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(71) Applicant:
Murata Kikai Kabushiki Kaisha
Minami-ku, Kyoto-shi, Kyoto (JP)

(72) Inventor: **Kitayama, Futoshi**
Uji-Shi, Kyoto (JP)

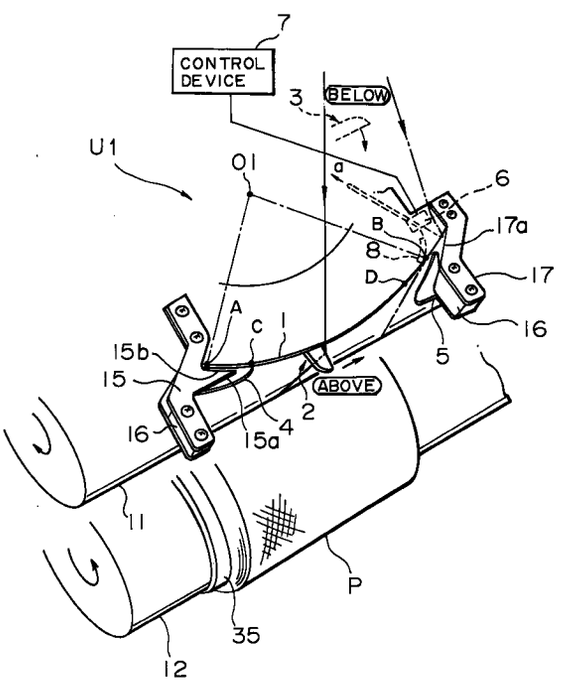
(74) Representative:
Liedl, Christine, Dipl.-Chem. et al
Albert-Rosshaupter-Strasse 65
81369 München (DE)

(54) Traverse device having rotating wings

(57) A traverse device (U1) that is able to prevent the yarn from wrapping around the base of the rotating wing (2,3) when the yarn breaks, passes the return point (A,B) and is carried by the rotating wing.

A heater (6) is arranged at a position past the return point, as a yarn cutting device for the yarn wound on the wing when a yarn break occurs and preferably, a yarn path restriction guide (8) is arranged such that the yarn passes the heater.

FIG. 1



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Description

Field of the invention

The present invention relates to a traverse device which traverses yarn by rotating two rotating wings in opposite directions along a yarn guide forming a traverse path of a yarn having return points on the left and right sides, and which transfers yarn at the aforementioned return points between the two rotating wings.

Background of the invention

A conventional traverse device such as that shown in Figure 8 is known. An arc-shaped yarn guide 101 that forms the yarn traverse path is arranged and the yarn is (reciprocally) traversed between points A and B at the left and right sides of this yarn guide. Two rotating wings 102,103 are positioned above and below this yarn guide 101 so that they enclose it. The lower rotating wing 102 is attached to a clockwise-rotating rotating shaft 104 and the upper rotating wing 103 is attached to a counter clockwise rotating hollow shaft 105 by the same axis as the rotating shaft 104. As a result, two rotating wings 102,103 rotate in opposite directions spaced apart at a predetermined spacing H. The tip 102a of the lower rotating wing 102 handles traversing to the left from point B to point A and the tip 103a of the upper rotating wing 103 handles traversing to the right from point A to point B.

The left side of the same diagram shows the yarn transfer state at return point A and the right side of the diagram shows the yarn transfer state at return point B. At return point A, the yarn is transferred from the tip 102a of the lower rotating wing 102 to the tip 103a of the upper rotating wing 103. At return point B, the yarn is transferred from the tip 103a of the upper rotating wing 103 to the tip 102a of the upper rotating wing 102.

In order to carry out this yarn transfer, auxiliary guides 106,107,108,109 are arranged in the vicinity of the return points A,B and are above and below the yarn guide 101. At return point B, auxiliary guide 106 projects inwards and stops yarn on the left moving tip 102a while auxiliary guide 107 projects outwards and releases the yarn of the right moving tip 103a. At return point A, auxiliary guide 109 projects inwards and stops yarn on the right moving tip 103a while auxiliary guide 108 projects outwards and releases the yarn of the left moving tip 102a. In this way, yarn transfer is realised by auxiliary guides 106,107 at return point B and yarn transfer is realised by auxiliary guides 108,109 at return point A.

When a yarn breakage occurs on the upstream side of this type of traverse device, slack is generated in the yarn of the traverse device, the yarn transfer at the return points is not performed as described earlier, yarn passes the return point and is picked up and the yarn sometimes wraps around the base of the rotating wing.

When this wrapping occurs, it is necessary to remove the wrapped yarn. However, as the yarn is wrapped in a tight place between the spinning devices and at the base of the rotatinh wings, it can not be removed without dismantling the traverse device and time and effort are needed for this removal operation.

Summary of the Invention

With respect to the aforementioned problems, it is an object of the present invention to propose a traverse device capable of preventing the yarn from wrapping around the base of the rotating wing when the yarn breaks, passes the return point and is carried by the rotating wing.

In order to achieve the aforementioned object, a first aspect of the present invention is a traverse device having rotating wings provided with a yarn guide having a guide surface forming a traverse path and two rotating wings which rotate in opposite directions to each other along that yarn guide and are arranged above and below the yarn running direction, and which transfers yarn between the pair of rotating wings at the return points of the traverse path, arranged in a position past the return points with a yarn cutting device for the yarn wound on the rotating wings when the yarn breaks.

Due to this, the yarn that attempts to become wrapped on the rotating wings when the yarn breaks, is cut and that wrapping is prevented.

In addition to this first aspect, the yarn cutting device is a heater and that heater is only turned on for a predetermined time when a yarn breakage is predicted.

Furthermore, a yarn path restriction guide is arranged which guides the yarn which may wind on the rotating wings at times of yarn breakage, to the yarn cutting device.

A second aspect of the present invention is a traverse device having rotating wings provided with a yarn guide having a guide surface forming a traverse path and two rotating wings which rotate in opposite directions to each other along that yarn guide and are arranged above and below the yarn running direction, and which transfers yarn between the pair of rotating wings at the return points of the traverse path, arranged with an air operated yarn path alteration means for a yarn which attempts to become wrapped on the wings when the yarn breaks in a position past the return point.

Due to this, wrapping is prevented due to the yarn path of the yarn which attempts to become wrapped on the wing when the yarn breaks being changed.

Brief Description of the Drawing

Figure 1 is a perspective view of the main part of the traverse device of the present invention.

Figure 2 is a side view showing the transfer of the yarn at the left return point of the traverse path.

Figure 3 is a side view showing the transfer of the yarn at the right return point of the traverse path.

Figure 4 is a drawing as seen from above Figure 1 and showing mainly the yarn guide and rotating wings.

Figure 5 is a vertical section of the traverse device showing the arrangement of another yarn cutting device.

Figure 6 is a drawing as seen from direction A of Figure 5 and showing mainly the drive system.

Figure 7 is a perspective view of the main part of another embodiment of the traverse device of the present invention.

Figure 8 is a diagram showing the main part of a conventional traverse device.

Detailed Description of the Preferred Embodiments

Below, with reference to the drawings, an embodiment of the present invention will be described. Figure 1 is a perspective view of the main part of the traverse device of the present invention, Figure 2 is a side view showing the transfer of the yarn at the left return point A of the traverse path and Figure 3 is a side view showing the transfer of the yarn at the right return point B of the traverse path.

A normal traverse device comprises a plurality of traverse units U1 arranged in a line. One traverse unit U1 is shown in Figure 1.

1 is a yarn guide positioned to the left and right of the traverse center. 2 is a rotating wing that is positioned on the upper side and that rotates in a counter clockwise direction about the traverse center 01. 3 is a rotating wing that is positioned on the lower side and that rotates in a clockwise direction about the traverse center 01. 4 is an auxiliary guide of return point A. 5 is an auxiliary guide of return point B.

6 is a heater arranged as a yarn cutting device attached to a position past the return point B and being the lower surface of the yarn guide 1. 7 is a control device for controlling the turning ON and OFF of the heater. 8 is a yarn path restriction guide for forming a yarn path that cut across the heater and is arranged on the lower surface of the yarn guide 1. All these form the main components of one traverse unit. 11 is a touch roller or friction roller. 12 is a bobbin holder. 35 is a bobbin attached to the bobbin holder 12. P is a package comprising yarn wound on the bobbin 35.

It should be noted that 15 is a bracket that supports the auxiliary guide 4 via a block 16. 17 is a bracket that supports the auxiliary guide 5 via a block 16.

As shown in the sectional view of the return point B of Figure 3, the heater 6 is a plate heater embedded in the lower surface of the yarn guide 1 and is able to generate enough localised heat to melt a synthetic resin yarn passing the lower surface of the heater 6. In Figure 1, the yarn which is carried past the return point B by the upper rotating wing 2 when the yarn breaks and becomes wrapped on the rotating wing wraps while forming a yarn path in a direction tangential (arrow a) from the yarn guide 1 towards the housing part at the base of the rotating wing 2. Thus the heater 6 is arranged in a position that cuts across the yarn path of arrow a facing the base of the rotating wing 2.

It is preferable for the yarn which is to be melted by the heater 6 to be yarn as far downstream as possible.

Furthermore, it is preferable for the surface area of the heater 6 to be small. Due to this, the circular peaked yarn path restriction guide 8 is the lower surface of the yarn guide 1 and is arranged in the vicinity of the return point B. The yarn path of the yarn from the touch roller 11 to the arrow a is bent by the yarn path restriction guide 8 and a yarn which has passed the yarn path restriction guide 8 are positioned directly below the heater 6 and the wrapped yarn is cut downstream from there and wrapping is stopped.

The control device 7 performs on/off control of the heater 6. The heater 6 may be set so as to be always on but this increases the power consumption. It has been shown from experience that yarn breakage is statistically more likely when certain operations of the winder mounted on the traverse device are performed. Thus the control device 7 of the winder on which the traverse device is mounted only turns the heater on for a predetermined time before and after the periods when yarn breakage is likely to occur of among the operations of the winder.

For example, consider a traverse device comprising a system that winds a synthetic fiber yarn by a spinning device, godet roller and take-up winder, mounted on a take-up winding device. Furthermore, the device has auto-revolving functions where the take-up winder performs automatic movement of the yarn from a full bobbin to an empty bobbin and also that the device has a yarn threading device that threads the yarn by a manual operation at the start of winding. With this kind of system, the periods when yarn breakage easily occurs is the auto-revolving and yarn threading times. Thus the heater 6 is turned ON when the auto-revolving starts (when the bobbin holder into which has been inserted the empty bobbin starts rotating) or the time when the manual yarn threading starts (when the bobbin holder starts rotating) and the heater is turned OFF a predetermined time period of 5-20 seconds after the completion of auto-revolving or yarn threading.

If a yarn breakage is generated on this kind of system, when a sensor detects the yarn breakage, all the yarns heading towards the traverse units U1 are cut upstream of the take-up winder and the yarn from the spinner is sucked. In short, when a yarn breakage occurs, about 4-5m of yarn which is heading towards the take-up winder becomes free and enters the traverse device. The yarn path restriction guide 8 of the heater 6 being the yarn cutting device prevents the winding of this yarn onto the rotating wing. It should be noted that the yarn cutting device is not limited to the heater and may be a mechanical cutter.

Next, the return points A and B will be described.

As shown in Figure 2 showing the state of the return

point A, the yarn guide 1 is positioned above the upper and lower rotating wings 2,3 and the auxiliary guide 4 that projects outwards from the side of the touch roller 11 is positioned below the upper and lower rotating wings 2,3. In short, auxiliary guide 4 is only positioned on the traverse center side enclosing the traverse path. The entire arrangement of the auxiliary guide 4 is positioned so that it is parallel with the surface of the touch roller 11 and moreover in a forward slanting position so that it intersects the running yarn Y at an angle.

At the return point A, the yarn is transferred from the lower rotating wing 3 to the upper rotating wing 2. Point C shows a state where the rotating wing 2 is traversing the yarn to the right of Figure 1 along the yarn guide 1. The yarn guide 1 performs the role of holding the yarn on the upper rotating wing 2 and does not only determine the traverse path but also aids yarn transfer. As the auxiliary guide 4 that aids yarn transfer together with yarn guide 1 is only for removing the yarn from the lower rotating wing 3, the degree of flexing of the yarn at the auxiliary guide 4 is restricted to a minimum where it does not obstruct yarn transfer.

When a yarn breakage occurs, as the upstream yarn becomes slack, when the yarn transfer from the lower rotating wing 3 to the upper rotating wing 2 occurs, there is comparatively little possibility that the lower rotating wing 3 will wind the yarn. Due to this, the positioning of the heater as a yarn cutting device is ommitted at this part but a heater as a yarn cutting device may be arranged at this part.

As shown in Figure 3 showing the state of the return point B, even though the degree of projection differs, the structure where the yarn guide 1 is positioned above the upper/lower rotating wings 2,3 is the same as that in Figure 2. However, the auxiliary guide 5 below the rotating wings 2,3 is positioned so that it projects inwards from the side of the opposite touch roller 11. In short, tie auxiliary guide 5 is positioned enclosing the traverse path on the opposite side to the traverse center. The yarn is transferred from the upper rotating wing 2 to the lower rotating wing 3 at this return point B.

Point D shows the state where the yarn is being traversed to the left by the rotating wing 3 along the yarn guide 1. Yarn guide 1 takes the yarn separated from the upper rotating wing 2 and does not only determine the traverse path but also aids yarn transfer. As the auxiliary guide 5 holds the yarn on the lower rotating wing 3, the amount of flexing at the auxiliary guide 5 becomes greater than auxiliary guide 4. In this way, as the yarn guide 1 and the auxiliary guide 4 are on both sides enclosing the traverse path, as made clear by comparison with Figure 2, the flexing of the yarn is a not a simple <-shape but a zigzag.

When a yarn breakage occurs, as the upstream yarn becomes slack, when the yarn transfer from the upper rotating wing 2 to the lower rotating wing 3 occurs, there is a high possibility that the upper rotating wing 2 will wind the yarn. Due to this, the heater 6 as a yarn cutting device is positioned at this part. Furthermore, in order to ensure the yarn path through this heater 6, the yarn path restriction guide 8 is also arranged.

Further, in order to reduce the difference in the free length between the upper/lower rotating wings 2,3 and the touch roller 11 (or friction roller), it is preferable to arrange the upper/lower rotating wings 2,3 close together. Due to this, the yarn guide 1 is positioned above the upper/lower rotating wings 2,3 and the auxiliary guides 4,5 are positioned below the upper,lower rotating wings 2,3. As a result, the distance between the tip of the wings 2,3 and the touch roller 11 (friction roller) is approximately uniform at the left and right return points, the delay in yarn movement in the traverse direction by the free length is the same to the left and right and the package shape at the left and right ends is the same.

In addition, at the left/right return points A,B of Figures 2 and 3, the yarn is transferred in opposite directions between the counter clockwise rotating upper rotating wing 2 and the clockwise rotating lower rotating wing 3 as shown in the drawing via the overlap spaces which carry the yarn. By providing an extremely short overlap area, the yarn becomes free at transfer times, naturally returns to the center position of the traverse width due to the yarn tension and deformation of the package shape from instability along the traverse width is prevented. In this way, when a yarn guide 1 is arranged on the upper side of the upper and lower rotating wings 2,3 and an overlap space is arranged at the left and right return points A,B, the heater 6 as a yarn cutting device is effective as the winding of yarn by the rotating wings 2,3 is easily caused when the yarn breaks.

It should be noted that in the description of the aforementioned embodiment, an example where, of the right and left sides of the yarn guide 1 of figure 1, the heater 6 is arranged at only the right side where wrapping easily occurs is given but an embodiment where the heater 6 is arranged only at the left side or at both sides is possible.

Furthermore, the detailed structure of the traverse device that transfers yarn between the upper and lower positioned rotating wings at the left and right return points of the traverse path, and an example of the layout of another heater will be described using Figures 4 through 6.

In Figure 4, the upper rotating wing 2 has a slightly smaller diameter than the lower rotating wing 3 and even if the upper/lower rotating wings 2,3 are positioned at an angle, the tips of the rotating wings 2,3 are approximately in alignment with the yarn path Y. The upper rotating wing 2 has two tips 2a,2b separated by 180 ° about the center 01 and the lower rotating wing 3 has two tips 3a,3b separated by 180 ° about the center 02. The rotation center 01 of the upper rotating wing 2 and the rotation center 02 of the lower rotating wing 3 are

positioned along the line joining 13 and a seperated by the distance ε.

It should be noted that the line of the upper rotating wing 2 passing through the center 01 forms the traverse center line 14 being vertical to the base line 13.

In this way, due to the biased positioning of the center 01 and center 02, at return point B, yarn transfer from the upper tip 2a to the lower tip 3a is carried out and as the lower tip 3a reaches the return point A, the upper tip 2b also reaches return point A. Thus, during one rotation in opposite directions of the rotating wings 2,3, two tips 2a,2b,3a,3b cause one reciprocal movement of the yarn along the traverse path determined by the yarn guide 1 and auxiliary guides 4,5.

It should be noted that the number of tips of the rotating wings 2,3 is not limited to two and there may be three tips arranged 120 ° apart. Furthermore, one rotating wing may have two tips, the other may have three tips and the angular velocity between the two may be proportionally different.

The auxiliary guides 4,5 that aid yarn transfer via the bracket attached to the yarn guide 1, are positioned below the rotating wings 2,3 and the yarn guide 1 and auxiliary guides 4,5 enclose the rotating wings 2,3 from above and below. The auxiliary guide 4 has an outward facing guide surface 4a and the auxiliary guide 5 has an inward facing guide surface 5a which faces the traverse center 01.

It should be noted that the bracket 15 of figure 1 has a guide surface 15a that is separated from the traverse path along the yarn guide 1 and when bobbin changing is carried out by a turret rotation, is a surface that grips the yarn separated from the rotating wings 2,3 by the action of the yarn removal guide and the yarn passing guide. When the yarn is on this guide surface 15a, it is not traversed and a bunch winding is formed on the end of the bobbin 35. If the yarn slips and separates from the guide surface 15a, yarn traversing starts due to the abovementioned details.

Yet further, the drive system that rotates the rotating wings 2,3 in opposite directions will be described with figures 5 and 6.

In Figure 5, a central shaft 23 is supported so as to be freely rotatable with respect to the base hoard 21 via a bearing 22. Further, a hollow body 25 is supported so as to be freely rotatable with respect to the base beard 21 via a bearing 24. Yet further, a drive shaft 27 is supported so as to be freely rotatable with respect to the base board 21 via a hearing 26. This drive shaft 27 is rotated by the pulley 28.

A timing pulley 29 is arranged on the pulley 28 side of this drive shaft 27 and a gear 30 is attached to the other side of the pulley 28. The timing pulley 32 that engages the timing belt 31 attached to the timing pulley 29 is attached to the central shaft 23. The lower side of the central shaft 23, in short, the rotating wing 3 rotates in the same direction as the drive shaft 27. Also a gear 33 that engages with a gear 30 is attached to the hollow body 25 and the lower side of the hollow body 25, in short, the rotating wing 2 rotates in the direction opposite that of the drive shaft 27.

In Figure 6, due to the meshing ratio between gears 30 and 33, and the meshing ratio between timing pulleys 29 and 32 being made the same, rotating wings 2,3 rotate in opposite direction at the same angular velocity. It should be noted that 34 is an idle pulley for applying tension to the timing belt 31.

On the driver system of Figure 5 described above, the outer side of the hollow body 25 on which is mounted the upper rotating wing 2 is covered and the heater 9 is embedded in the lower surface of the housing 21a that forms a partition between the rotating wing 2 and hollow body 25. The positioning of this as seen from above is shown in figure 6. The heater 9 is a horseshoe shape positioned on the outer periphery of the housing part 21a at the base of the rotating wing 2 and the front edge forms an open end.

In Figure 6, the yarn wrapped by either of the left or right return points A,B attempts to become wrapped around the outer side housing part of the hollow body having the gear 33 but as that yarn definitely passes the lower surface of the heater 9, it is melted by the heater 9. Due to this kind of arrangement of the heater 9, wrapping on both the left and right return points A,B may be corresponded to.

Figure 7 shows the anti-wrapping system in place of the yarn cutting device.

Being parts positioned past the left and right return points A,B, air nozzles 10a,10b that are open towards the outer side and below the yarn guide 1 are arranged. These air nozzles 10a,10b function as a yarn path alteration means for altering the yarn path of the slackened yarn towards the outer side due to the air blown from these air nozzles 10a,10b.

When the yarn breaks, becomes slack, and the yarn that has passed the return points A,B and is attempting to be carried past either of the rotating wings 2,3 is blown outwards being carried by the air current, wrapping is prevented. However, the air nozzles 10a,10b are arranged in a position past the return points A,B so as not to influence the correct yarn returning.

Each air nozzle 10a,10b blow compressed air from the air source by turning the electromagnetic valve device 10c on and the control device 7 performs the ON/OFF of the electromagnetic valve device 10c. As shown in Figure 1, the ON/OFF timing of the electromagnetic valve device 10c is set to a predetermined period of time before and after the operations of the device where yarn breakage may arise but may be operated during normal blowing. Furthermore, the air nozzles 10a,10b are not limited to altering the yarn path to the outer side by the blowing and may alter the yarn path by suction of the yarn end that is attempting to become wrapped on the rotating wing.

In the aforementioned embodiment, a yarn cutting

device or yarn path alteration means applied to a traverse device arranged with a yarn guide above two rotating wings has been described but as shown in Figure 8, the yarn cutting device or yarn path alteration means of the present invention may be applied to a traverse device arranged with a yarn guide between the two rotating wings.

As described above, a first aspect of the present invention is, when a yarn breakage occurs, the prevention of wrapping of the cut yarn end on the housing at the base of the rotating wing due to the yarn cutting device cutting the yarn that is carried past the return points and attempts to become wrapped on the rotating wing. As a result, trouble some operations such as dismantling of the wing traverse device for removal of the wrapped yarn are unnecessary.

In addition to the first aspect, the yarn cutting device instantaneously melts the synthetic resin yarn as it is a heater and moreover, as the turning ON of the heater is limited to a predetermined time including the time when yarn breakage occurs, the yarn may be reliably melted when necessary without an unnecessary use of energy.

In further addition to the first aspect, the yarn cutting device may be only arranged in a necessary place due to the yarn path restriction guides that guide the yarn wound by the aforementioned wings when a yarn breakage occurs to the yarn cutting device. Accordingly, the structure of the device is simplified.

A second aspect of the present invention, similar to the first aspect, is the prevention of wrapping of the cut yarn end on the housing part at the base of the rotating wing and as a result, trouble some operations such as dismantling of the wing traverse device for removal of the wrapped yarn are unnecessary.

Claims

1. A traverse device having rotating wings provided with a yarn guide having a guide surface forming a traverse path and two rotating wings that rotate in directions opposite to each other along the yarn guide and are arranged above and below the yarn running direction, and which performs transfer of the yarn between the rotating wings at return points on the traverse path, arranged with;

   a yarn cutting device for the yarn that winds on the rotating wings when the yarn breaks at a position past the return points.

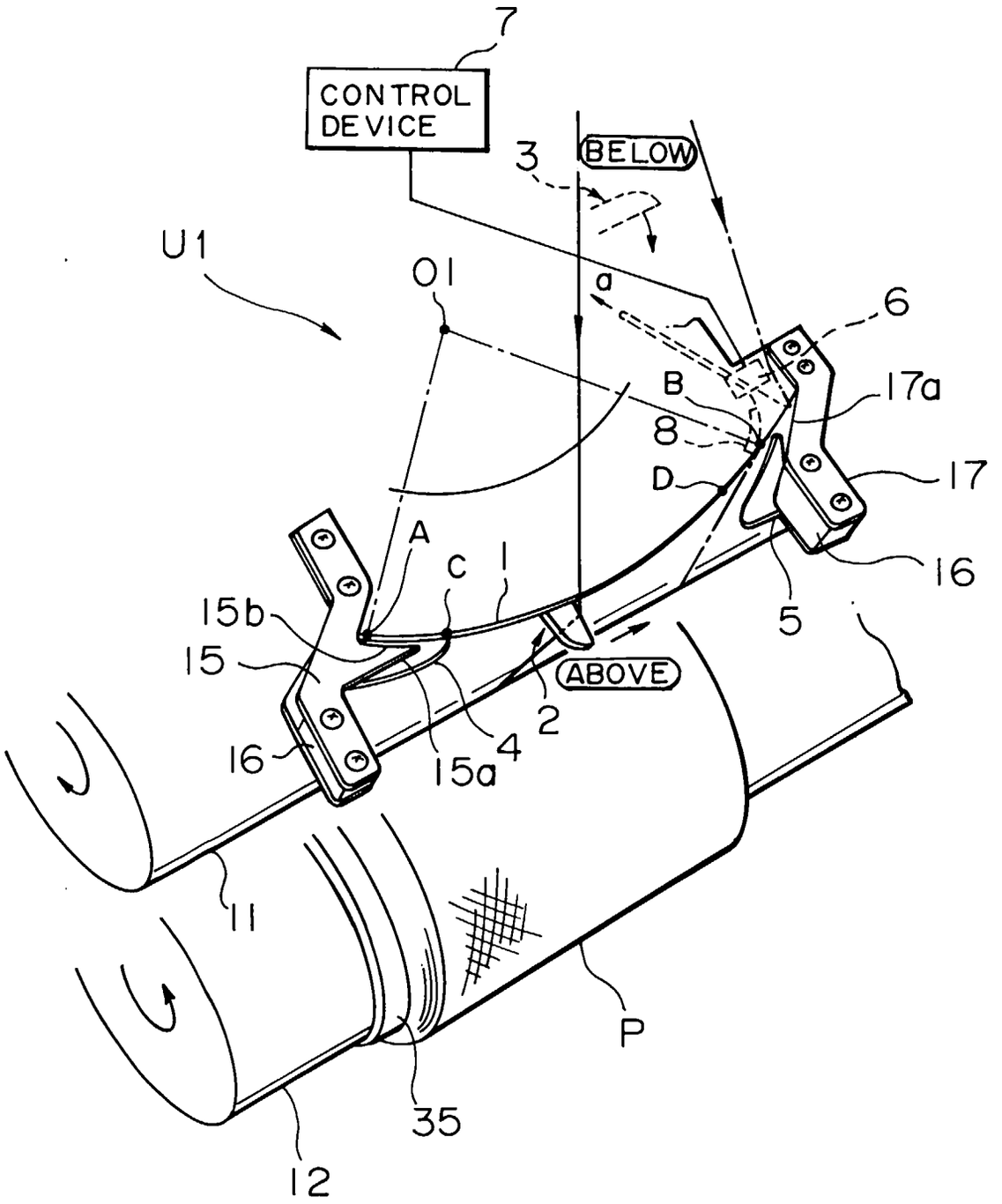
2. A traverse device having rotating wings as in claim 1, wherein the yarn cutting device is a heater and this heater is only turned on for a predetermined time where breakage of the yarn is predicted.

3. A traverse device having rotating wings as in claim 1, arranged with a yarn path restriction guide that guides the yarn which is wound by the wings when the yarn breaks to the yarn cutting device.

4. A traverse device having rotating wings provided with a yarn guide having a guide surface forming a traverse path and two rotating wings that rotate in directions opposite to each other along the yarn guide and are arranged above and below the yarn running direction, and which performs transfer of the yarn between the rotating wings at return points on the traverse path, arranged with;

   an air operated yarn path alteration means for the yarn that attempts to become wound by the rotating wings when the yarn breaks in a position past the return points.

FIG. 1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CONTROL DEVICE
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U1
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D
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FIG. 2

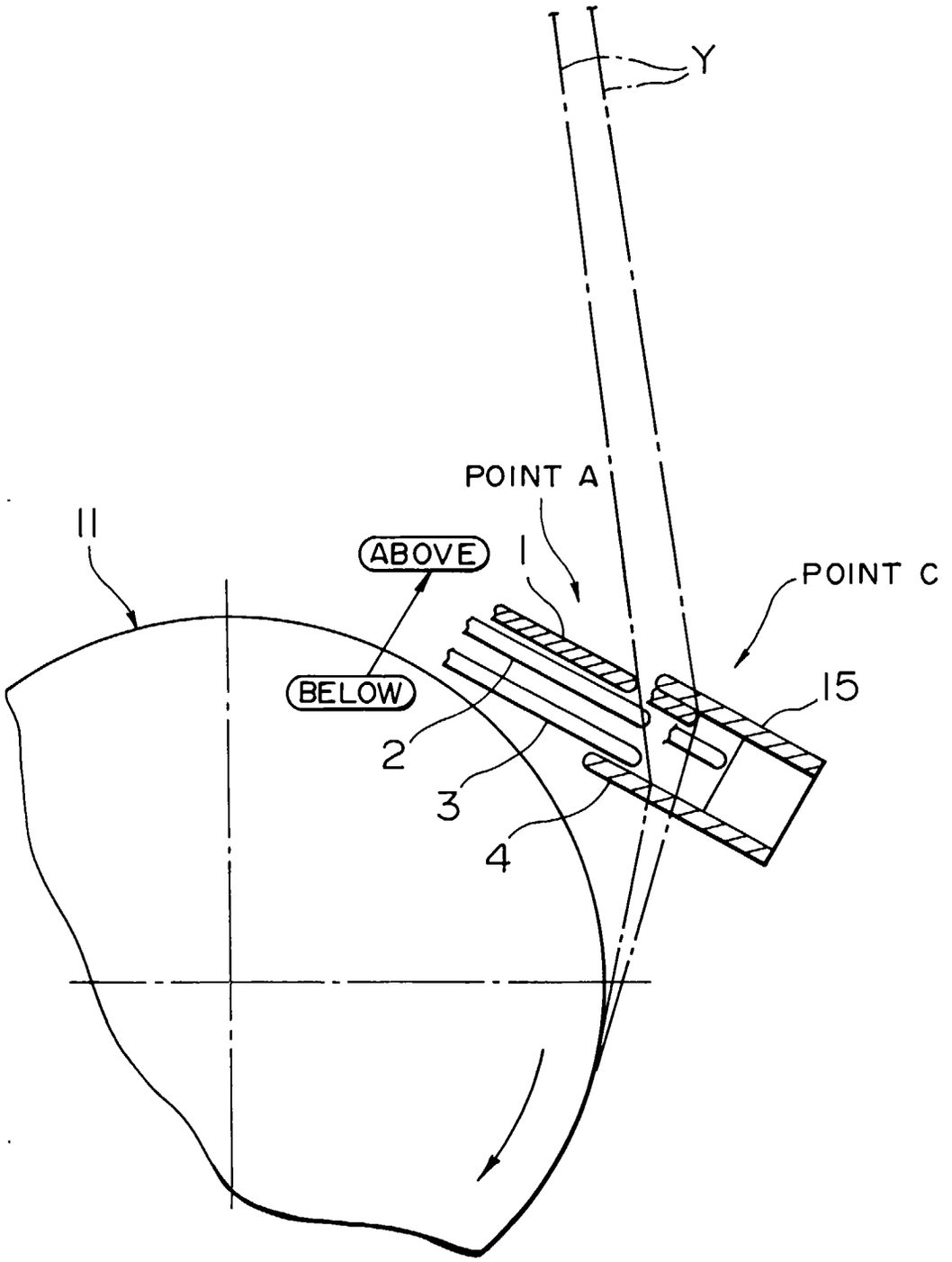

FIG. 3

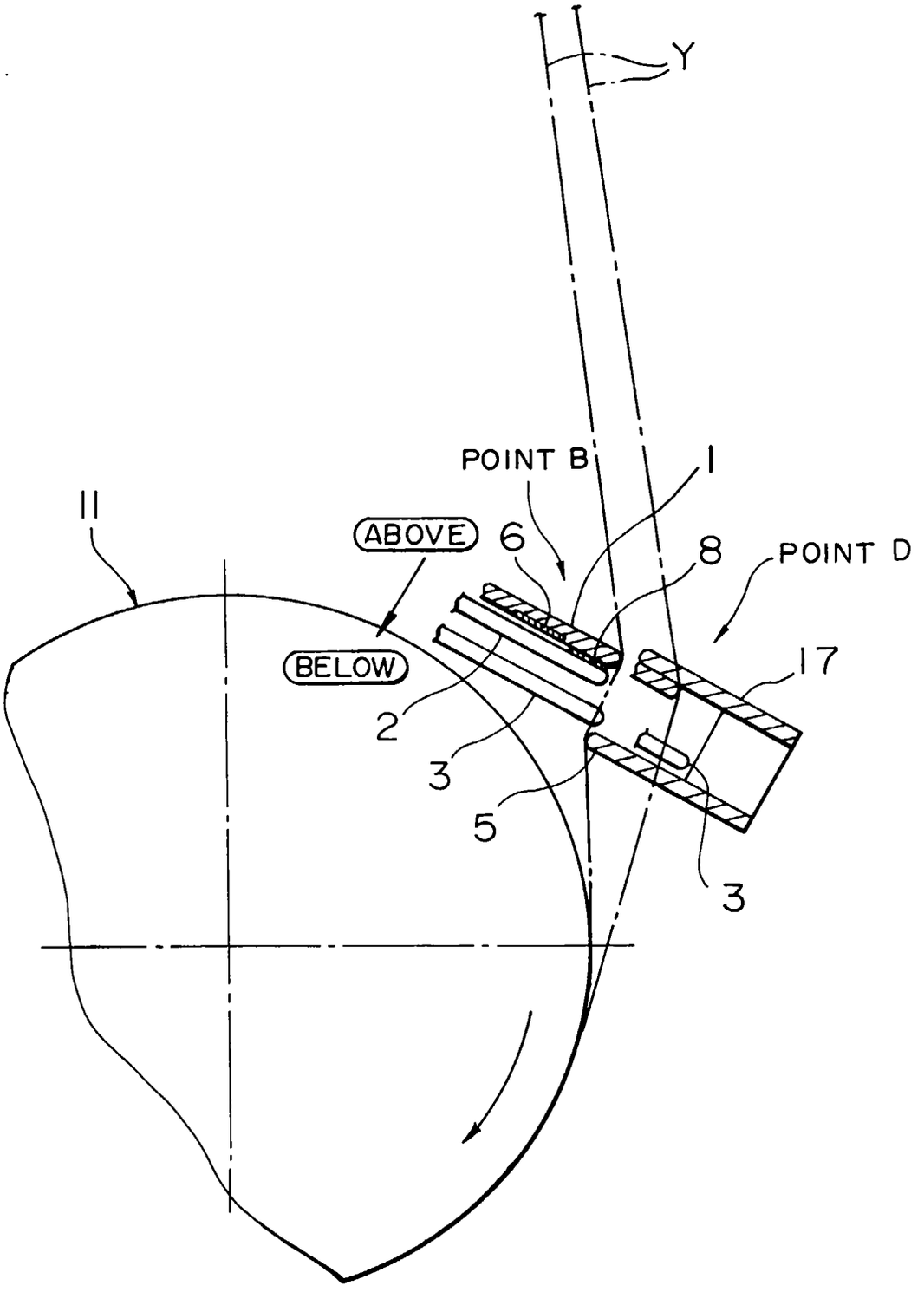

FIG. 4

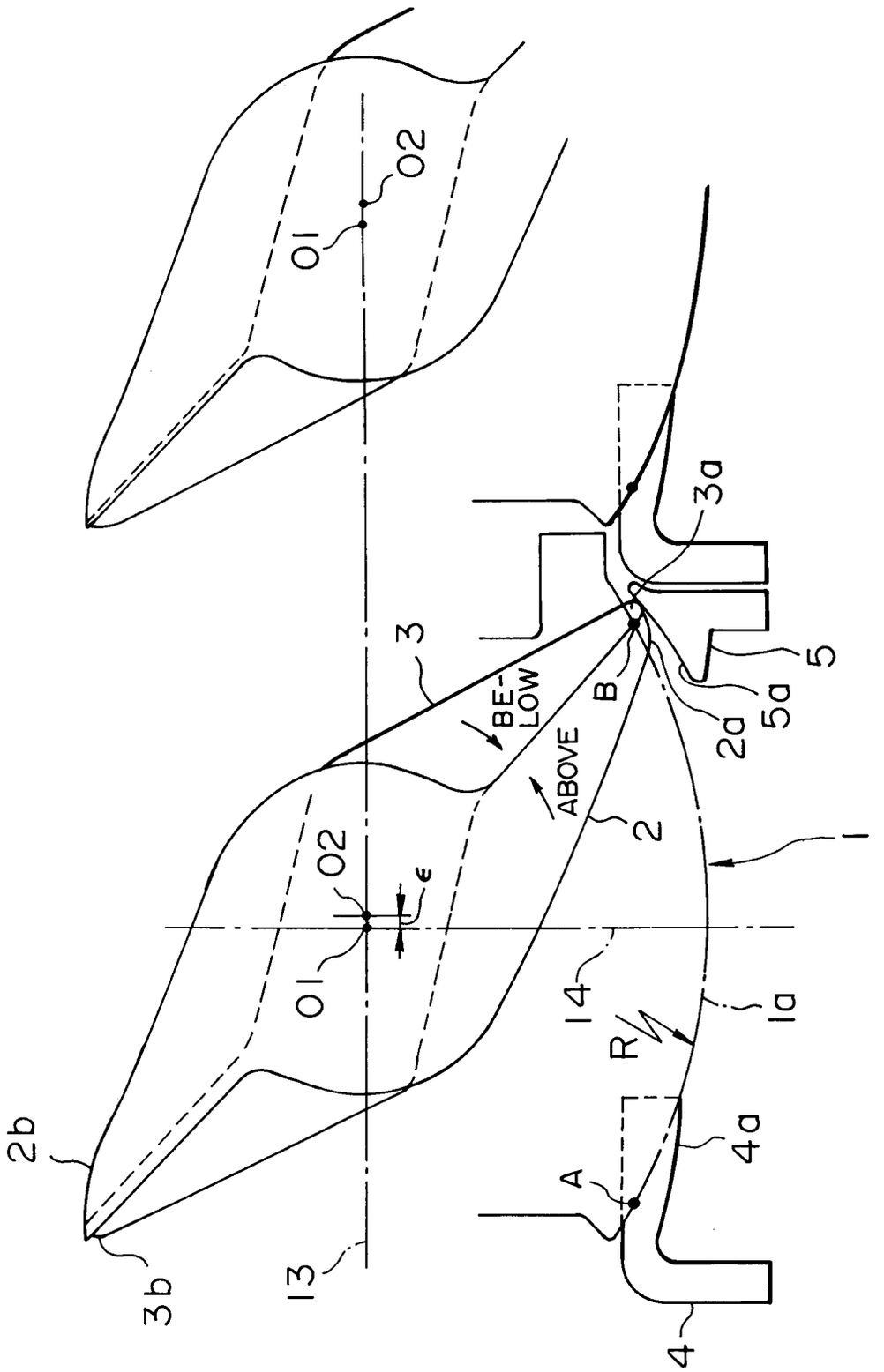

FIG. 5

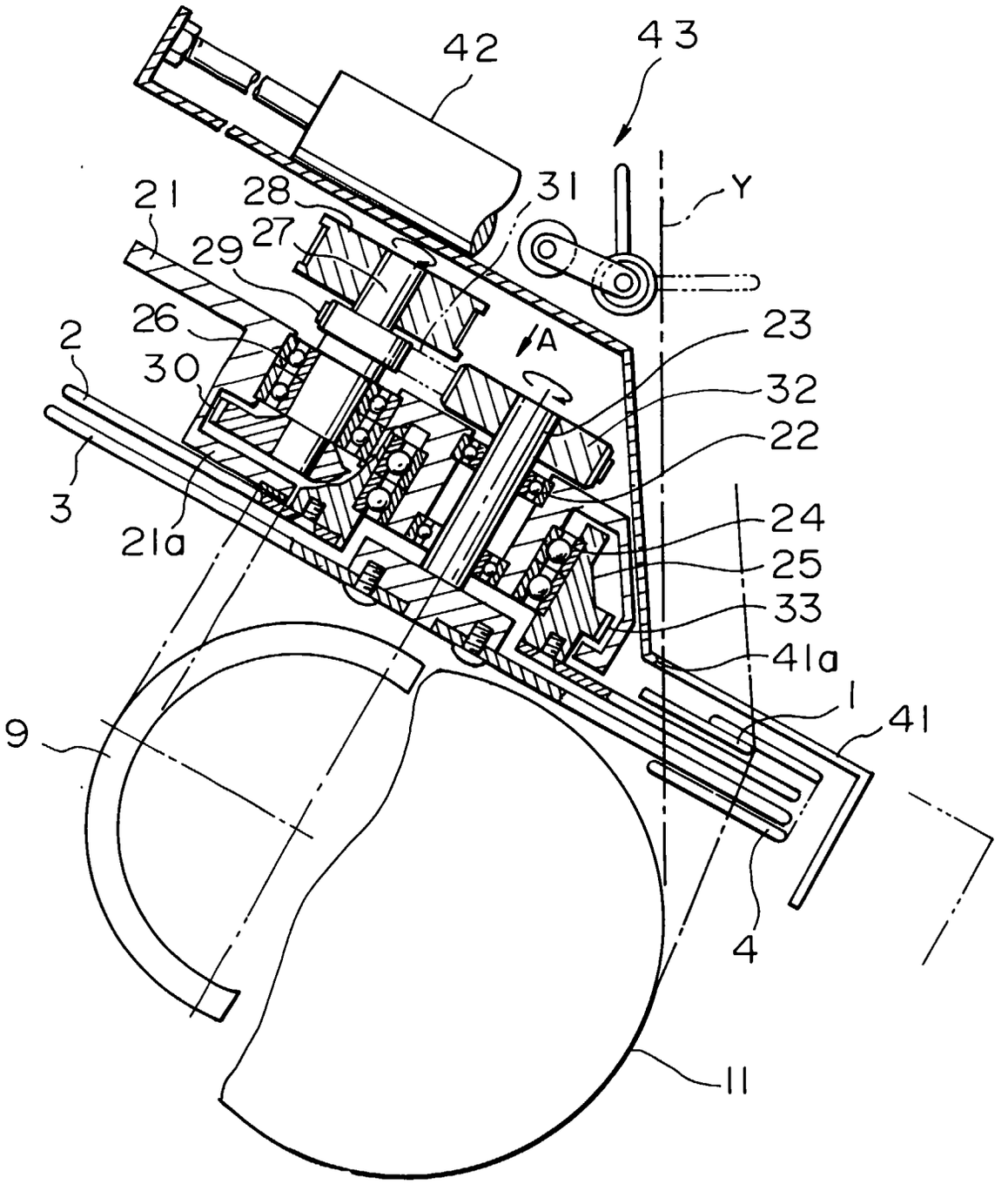

FIG. 6

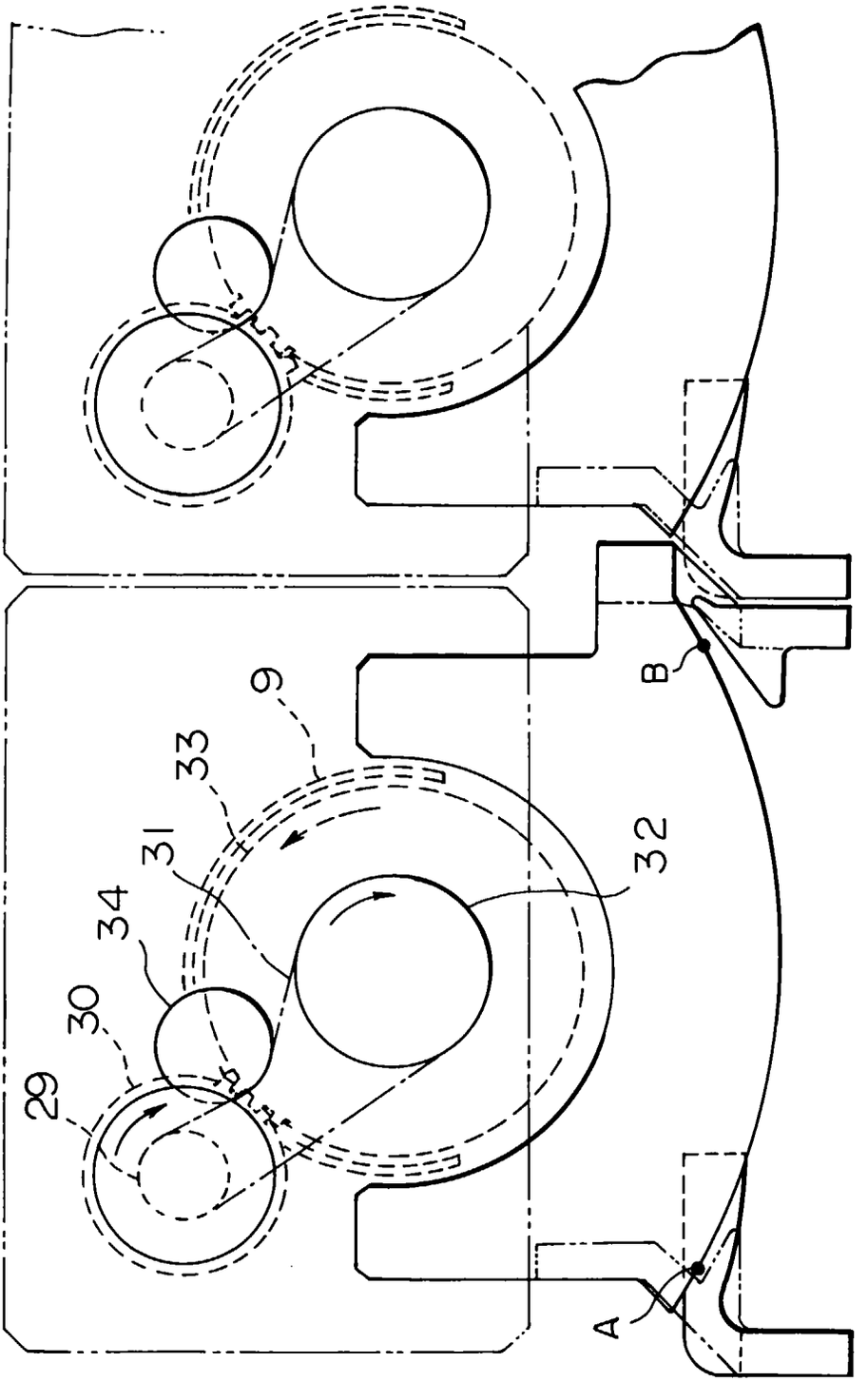

FIG. 7

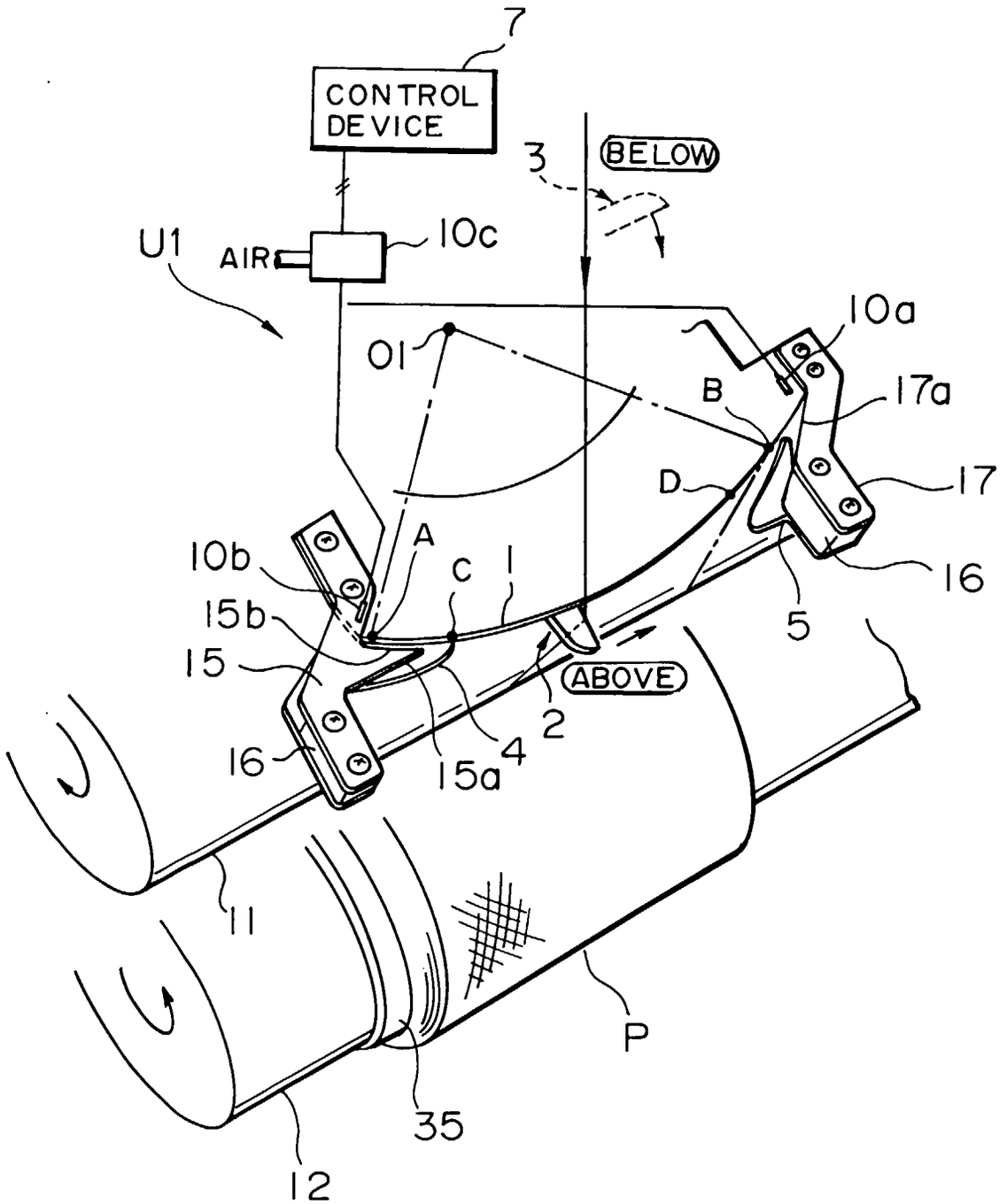
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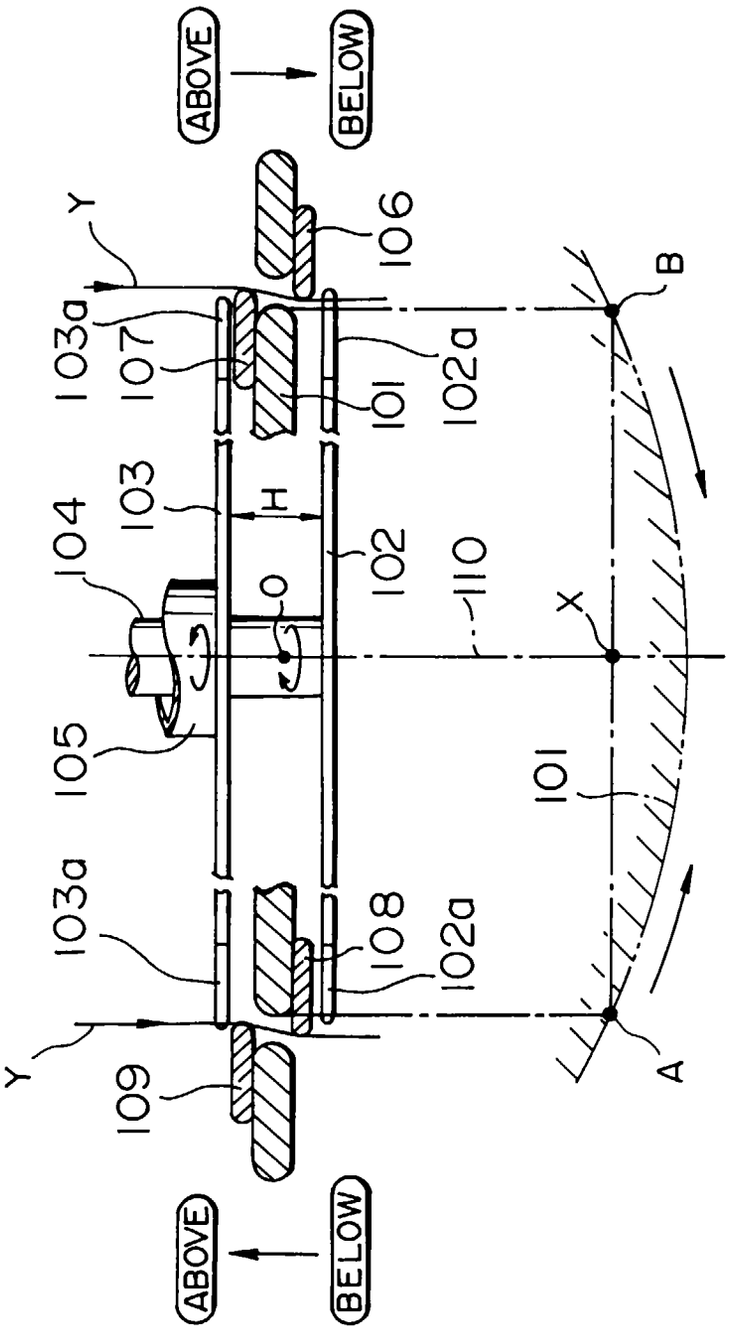
FIG. 8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ABOVE
BELOW

European Patent Office

EUROPEAN SEARCH REPORT

Application Number EP 97112174.4

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 6)
A	US 4858838 A (HARRIS, P.S. et al.), 22 August 1989 (22.08.89), claims 1-3. --	1-4	B 65 H 54/28
A	EP 0625477 A2 (NEUMAG), 23 November 1994 (23.11.94), claim 1. --	1	
A	US 5176330 A (SHOICHI TONE) 05 January 1993 (05.01.93), claims 1,2. ----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl. 6)

B 65 H 54/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	16-10-1997	JASICEK

CATEGORY OF CITED DOCUMENTS

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