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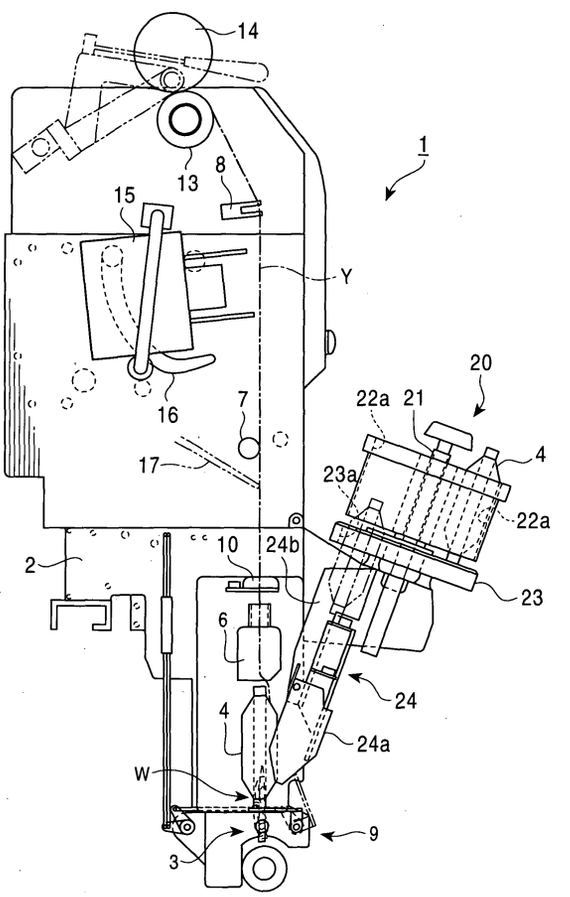
(54) Automatic winder

(57) The present invention improves the shape of a yarn path to reduce the load on a yarn to increase a winding speed, while still preventing the tension breakage of the yarn and an increase in the amount of fluffs. An automatic winder includes a magazine type bobbin housing device 20, a holding device 3 for yarn supplying bobbins 4, and a bobbin chute 24 that guides a bobbin 4 falling from the bobbin housing device 20 to the holding device 3. The holding device 3 is provided with a first pawl 31 and a second pawl 32 which operate as holding means for the bobbins 4 and rotative moving shafts 33 and 34 which rotatively move both pawls 31 and 32. A bottom guide 24b of the bobbin chute 24 is adapted to be pivotable with respect to a main body 24a. Accordingly, when the bobbin chute 24 is closed, a path is formed through which the falling bobbin 4 is guided. Rotatively moved positions of the first pawl 31 include a position at which the first pawl 31 receives the bobbin 4 from the bobbin housing device 20, a position at which the first pawl 31 holds the bobbin during a winding operation, and a position at which the first pawl 31 discharges the bobbin to a side of a frame 2 (Fig. 1).

FIG. 1



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Description

Field of the Invention

[0001] The present invention relates to an automatic winder comprising a magazine type bobbin housing device, a holding device for yarn supplying bobbins, and a bobbin chute that guides a bobbin falling from the bobbin housing device to the holding device.

Background of the Invention

[0002] An automatic wider has hitherto been known which comprises winding units for respective spindles each winding unit being provided with a magazine type bobbin housing device as a source of yarn supplying bobbins. For example, such a technique is disclosed in the Japanese Utility Model Application Publication (Jikko-Hei) No. 8-1252. Such an automatic winder has a large number of winding units arranged in line. Accordingly, the magazine type bobbin housing device is located at a side of (with respect to the direction in which the winding units are arranged in parallel) a frame of each winding unit. Then, a bobbin is supplied to the winding unit by being slidably dropped from the housing device at the side of the frame to a peg provided at the bottom of the frame.

[0003] In the above conventional automatic winder, the bobbin is supplied to the bottom of the unit frame from a direction inclined from the vertical direction.

[0004] The bobbin is then held by the peg while remaining in the inclined posture. In this case, the yarn is drawn out in the direction of the axis of the bobbin so as to be appropriately unwound. Since the bobbin is held in the inclined posture, naturally enough, the axial direction is inclined. Thus, the yarn runs from the bobbin located at the bottom of the frame to a traverse drum (winding package) located at the top of the frame while being bent. When the yarn path is bent, the yarn contacts with guides or the like on the yarn path while being bent. This contact resistance is accumulated in the yarn. Furthermore, as the amount of yarn in a bobbin 4 decreases, unwinding tension increases rapidly regardless of the shape of the yarn path. Specifically, if the yarn path is bent, the load on the yarn increases, so that the tension breakage of the yarn is likely to occur. The yarn may undergo more damage to increase the amount of fluffs generated. Accordingly, the speed at which the yarn is wound is limited in order to prevent the tension breakage and the increase in the amount of fluffs.

[0005] It is thus an object of the present invention to improve the shape of the yarn path to reduce the load on the yarn to increase the winding speed.

Summary of the Invention

[0006] The problems to be solved by the present invention have been described. Means for solving these problems will be described below.

[0007] According to Claim 1, there is provided an automatic winder comprising a magazine type bobbin housing device, a holding device for yarn supplying bobbins, and a bobbin chute that guides a bobbin falling from the bobbin housing device to the holding device, wherein the holding device is provided with holding means for holding the bobbins and rotative moving means for the holding means.

[0008] In Claim 2, the bobbin chute is configured so that at least its bottom portion can be opened and closed, and when the bobbin chute is closed, a path is formed through which the falling bobbin is guided.

[0009] In Claim 3, rotatively moved positions of the holding means include a position at which the holding means receives a bobbin from the bobbin housing device, a position at which the holding means holds the bobbin during a winding operation, and a position at which the holding means discharges the bobbin to a side of a frame.

[0010] In Claim 4, at the position at which the holding means holds the bobbin during said winding operation, the holding means holds the bobbin in such a posture as sets an axis of the bobbin to extend in a vertical direction and makes a yarn path of a yarn unwound from the bobbin a straight line.

Brief Description of the Drawings

[0011]

Figure 1 is a front view showing a winding unit.
Figure 2 is a front view showing the lower part of a frame where a first pawl is at a receiving position.
Figure 3 is a front view showing the lower part of the frame where the first pawl is at a working position.
Figure 4 is a front view showing the lower part of the frame where the first pawl is at a discharging position.

Detailed Description of the Preferred Embodiments

[0012] With reference to the drawings, a description will be given of an embodiment of an automatic winder according to the present invention.

[0013] The automatic winder according to the present embodiment is composed of a large number of winding units 1 arranged in line and a control device for the winding units 1, 1, ... In this case, one winding unit 1 corresponds to each spindle. In each drawing, the direction in which the winding units 1 are arranged in line using the control device side as a reference corresponds to the direction in which the reader views the automatic winder from its front.

[0014] The configuration of the winding unit 1 will be described with reference to Figure 1.

[0015] A holding device 3 for bobbins 4 is provided at

the bottom of a frame 2 of the winding unit 1. Yarn supplying bobbins 4 are held in the holding device 3. A yarn Y is unwound and drawn upward from the bobbin 4. The yarn Y is wound into a winding package 14 via a traverse drum 13 provided at the uppermost position of the frame 2. Various devices are arranged on a yarn path extending from the bobbin 4 to the winding package 14. These devices include a balloon controller 6, a guide plate 10, a disk or gate type tenser 7 that applies a predetermined tension to the yarn Y, and a slab catcher 8 that detects a defect in a yarn Y. These devices are arranged in this order from the bobbin 4 located at the most upstream position of the yarn path to a downstream side (upward). A splicer 15 is provided at a side of the yarn path to carry out yarn splicing. During yarn splicing, an upper yarn on the package 14 side is guided by a suction mouth 16 to the splicer 15. A lower yarn on the bobbin 4 side is guided by a suction pipe 17.

[0016] The winding unit 1 is provided with a magazine type bobbin housing device 20 as a source of yarn supplying bobbins 4. The bobbin housing device 20 comprises a magazine can 22 that rotates intermittently around a central shaft 21. A plurality of housing holes 22a for the bobbins 4 are formed in the magazine can 22 like a magazine. A stop plate 23 is fixedly provided around a lower part of the central shaft 21 to prevent the bobbin 4 from inadvertently falling from the bottom of the magazine can 22. The stop plate 23 is formed with a through-hole 23a corresponding to one of the plurality of housing holes 22a. The bobbin 4 can fall downward through the through-hole 23a. That is, the bobbin 4 is fed by intermittently driving the magazine can 22. Furthermore, a bobbin chute 24 is provided in association with the through-hole 23a to guide the bobbin 4 along its falling path. The bobbin 4 falls down to the holding device 3 via the bobbin chute 24. The bobbin housing device 20 and the bobbin chute 24 are supported by the frame 2.

[0017] The bobbin housing device 20 is located at a side of the frame 2 of each winding unit 1. The magazine can 22 takes such a posture as points the housing holes 22a toward the holding device 3 side so that the bobbin 4 falls in a direction inclined from the vertical direction.

[0018] A description will be given of the tension breakage of a yarn Y and the generation of fluffs attributed to the shape of the yarn path. The yarn Y unwound from the bobbin 4 is drawn out in the axial direction of the bobbin 4 so as to be appropriately unwound. Thus, if the winding package 14 (traverse drum 13), into which the yarn Y is wound, is offset from the axial direction of the bobbin 4, the yarn path may be bent. Figure 2 shows the posture of the bobbin 4 during a fall. In a winding unit in which the yarn is unwound from the bobbin maintaining the same posture as that taken during a fall (in contrast to the present embodiment), the axis of the bobbin is inclined. Consequently, the yarn path leading to the traverse drum, located immediately above the bobbin 3, is bent.

[0019] Guide members such as the guide plate 10 are provided on the yarn path as means for guiding the yarn Y. If the yarn path is bent, contact resistance resulting from bending associated with the guide member is accumulated in the yarn Y. In addition, as the amount of yarn Y in the bobbin 4 decreases, unwinding tension increases rapidly regardless of the shape of the yarn path. Thus, if the yarn path is bent, the load on the path increases, so that the tension breakage of the yarn Y is likely to occur. The yarn Y may undergo more damage to increase the amount of fluffs generated. Accordingly, the speed at which the yarn Y is wound is limited in order to prevent the tension breakage and the increase in the amount of fluffs.

[0020] To prevent the tension breakage of the yarn Y and the increase in the amount of fluffs, the winding unit 1 according to the present embodiment is adapted so that the yarn Y extending from the bobbin 4 to the winding package 14 (traverse drum 13) forms an almost straight line. Specifically, the position at which the bobbin 4 is held is set so that the axial direction of the bobbin 4, corresponding to the unwinding direction of the yarn Y, points toward the winding package 14 (traverse drum 13). The yarn path formed to extend from the bobbin 4 to the winding package 14 (traverse drum 13) forms an almost straight line.

[0021] The holding device 3 will be described with reference to Figures 2 to 4.

[0022] The holding device 3 comprises holding means for the bobbin 4 and rotative moving means for the holding means. The holding device 3 can hold the bobbin 4 in an inclined posture taken during a fall and adjust the posture of the bobbin 4 so that a winding operation can be appropriately preformed. The holding device 3 is provided with a first pawl 31 and a second pawl 32 as the holding means for the bobbin 4. The pawls 31, 32 are fixedly provided on rotative moving shafts 33, 34. The pawls 31, 32 can be pivoted in a lateral direction. The rotative moving shafts 33, 34 are composed of an internal shaft and an external shaft which are concentrically arranged and which can be rotated relative to each other. The winding units 1 are arranged in line in a longitudinal direction, while the rotative moving shafts 33, 34 define a lateral direction with respect to the longitudinal direction.

[0023] First, a description will be given of how the holding means holds and releases the bobbin 4.

[0024] The first pawl 31 and the second pawl 32 can be independently pivoted. The holding and releasing of the bobbin 4 are switched depending on the position to which the second pawl 32 is pivoted with respect to the first pawl 31. As shown in Figure 2, when the yarn supplying bobbin 4 is newly supplied, the pawls 31, 32 are closed. The bobbin 4 is dropped onto the holding device 3. At this time, both pawls 31, 32 point toward the magazine can 20. When the bobbin 4 falls, both pawls 31, 32 are inserted into a core tube 4a of the bobbin 4. The bobbin 4 is held by opening the pawls 31, 32 to abut

both pawls 31, 32 against an inner wall of the core tube 4a (in Figure 2, the "open" second pawl 32 is shown by an alternate long and two short dashes line). In this manner, the bobbin 4 is positioned and held by the holding device 3. When the bobbin 4 from which the yarn Y has been completely unwound for supply is removed from the holding device 3, the pawls 31, 32 are closed again to release the holding of the bobbin 4 by the pawls 31, 32.

[0025] A description will be given of regulating means for positioning the second pawl 32 with respect to the first pawl 31 in the "closed" state.

[0026] A pin 31a is fixedly provided on the first pawl 31 at a position where the second pawl 32 can abut against the first pawl 31. The pin 31a regulates the rotative movement of the second pawl 32 beyond the first pawl 31. In this case, if the pawls 31, 32 are "closed", when the second pawl 32 abuts against the pin 31a, the second pawl 32 is positioned with respect to the first pawl 31. Accordingly, in the "closed" state, the pawls 31, 32 are always appropriately positioned relative to each other.

[0027] Now, a description will be given of the adjustment of posture of the bobbin 4 using the rotative moving means of the holding means.

[0028] Both first pawl 31 and second pawl 32 can be pivoted. Accordingly, the first pawl 31 and the second pawl 32 can be pivoted while holding the bobbin 4, to change the posture in which the bobbin 4 is held. In this case, three stopped positions are set for the rotative moving first pawl 31. At the first stopped position, as shown in Figure 2, the first pawl 31 is stopped so as to point toward the magazine can 21 (receiving position S). The receiving position S of the first pawl 31 is a rotatively moved position at which the holding means receives the bobbin 4 from the bobbin housing device 20. At the second stopped position, as shown in Figures 1 and 3, the first pawl 31 is stopped so as to point toward the traverse drum 13 (winding package 14) (working position W). The working position W of the first pawl 31 is a rotatively moved position at which the holding means holds the bobbin 4 during a winding operation. At the third stopped position, as shown in Figure 4, the first pawl 31 is stopped so as to point toward the outside of the magazine can 21 (discharging position E). When the first pawl 31 is at the discharging position E, the bobbin 4 is discharged to a side of the frame 2.

[0029] By setting the holding means at the three rotatively moved positions as described above, it is possible to switch the posture of the bobbin 4 held by the holding means, to the one suitable for the reception of the bobbin 4, the unwinding of a yarn Y from the bobbin 4, or the discharge of the bobbin 4.

[0030] Wherever the first pawl 31 is stopped, the second pawl 32 can be pivoted with respect to the first pawl 31. It is thus possible to hold or release the bobbin 4 regardless of the stopped position of the first pawl 31. With the bobbin 4 held by both pawls 31, 32, when the first pawl 31 is rotatively moved to the working position W, the bobbin 4 is pointed toward the traverse drum 13 while remaining held (winding package 14). Then, when a winding operation is started in this state, the tension breakage or the increase in the amount of fluffs can be prevented. The case in which the first claw 31 is at the discharging position E will be described later when a discharging device 9 is described.

[0031] As described above, the holding means for the bobbin 4 is composed of the first pawl 31, the second pawl 32, and the rotative moving shaft 34, which rotatively moves the second pawl 32 with respect to the first pawl 31. The holding means can hold and release the bobbin 4. Furthermore, as means for rotatively moving the holding means, there are provided the rotative moving shaft 33, which rotatively moves the first pawl 31, and the rotative moving shaft 34, which rotatively moves the second pawl 32 in unison with the first pawl 31. The holding means can change the posture of the bobbin 4 held by the holding means.

[0032] Thus, in the winding unit 1, provided in the automatic winder, even if the bobbin housing device 20 is located at a side of the frame 2 and the new bobbin 4 is supplied by being dropped from an inclined direction, the posture of the bobbin 4 during the fall can be changed so that it can be held in a different posture. Then, by holding the bobbin 4 so that the yarn path of the yarn Y unwound from the bobbin 4 forms a straight line (the axis of the bobbin 4 extends in the vertical direction), it is possible to prevent the tension breakage or the increase in the amount of fluffs.

[0033] Furthermore, the holding means for the bobbin 4 and the rotative moving means for the holding means are simultaneously constituted simply by providing the holding device 3 with the pair of pawl members composed of the first pawl 31 and the second pawl 32 so that the pawls can be pivoted. Thus, the simple device configuration can be used to hold the bobbin and to adjust the posture of the bobbin.

[0034] The discharging device 9 will be described with reference to Figures 2 to 4.

[0035] The discharging device 9 for the bobbin 4 is located at the bottom of the frame 2 adjacent to the holding device 3. The discharging device 9 removes the empty bobbin 4 from which all the yarn Y has been unwound, and then discharges it to a side of the frame 2. Once the unwanted bobbin 4 is removed from the holding device 3, the new yarn supplying bobbin 4 is supplied to the holding device 3.

[0036] The discharging device 9 is provided with a discharging plate 25 and a rotative moving shaft 26 that rotatively moves the discharging plate 25. The discharging plate 25 is formed to appear concave in a plan view (not shown in the drawings). The discharging plate 25 has a recess portion 25a through which the first pawl 31 and the second pawl 32 can escape. This prevents the discharging plate 25 from contacting with the pawls 31, 32. As shown in Figures 2 and 3, the pawls 31, 32 and

the discharging plate 25 can be arranged so as to appear superimposed on one another in a front view. Except during the discharge of the empty bobbin 4, the discharge plate 25 is stopped so as to incline toward the frame 2. Consequently, the discharge plate 25 does not contact with the core tube 4a of the bobbin 4.

[0037] To form a discharging path P through which the discharging deice 9 discharges the empty bobbin 4, the bobbin chute 24 is provided with the arrangements described below.

[0038] A bottom guide 24b is provided at the bottom of the bobbin chute 24 so as to be pivotable with respect to a main body 24a of the bobbin chute 24. The bottom guide 24b normally (except during the discharge of the empty bobbin 4) takes a posture in which it lies along the falling path of the bobbin 4 which extends from the magazine can 22 to the holding device 3. It is assumed that in this posture, the bottom guide 24b is located at a guide position. On this occasion, the bottom guide 24b functions as a guide for the falling path of the bobbin 4. Furthermore, while the empty bobbin 4 is being discharged, the bottom guide 24b takes a posture in which it lies offset from the falling path of the bobbin 4 extending from the magazine can 22 to the holding device 3. As shown in Figure 4, in the present embodiment, the bottom guide 24 points in the vertical direction. It is assumed that in this posture, the bottom guide 24b is at a guide stopping position. In this case, the bottom guide 24b does not function as a part of the falling path of the bobbin 4.

[0039] A description will be given of an operation of discharging the empty bobbin 4.

[0040] First, the first pawl 31 is rotatively moved to the discharging position E and then stopped. At this time, the second pawl 32 operates in unison with the first pawl 31 in order to keep holding the empty bobbin 4. Subsequently, the second pawl 32 is rotatively moved to "close" the pawls 31, 32 to release the bobbin 4. At the same time, a bottom portion of the bobbin chute 24 is opened so that the bobbin 4 on the holding device 3 can be discharged to the outside (toward the right end of the figure) of the frame 2. Specifically, the bottom guide 24b pivots from the guide position to the guide stopping position. Then, the discharging plate 25 stopped so as to incline toward the frame 2 rotatively moves toward the outside of the frame 2. The discharging plate 25 thus abuts against a bottom surface of the core tube 4a to push the bobbin 4 to the outside of the frame 2. In this manner, the empty bobbin 4 is discharged from the winding unit 1.

[0041] When the bobbin chute 24 is configured as described above, it is located close to the holding means composed of the pawls 31, 32. This ensures the delivery of the bobbin 4 to the holding means, while preventing the bobbin chute 24 from obstructing the discharge of the empty bobbin 4.

[0042] The configuration of the bobbin chute 24 is not limited to the one in which the bobbin chute 24 is provided with the bottom guide 24b, which can pivot with respect to the main body 24a. To form the discharging path P through which the discharging device 9 discharges the bobbin 4, it is possible to use other configurations provided that at least the bottom portion of the bobbin chute 24 can be opened and closed and that in the closed state, a path is formed through which the falling bobbin is guided.

[0043] As set forth in Claim 1, the present invention provides an automatic winder comprising a magazine type bobbin housing device, a holding device for yarn supplying bobbins, and a bobbin chute that guides a bobbin falling from the bobbin housing device to the holding device, wherein the holding device is provided with holding means for holding the bobbins and rotative moving means for the holding means. Accordingly, even if the bobbin housing device is located at a side of the frame and the new bobbin is supplied by being dropped from an inclined direction, the posture of the bobbin during the fall can be changed so that it can be held in a different posture. Moreover, the bobbin can be held so that the yarn path of the yarn unwound from the bobbin forms a straight line (the axis of the bobbin extends in the vertical direction). This makes it possible to prevent the tension breakage or the increase in the amount of fluffs.

[0044] As set forth in Claim 2, the bobbin chute is configured so that at least its bottom portion can be opened and closed, and when the bobbin chute is closed, a path is formed through which the falling bobbin is guided. Accordingly, the bobbin chute 24 is located close to the holding means. This ensures the delivery of the bobbin from the bobbin housing deice to the holding means, while preventing the bobbin chute from obstructing the discharge of the empty bobbin.

[0045] As set forth in Claim 3, rotatively moved positions of the holding means include a position at which the holding means receives a bobbin from the bobbin housing device, a position at which the holding means holds the bobbin during a winding operation, and a position at which the holding means discharges the bobbin to a side of a frame. This makes it possible to switch the posture of the bobbin held by the holding means, to the one suitable for the reception of the bobbin, the unwinding of a yarn from the bobbin, or the discharge of the bobbin.

Claims

1. An automatic winder comprising a magazine type bobbin housing device, a holding device for yarn supplying bobbins, and a bobbin chute that guides a bobbin falling from the bobbin housing device to the holding device, the automatic winder being **characterized in that** said holding device is provided with holding means for holding the bobbins and rotative moving means for the holding means.

2. An automatic winder according to Claim 1, **characterized in that** the bobbin chute is configured so that at least its bottom portion can be opened and closed, and when the bobbin chute is closed, a path is formed through which the falling bobbin is guided.

3. An automatic winder according to Claim 1 or Claim 2, **characterized in that** rotatively moved positions of the holding means include a position at which the holding means receives a bobbin from the bobbin housing device, a position at which the holding means holds the bobbin during a winding operation, and a position at which the holding means discharges the bobbin to a side of a frame.

4. An automatic winder according to Claim 3, **characterized in that** at the position at which the holding means holds the bobbin during said winding operation, the holding means holds the bobbin in such a posture as sets an axis of the bobbin to extend in a vertical direction and makes a yarn path of a yarn unwound from the bobbin a straight line.

FIG. 1

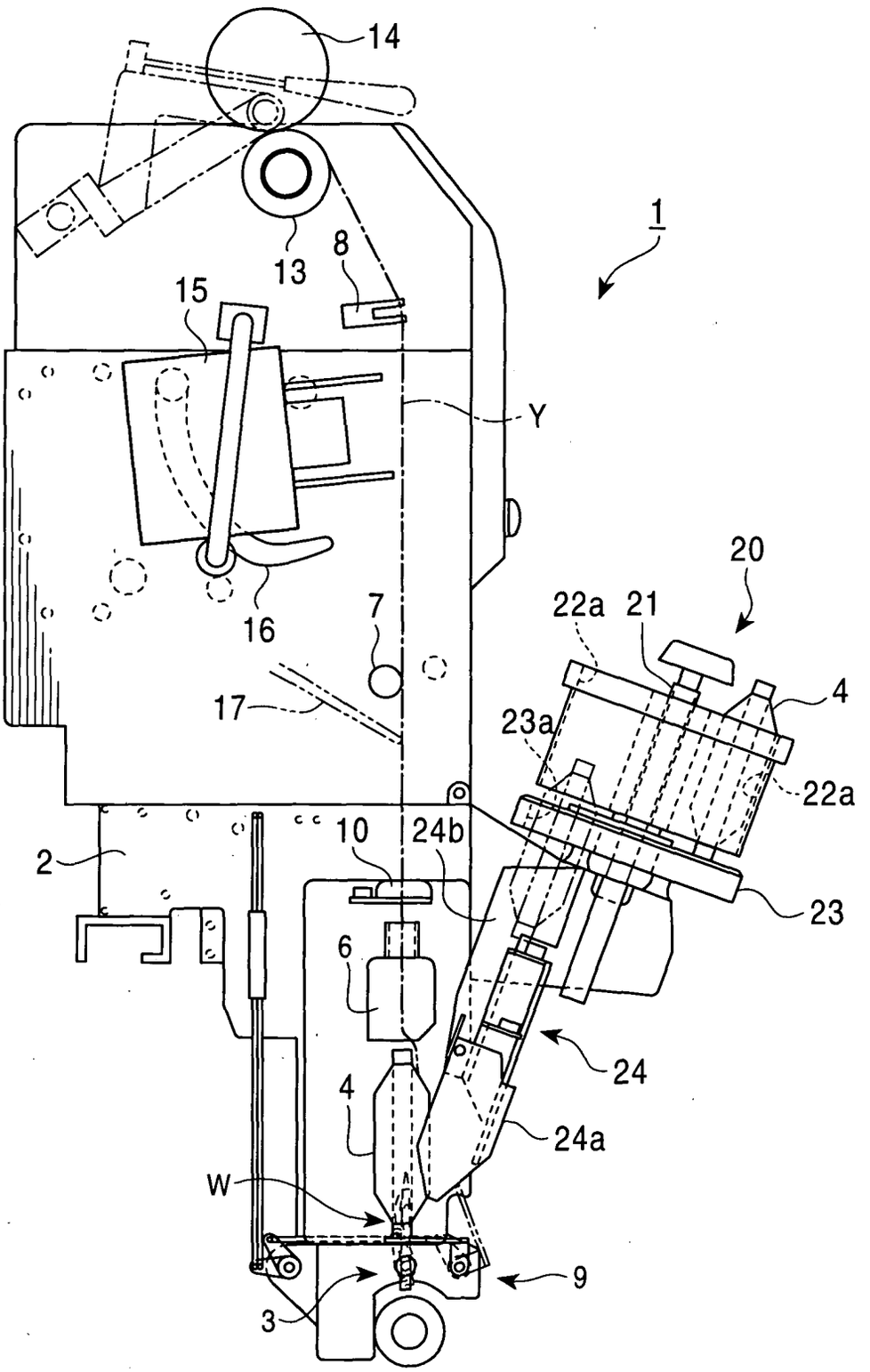

FIG. 2

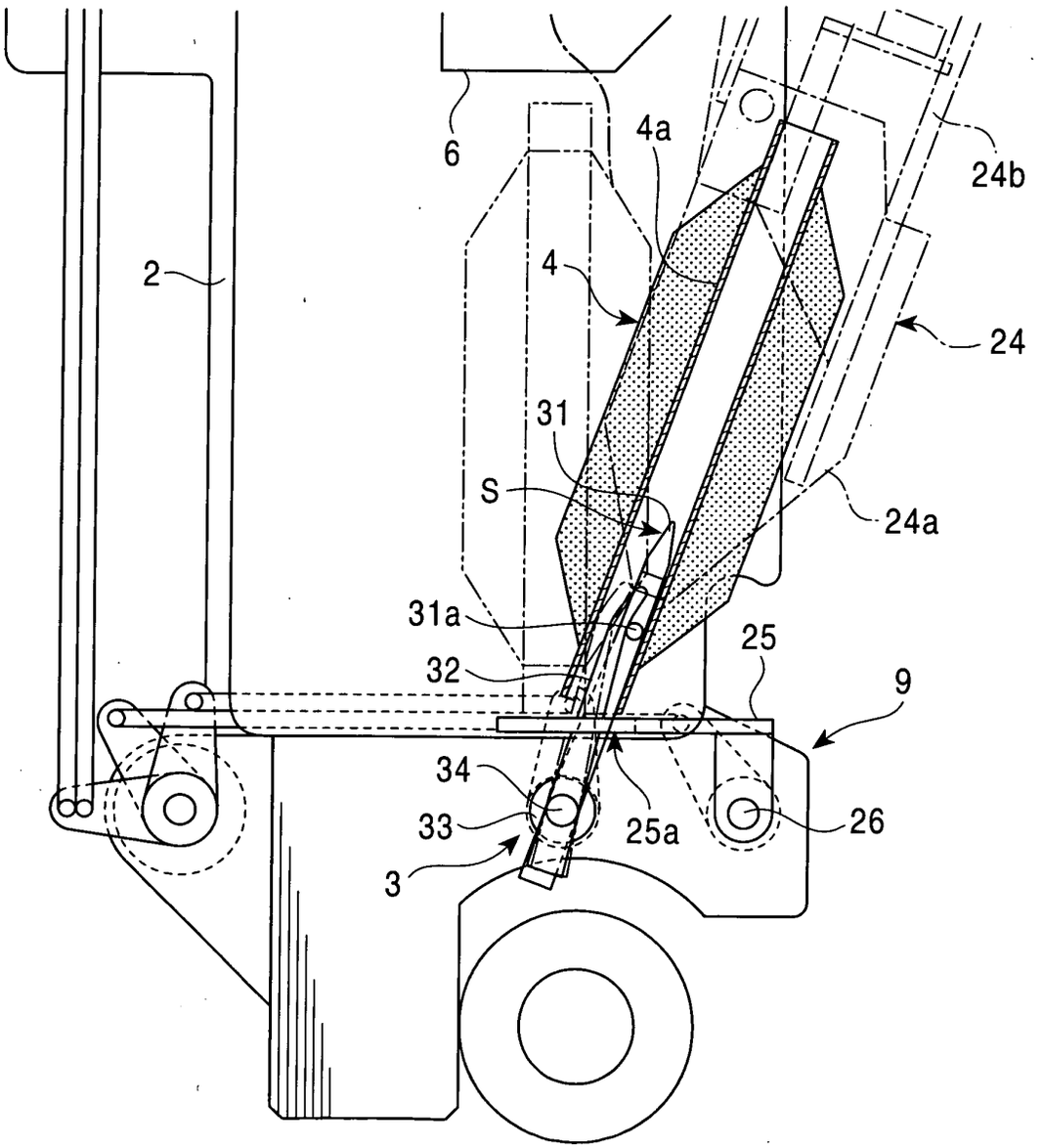

FIG. 3

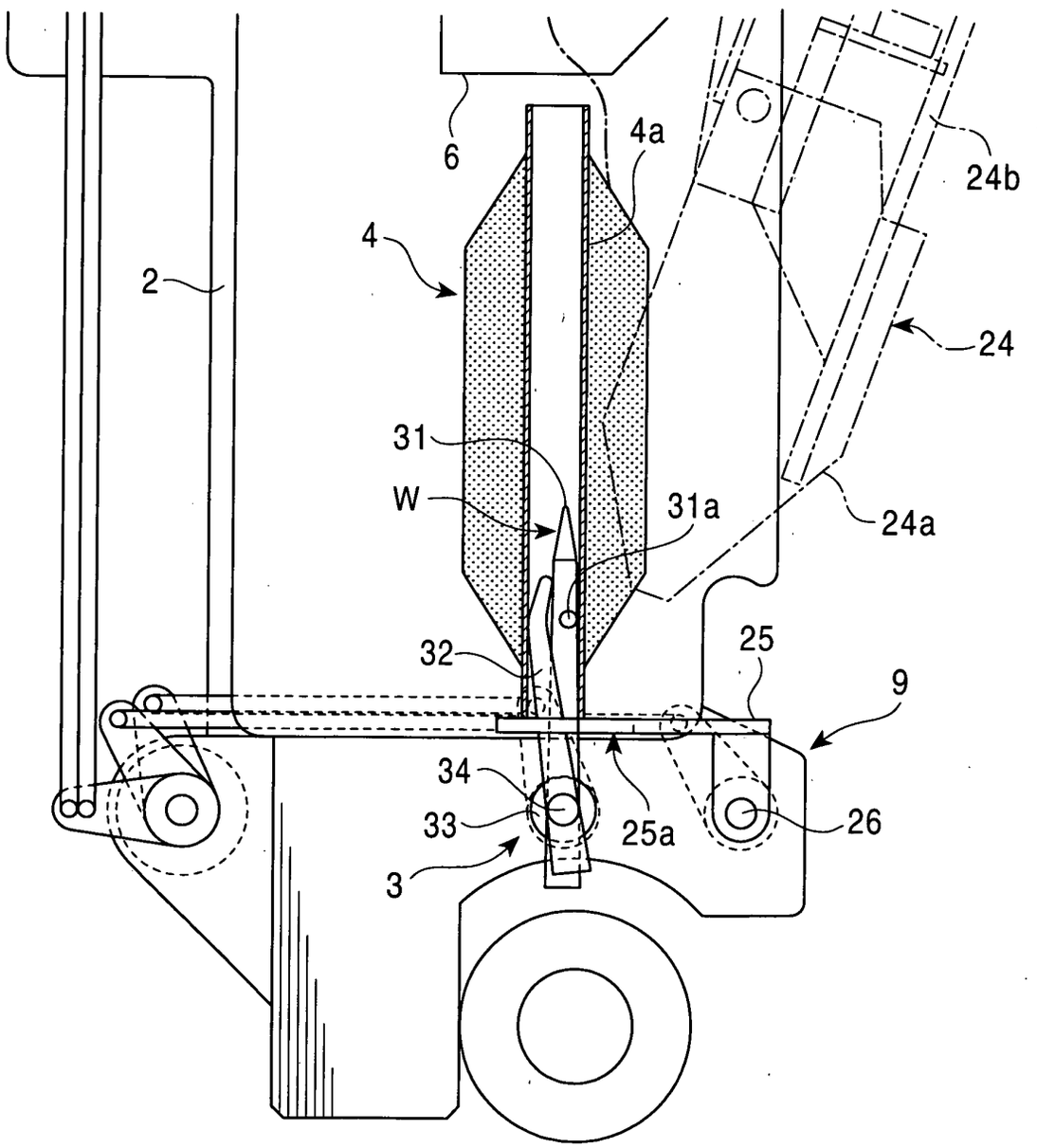

FIG. 4