIG.5B



GGF

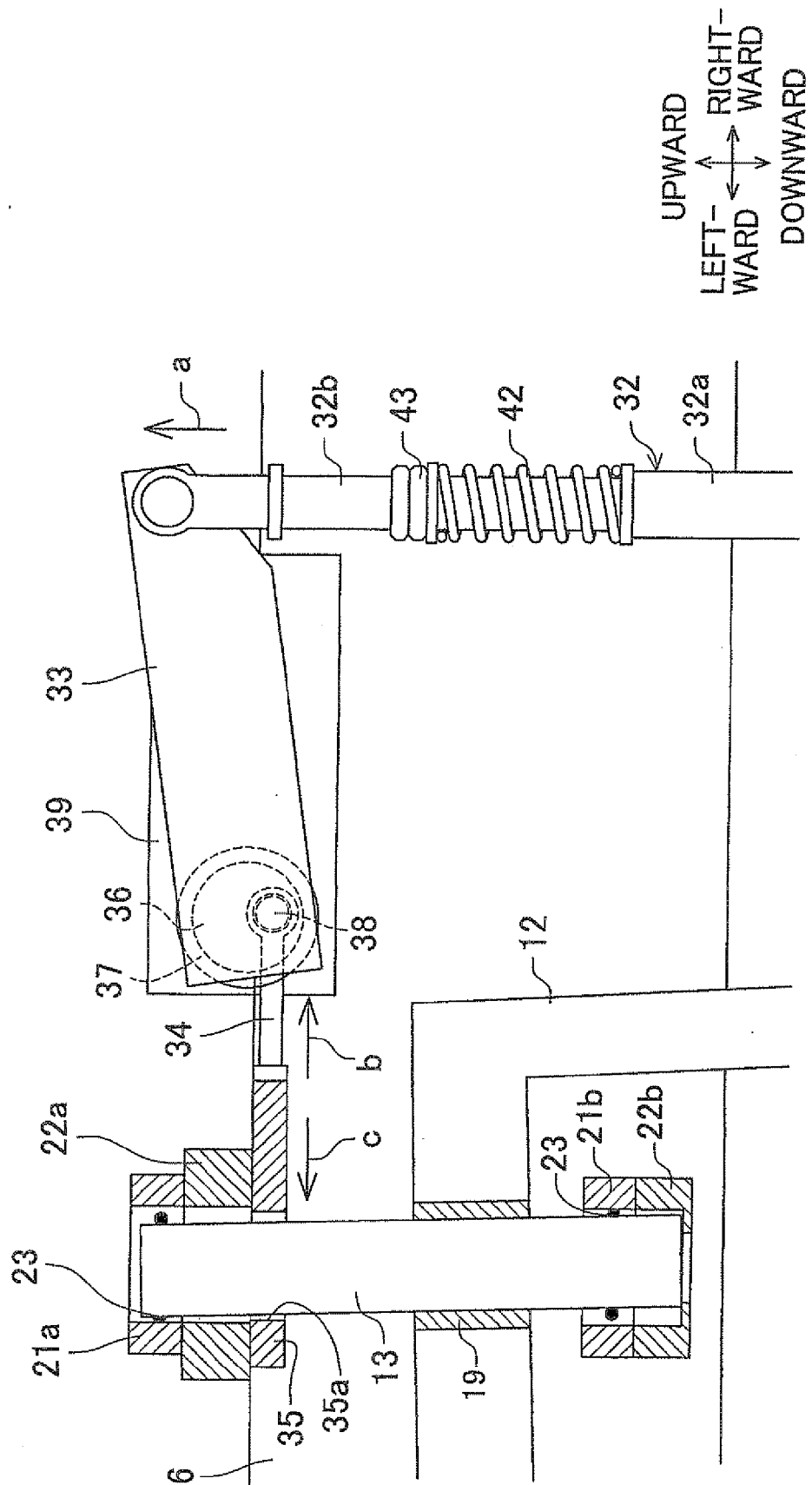


FIG. 7

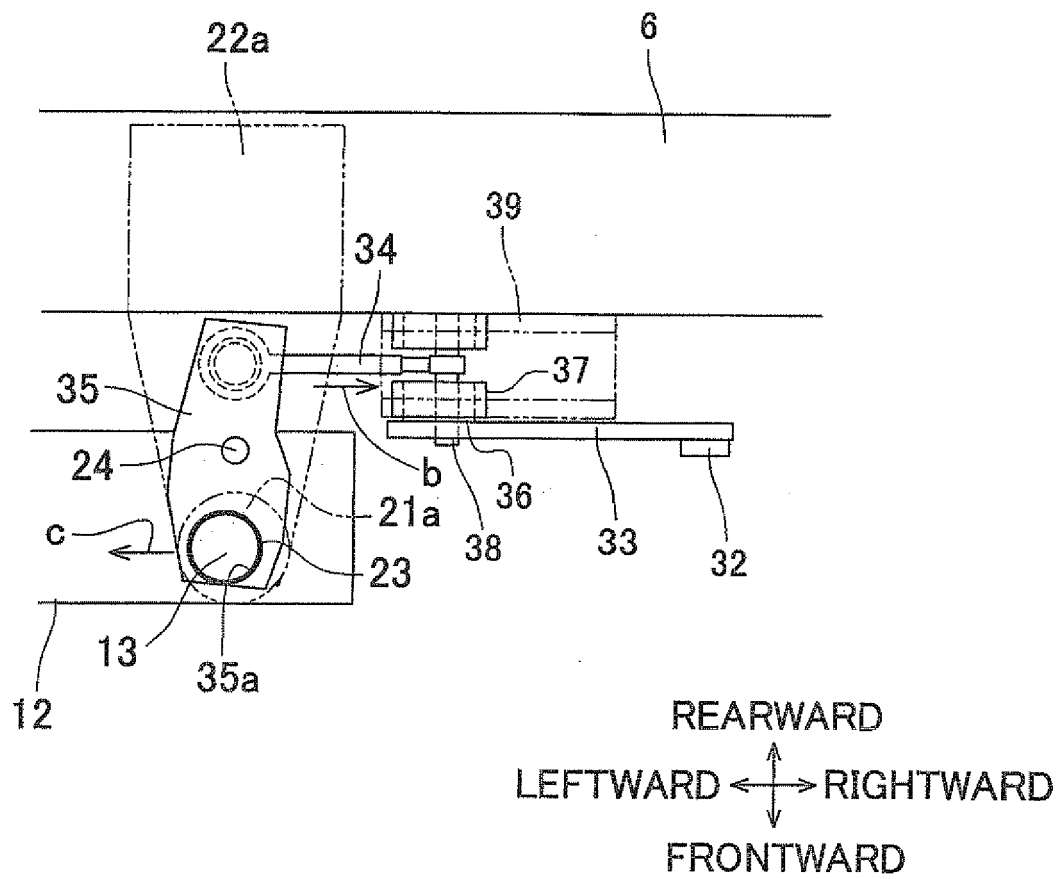


FIG.8

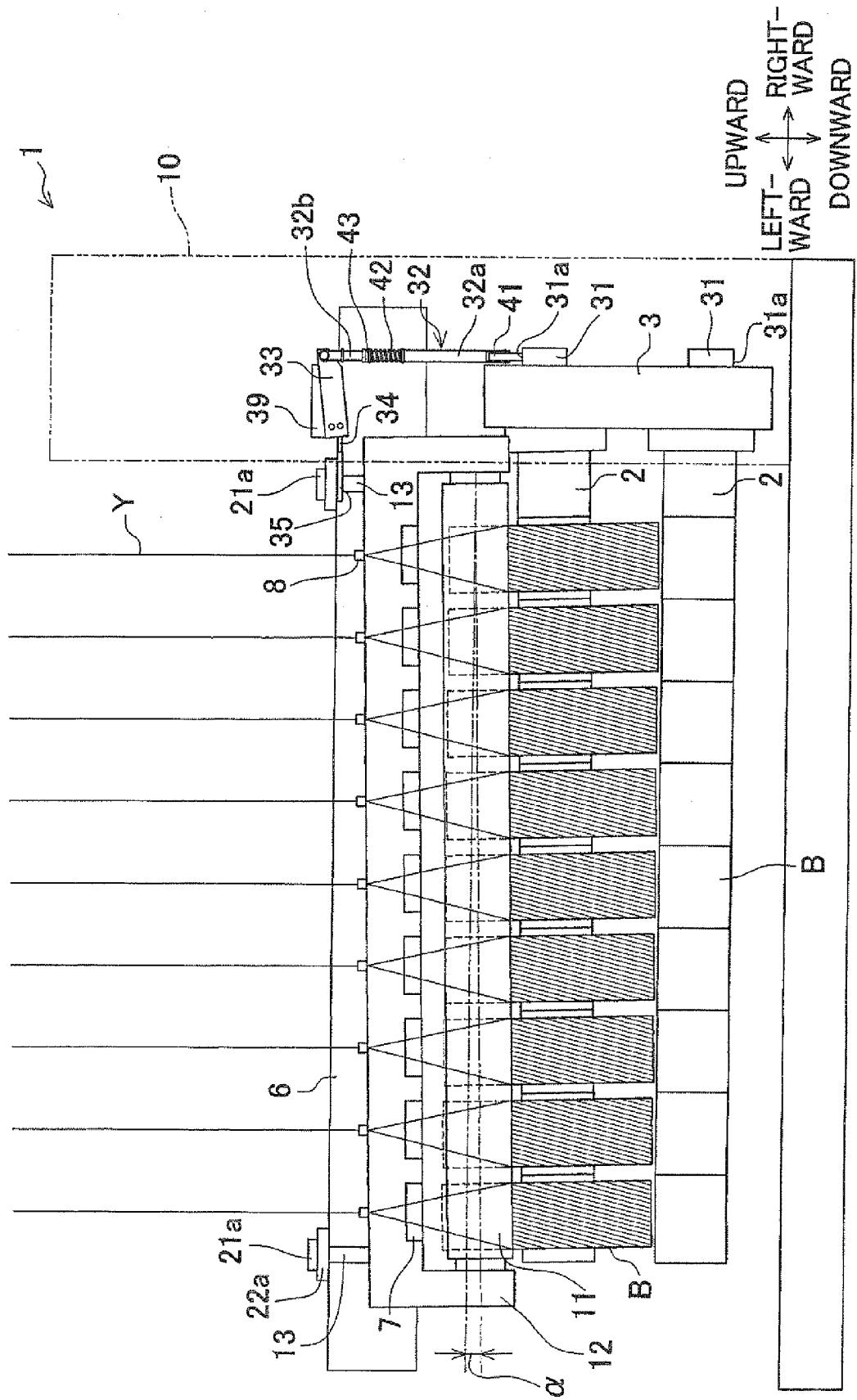


FIG.10

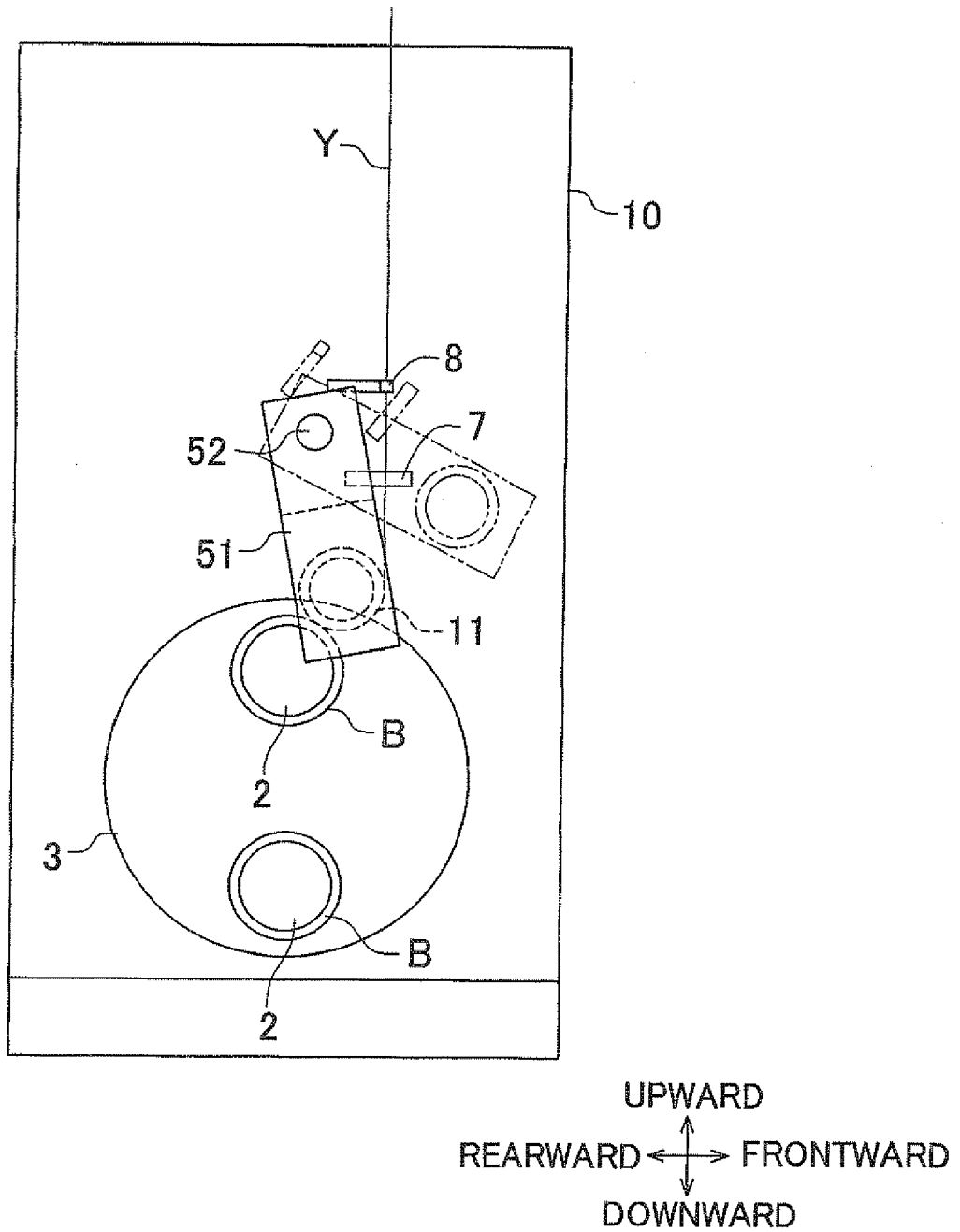


FIG.11

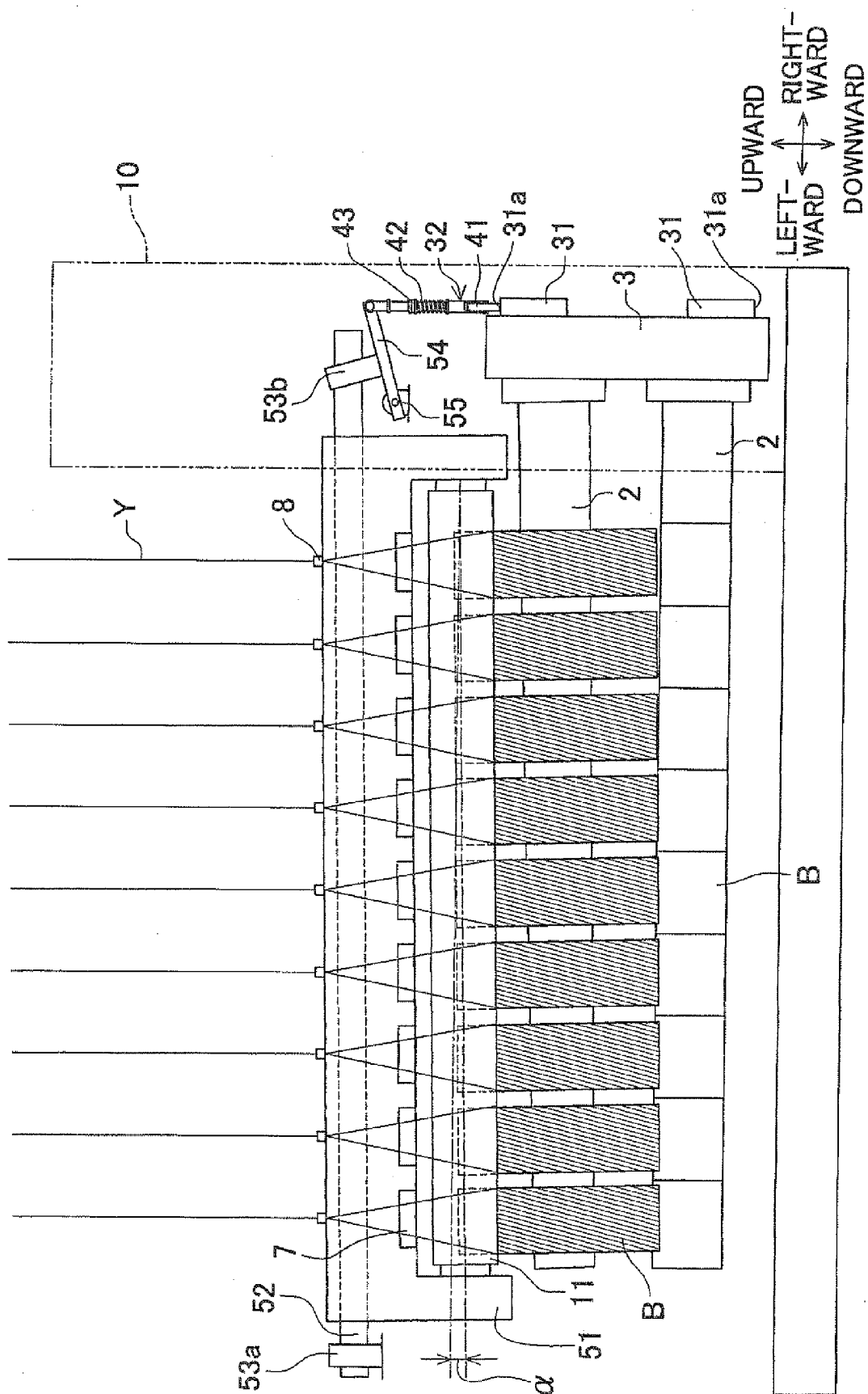
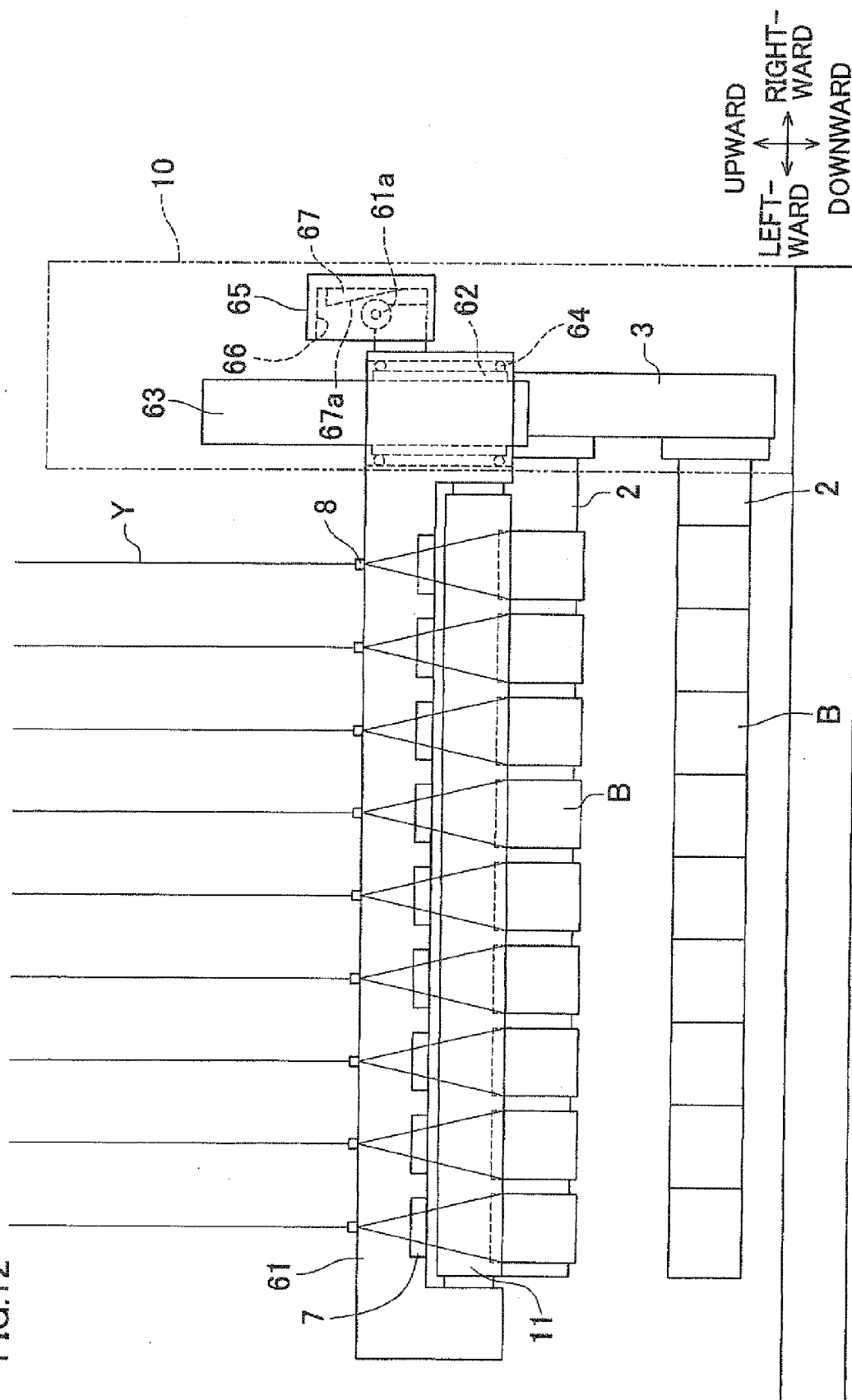
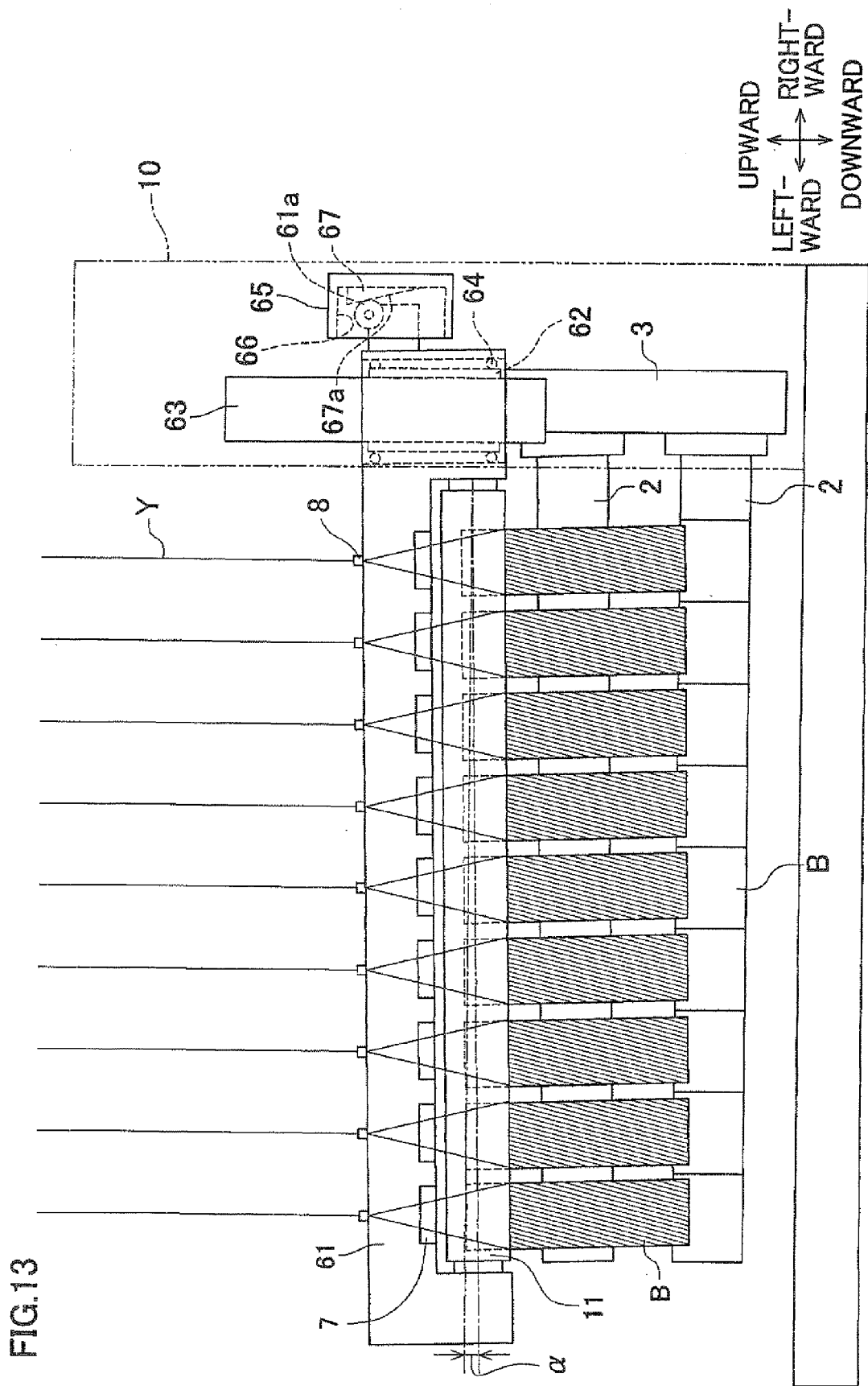


FIG.12





REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 8310723 A [0002] [0004] [0005]