(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 795 509 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
15.01.2003 Bulletin 2003/03

(51) Int Cl.[7]: **B65H 54/28**

(21) Application number: **97102984.8**

(22) Date of filing: **24.02.1997**

(54) **Yarn traverse device**

Fadentraversiervorrichtung

Mécanisme de va-et-vient de fil

(84) Designated Contracting States:
DE FR IT

(30) Priority: **14.03.1996 JP 8574596**
14.03.1996 JP 8593596

(43) Date of publication of application:
17.09.1997 Bulletin 1997/38

(60) Divisional application:
01130817.8 / 1 197 461
01130818.6 / 1 195 341
02012950.8 / 1 249 421

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(56) References cited:
EP-A- 0 114 642 **DE-A- 4 425 133**

- **PATENT ABSTRACTS OF JAPAN vol. 017, no. 304 (M-1427), 10 June 1993 & JP 05 024740 A (TORAY IND INC), 2 February 1993,**

Remarks:

The file contains technical information submitted after the application was filed and not included in this specification

EP 0 795 509 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The invention relates to a yarn traverse device according to the preamble of the claim 1.

[0002] A yarn traverse device of this type is known from DE-A-4425133. The overall length and height of such a device increases the more adjacent and slanting yarn traverse units are provided and the length of the individual rotating shafts of the wings increases. The increasing length of these shafts furthermore leads to a possible deformation of the shafts under load and therefore the wings of the yarn traverse units. Furthermore the slanting of yarn traverse units may lead to a deformation of one of the slanting surfaces of the packages produced by the winder due to a possible variation of the yarn releasing position on one of the wings.

[0003] The object underlying the invention is therefore to provide a yarn traverse device having a reduced overall length and/or height. This object is solved according to the invention by the features as defined in the characterizing portion of claim 1 leading to a yarn traverse device having a reduced overall length. The embodiment according to claim 2 leads to a yarn traverse device having a reduced overall length and height.

[0004] The invention will now be described by way of example and with reference to the accompanying drawings in which:

Figure 1 is a top plan view of a yarn traverse unit according to the invention having slanting rotating wings;

Figure 2 is a vertical sectional view along the line II-II of Figure 1;

Figure 3 is a schematic front view of the yarn traverse unit in Figures 1 and 2; and

Figure 4 to 6 are schematic front views of the arrangement of the plurality of partially overlapping adjacent yarn traverse units forming a yarn traverse device;

[0005] Firstly, using Figures 1, 2 and 3, a yarn traverse unit U of the present invention will be described.

[0006] 1 is a propeller shaped upper rotating wing extending to points symmetrical with respect to a center of rotation 1a. The upper rotating wing 1 is mounted by a screw 6 to a rotating cylinder 5 supported via a bearing 4 on the periphery of a cylindrical frame 3 mounted on a flat frame 2. 7 is a propeller shaped lower rotating wing positioned below the upper rotating wing 1, having the same length as the upper rotating wing 1 and extending to points symmetrical with respect to a center of rotation 7a separated only by a predetermined eccentric distance e from the center of rotation 1a of the upper rotating wing 1. The lower rotating wing 7 is mounted by a screw 10 on the lower part of a rotating shaft 9 supported via a bearing 8 inside the cylindrical frame 3.

[0007] 11 is a guide member mounted above the upper rotating wing 1 for forming the traverse path of a yarn y. The tips of the upper rotating wing 1 and lower rotating wing 7 are so arranged that they project from an are shaped yarn guide surface 11a of the guide member 11. Furthermore, the eccentric distance e on the line joining the center of rotation 1a of the upper rotating wing 1 and the center of rotation 7a of the lower rotating wing 7 is positioned approximately in line with the yarn guide surface 11a of the guide member 11.

[0008] A spur gear 12 is mounted on the outer periphery of the rotating cylinder 5 supported via the bearing 4 on the periphery of the cylindrical frame 3. A spur gear 16 mounted on the lower end of a rotating shaft 15 supported via a bearing 14 inside the cylindrical frame 13 mounted on the plate frame 2 engages with that spur gear 12. 17 is a pulley mounted on the upper part of the rotating shaft 15. A spur gear 18 is mounted on the rotating shaft 15 positioned between the pulley 17 and the spur gear 16, and a spur gear 20 mounted on a rotating shaft 19 supported via a bearing inside the cylindrical frame (not shown in the drawings) mounted on the plate frame 2 similar to the aforementioned cylindrical frame 13 engages with that spur gear 18. Furthermore, the spur gear 20 engages with a spur gear 21 mounted on the upper part of rotating shaft 9 to which the lower rotating wing 7 is attached.

[0009] As shown in Figure 3, the plane of rotation of the upper rotating wing 1 and the plane of rotation of the lower rotating wing 7 are slanted by a predetermined angle with respect to line of the axis of rotation t1 of the publicly known touch roller T positioned below the upper rotating wing 1 and the lower rotating wing 7 or with respect to the line of the axis of rotation p1 of the package P which contacts the touch roller T. This slanting is to a degree such that the free length (d1) of the yarn y at the right edge transfer position (A) and the free length (d2) of the yarn y at the left edge transfer position (B) is the same. In short, the upper rotating wing 1 and the lower rotating wing 7 are slanted with respect to the line of the axis of rotation t1 of the touch roller T or the line of the axis of rotation p1 of the package P so that the free length (d1) of the yarn y from the point (a1) where the yarn y separates from the upper rotating wing 1 and couples with the lower rotating wing 7 to the contact point (a2) where the yarn y contacts the touch roller T when yarn y is tranferred from the upper rotating wing 1 to the lower rotating wing 7 at the right transfer position (A), and the free length (d2) from the point (b1) where the yarn y separates from the lower rotating wing 7 and couples with the upper rotating wing 1 to the contact point (b2) where the yarn y contacts the touch roller T when yarn y is tranferred from the lower rotating wing 7 to the upper rotating wing 1 at the left transfer position (B) are the same. g in Figure 3 is the yarn guide advancing the yarn y.

[0010] Now the operation of the above yarn traverse

unit having the above described structure will be described.

[0011] When the pulley 17 rotates due to a drive belt (not shown in the drawings), the spur gear 12 which engages with the spur gear 16 rotates via that spur gear 16 mounted on the lower end of the rotating shaft 15 to which is attached pulley 17. When spur gear 12 rotates, the rotating shaft 5 on which the spur gear 12 is mounted rotates and consequently, the upper rotating wing 1 which is attached to the rotating shaft 5 rotates.

[0012] When the pulley 17 rotates, the spur gear 20 which engages with spur gear 18 rotates via that the spur gear 18 mounted in the middle of the rotating shaft 15 to which is attached the pulley 17. When the spur gear 20 rotates, as the spur gear 21 which engages with the spur gear 20 rotates, the rotating shaft 9 on which the spur gear 21 is mounted rotates and consequently, the lower rotating wing 7 which is attached to the rotating shaft 9 rotates.

[0013] The rotation of the pulley 17 is transmitted to the upper rotating wing 1 via the spur gear 16 and the spur gear 12. As the rotation of the pulley 17 is transmitted to the lower rotating wing 7 via the spur gear 18, the spur gear 20 and the spur gear 21, the upper rotating wing 1 and the lower rotating wing 7 rotate in opposite directions to each other.

[0014] For convenience, the upper rotating wing 1 rotates in the counter clockwise direction in Figures 1 and 3 and the lower rotating wing 7 rotate in the clockwise direction. Figure 1 shows also the situation, when the yarn y has been transferred along the yarn guide surface 11a of the yarn guide member 11 from the tip 1b of the upper rotating wing 1 which has moved from the left edge of the guide member 11 to the right edge to the tip 7b of the lower rotating wing 7 that is positioned at the right edge of the guide member 11 and is rotating in the clockwise direction.

[0015] The yarn y which has been transferred to the tip 7b of the lower rotating wing 7 is moved from the right edge to the left edge of the guide member 11 along the yarn guide surface 11a of the guide member 11. Then, the yarn y which has been moved from the right edge to the left edge of the guide member 11 by the tip 7b of the lower rotating wing 7 is transferred from the tip 7b of the lower rotating wing 7 to one tip 1c of the upper rotating wing 1 that has rotated to the left edge of the guide member 11 and is rotating in the counter clockwise direction. The yarn y is then moved to the right along the yarn guide surface 11a of the guide member 11.

[0016] Then, the yarn y which has been moved from the left edge to the right edge of the guide member 11 by the tip 1c of the upper rotating wing 1 is transferred from the tip 1c of the upper rotating wing 1 to the tip 7c of the lower rotating wing 7 that has rotated to the right edge of the guide member 11 and is rotating in the clockwise direction and this yarn y is then moved to the left along the yarn guide surface 11a of the guide member 11. In this way, the yarn y is traversed along the yarn guide surface 11a of the guide member 11 by the transfer from the upper rotating wing 1 to the lower rotating wing 7 or the lower rotating wing 7 to the upper rotating wing 1 at both edges of the guide member 11.

[0017] As the plane of rotation of the upper rotating wing 1 and the plane of rotation of the lower rotating wing 7 of the yarn traverse unit U are slanted with respect to the line of the axis of rotation t1 of the touch roller T or the line of the axis of rotation p1 of the package P the free length (d1) of the yarn y at the right transfer position (A), and the free length (d2) of the yarn y at the left transfer position (B) are the same, and a package P of good shape with the left and right edges of the package P being the same may be produced.

[0018] Referring to Figure 4, shows the arrangement in series along the touch roller T of a plurality of yarn traverse units U will be described.

[0019] Several yarn traverse units U are arranged in series such that the upper rotating wing 1 and lower rotating wing 7 of the yarn traverse unit U positioned on the right is positioned below the upper rotating wing 1 and lower rotating wing 7 of the yarn traverse unit U positioned on the left side. The planes of rotation of the upper rotating wing 1 and of the lower rotating wing 7 of adjacent yarn traverse units U partially overlap,

[0020] A drive belt b is wound on the pulley 17 attached to the rotating shaft 15 of each yarn traverse unit U and rotated by the drive belt b by a motor. The rectangle s shown below the plate frame 2 in Figure 4 is a simplification of the drive part of the upper rotating wing 1 and the lower rotating wing 7 comprising the spur gears 12, 16, 18, 20, 21 etc. shown in Figures 1 and 2.

[0021] In the above described embodiment, as the planes of rotation of the upper rotating wing 1 or planes of rotation of the lower rotating wing 7 of adjacent yarn traverse units U are positioned so as to each partially overlap, adjacent yarn traverse units U may be arranged in close proximity to each other and accordingly, when a plurality of yarn traverse units U are arranged in series, the entire length of the yarn traverse device may by shortened.

[0022] Furthermore, in the above described embodiment, as the four planes of rotation being the plane of rotation of the upper rotating wing 1 and the plane of rotation of the lower rotating wing 7 of one yarn traverse unit U and the plane of rotation of the upper rotating wing 1 and the plane of rotation of the lower rotating wing 7 of another yarn traverse unit U are arranged so as to be all different, even if one yarn traverse units U becomes faulty and the rotation of the rotating wings 1, 7 stop or a differences is generated between the rotational velocity of the rotating wings 1, 7 of one yarn traverse unit U with the rotational velocity of the rotating wings 1, 7 of another yarn traverse unit U, there is no interference or collision between the rotating wings 1, 7 of adjacent yarn traverse units U.

[0023] Yet further, as the plane of rotation of the upper rotating wing 1 and the lower rotating wing 7 of each

yarn traverse unit U are slanted with respect to the line of the axis of rotation t1 of the touch roller T or the line of the axis of rotation p1 of the package P so that the free length (d1) of the yarn y at the right transfer position (A), and the free length (d2) of the yarn y at the left transfer position (B) are the same, the package P of good shape with the left and right edges of the package P being the same may be produced.

[0024] Yet further still, as the height from the touch roller of the plurality of yarn traverse units arranged in series is the same at all the yarn traverse devices U, there is no dispersion of the traversed state at each yarn traverse unit U and accordingly a package of uniform shape may be produced.

[0025] Next, using Figure 5, another embodiment of the plurality of yarn traverse device having the above described structure arranged in combination along the touch roller T will be described.

[0026] In this embodiment, the plane of rotation of the lower rotating wing 7 of a yarn traverse unit U positioned on the left side and the plane of rotation of the upper rotating wing 1 of the yarn traverse unit U positioned on the right side are positioned in the same plane, so that they partially overlap and moreover the direction of rotation of the lower rotating wing 7 of the yarn traverse unit U positioned on the left side and the direction of rotation of the upper rotating wing 1 of the yarn traverse unit U positioned on the right side is the same direction. The lower rotating wing 7 of the yarn traverse unit U positioned on the left side and the upper rotating wing 1 of the yarn traverse unit U positioned on the right side which both rotate in the same direction have a suitable rotational phase difference such as 45 degrees or 90 degrees so that they do not interfere with each other when rotating.

[0027] On the aforementioned embodiment, the plane of rotation of the upper rotating wing 1 and the lower rotating wing 7 of each yarn traverse unit U are slanted with respect to the line of the axis of rotation t1 of the touch roller T or the line of the axis of rotation pi of the package P so that the free length (d1) of the yarn y at the right edge transfer position (A), and the free length (d2) of the yarn y at the left edge transfer position (B) are the same and the heights of each yarn traverse unit U from the touch roller T are constructed to be all the same thus there is no dispersion of the traversed state at each yarn traverse unit U and accordingly a package of uniform shape may be produced.

[0028] Next, using Figure 6, yet another embodiment of a yarn traverse device having a plurality of yarn traverse units U will be described.

[0029] In this embodiment, a plurality of yarn traverse units U are positioned along the touch roller T such that, for two adjacent yarn traverse units U, the upper rotating wing 1 of the yarn traverse unit U positioned on the right is inserted between the upper rotating wing 1 and the lower rotating wing 7 of the yarn traverse unit U positioned on the left. Accordingly, the plane of rotation of the upper rotating wing 1 and the lower rotating wing 7 of one of two adjacently positioned yarn traverse units U and the plane of rotation of the upper rotating wing 1 and the lower rotating wing 7 of the other yarn traverse device U partially overlap when viewed from above. In this way, the four planes of rotation being the plane of rotation of the upper rotating wing 1 and the plane of rotation of the lower rotating wing 7 of one yarn traverse unit U and the plane of rotation of the upper rotating wing 1 and the plane of rotation of the lower rotating wing 7 of another yarn traverse device U comprising adjacent yarn traverse devices U are different.

[0030] When the yarn traverse device is viewed from the front, the plane of rotation of the upper rotating wing 1 and the lower rotating wing 7 of each yarn traverse unit U are slanted at a predetermined angle with respect to the line of the axis of rotation t1 of the touch roller T or the line of the axis of rotation p1 of the package P. Accordingly, as the distance of each yarn traverse unit U from the line of the axis of rotation t1 of the touch roller T or the line of the axis of rotation p1 of the package P are approximately the same, the traverse conditions of each yarn traverse unit U may be approximately uniform.

[0031] Each pulley 17 of a yarn traverse unit group G1 comprising a predeterined number of adjacent yarn traverse units U (in the present embodiment, the yarn traverse unit group G1 comprises the three yarn traverse units on the left) are positioned so as to be within the same plane. Each pulley 17 is rotated by one drive belt b1 running the length of the common plane and wound on each pulley 17 and the upper rotating wing 1 and the lower rotating wing 7 are arranged so as to rotate in opposite directions to each other. Similarly, each pulley 17 of a yarn traverse unit group G2 comprising the same predeterined number of yarn traverse units U and being adjacent to that yarn traverse unit group G1 are also positioned so as to be within the same plane and each pulley 17 is rotated by one drive belt b2 running the length of the common plane and wound on each pulley 17.

[0032] M is a height adjustment pulley member arranged between the two adjacent yarn traverse unit groups G1, G2 and positioned below and above of which are attached pulleys m1, m2 which are capable of rotating. The upper pulley m1 above is positioned so that it is in the same plane as each pulley 17 positioned in the same plane of the yarn traverse unit group G1. The drive belt b1 that runs the length of the common plane is wound on the pulley m1 positioned above. The lower pulley m2 positioned below is positioned so that it is in the same plane as each pulley 17 positioned in the same plane of the yarn traverse unit group G2. The drive belt b2 that runs the length of the common plane is wound on the pulley m2 positioned below.

[0033] The drive belt b1 of the yarn traverse unit group G1 is linked to the drive belt b2 of the adjacent yarn traverse unit group G2 via the height adjustment pulley

member M. Accordingly, the drive force from the drive source such as a motor is transmitted to the drive belt b1 of the yarn traverse unit group G1 and is then transmitted to the drive belt b2 of the adjacent yarn traverse unit group G2 via the height adjustment pulley member M. In this way, the drive force from the drive source is sequentially transmitted to the adjacent yarn traverse unit group.

[0034] The reduced overall height of the yarn traverse device is determined by the distance h from the line of the axis of rotation of the touch roller T to the pulley 17 of the yarn traverse unit U positioned to the right. Accordingly, the length of the rotating shaft 15 on which the pulley 17 is mounted is different at every yarn traverse unit U. Further, if the length of the rotating shaft 15 becomes longer, a shape deformation of the rotating shaft 15 occurs due to the load from the drive belt and problems such as eccentric rotation arise.

[0035] When the yarn traverse unit groups G1, G2 are comprised of 3 yarn traverse units U as in the present embodiment, the yarn traverse device may have three types of rotating shaft 15 of differing lenghts. Due to the reduced length of almost all rotating shafts 15 deformation of the rotating shafts 15 and the wings 1,7 may be avoided.

Claims

1. A yarn traverse device for use with an automatic yarn winder having a plurality of winding units comprising a plurality of yarn traverse units (U) each having an upper rotating wing (1) and a lower rotating wing (7) which rotate in opposite directions and which are slanted with respect the axis of rotation of a touch roller (T) or a package (P), which overlap partially with the wings of adjacent traverse units (U) and the rotational centers of which are offset to each other,
   characterized by
   means for rotating the upper rotating wing (1) in the counter clockwise direction and the lower rotating wing (7) in the clockwise direction when viewed from the top, such that
   the lower rotating wing (7) transfers the yarn along a downward gradient and the upper rotating wing (1) transfers it along an upward gradient.

2. A yarn traverse device according to claim 1,
   characterized in that,
   a height adjustment pulley member (M) having two pulleys (m1, m2) which rotate in unison is arranged between yarn traverse unit groups (G1, G2) comprising a plurality of yarn traverse units (U) and the yarn traverse units (U) of one yarn traverse unit group (G1) are driven by a drive belt (b1) wound on one pulley (m1) of the height adjustment pulley member (M) and the yarn traverse units (U) of the other yarn traverse unit group (G2) are driven by a drive belt (b2) wound on the other pulley (m2) of the height adjustment pulley member (M).

Revendications

1. Dispositif de va-et-vient de fil pour utilisation avec un enrouleur de fil automatique comportant plusieurs unités d'enroulement, comprenant plusieurs unités de va-et-vient de fil (U), chacune avec une ailette de rotation supérieure (1) et une ailette de rotation inférieure (7) qui tournent dans des directions opposées et qui sont inclinées relativement à l'axe de rotation d'un rouleau tâteur (T) ou d'une bobine (P) et qui se chevauchent partiellement avec les ailettes des unités de va-et-vient adjacentes (U) et dont les centres de rotation sont décalés 1 'un relativement à l'autre, **caractérisé par** des moyens pour faire tourner 1 'ailette de rotation supérieure (1) en sens inverse horaire et l'ailette de rotation inférieure (7) en sens horaire en une vue de dessus, de telle sorte que l'ailette de rotation inférieure (7) transfère le fil le long d'un gradient vers le bas et 1 'ailette de rotation supérieure (1) le transfère le long d'un gradient vers le haut.

2. Dispositif de va-et-vient de fil selon la revendication 1, **caractérisé en ce qu'**un élément de poulie de réglage de hauteur (M) comportant deux poulies (m1, m2) qui tournent conjointement est disposé entre des groupes d'unités de va-et-vient de fil (G1, G2) comprenant plusieurs unités de va-et-vient de fil (U), et les unités de va-et-vient de fil (U) d'un groupe d'unités de va-et-vient de fil (G1) sont entraînées par une courroie d'entraînement (b1) enroulée sur une poulie (m1) de l'élément de poulie de réglage de hauteur (M), et les unités de va-et-vient de fil (U) de l'autre groupe d'unités de va-et-vient de fil (G2) sont entraînées par une courroie d'entraînement (b2) enroulée sur l'autre poulie (m2) de l'élément de poulie de réglage en hauteur (M).

Patentansprüche

1. Fadentraversiervorrichtung zur Verwendung mit einem Fadenspulautomaten, der mehrere Spulstellen hat, bestehend aus mehreren Fadentraversiereinheiten (U), von denen jede einen oberen Drehflügel (1) und einen unteren Drehflügel (7) hat, die in entgegengesetzten Richtungen drehen und die bezüglich der Drehachse einer Kontaktrolle (T) bzw. einer Auflaufspule (P) geneigt sind, die sich teilweise mit den Flügeln benachbarter Traversiereinheiten (U) überlappen und deren Drehmitten gegeneinander versetzt sind,
   gekennzeichnet, durch

Mittel zum Drehen des oberen Drehflügels (1) in der Gegenuhrzeigerrichtung und des unteren Drehflügels (7) in der Uhrzeigerrichtung, gesehen von oben, so dass der untere Drehflügel (7) den Faden längs eines nach unten gerichteten Gradienten und der obere Drehflügel (1) in längs eines nach oben gerichteten Gradienten transferiert.

2. Fadentraversiervorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** ein Höheneinstell-Riemenscheibenelement (M) mit zwei Riemenscheiben (m1, m2), die sich gemeinsam drehen, zwischen Fadentraversiereinheitsgruppen (G1, G2) angeordnet sind, die mehrere Fadentraversiereinheiten (U) umfassen, dass die Fadentraversiereinheiten (U) einer Fadentraversiereinheitsgruppe (G1) von einem Antriebsriemen (b1) angetrieben werden, der um eine Riemenscheibe (m1) des Höheneinstell-Riemenscheibenelements (M) gewickelt ist, und dass die Fadentraversiereinheit (U) der anderen Fadentraversiereinheitsgruppe (G2) von einem Antriebsriemen (b2) angetrieben sind, der auf die andere Riemenscheibe (m2) des Höheneinstell-Riemenscheibenelements (M) gewickelt ist.

FIG. 1

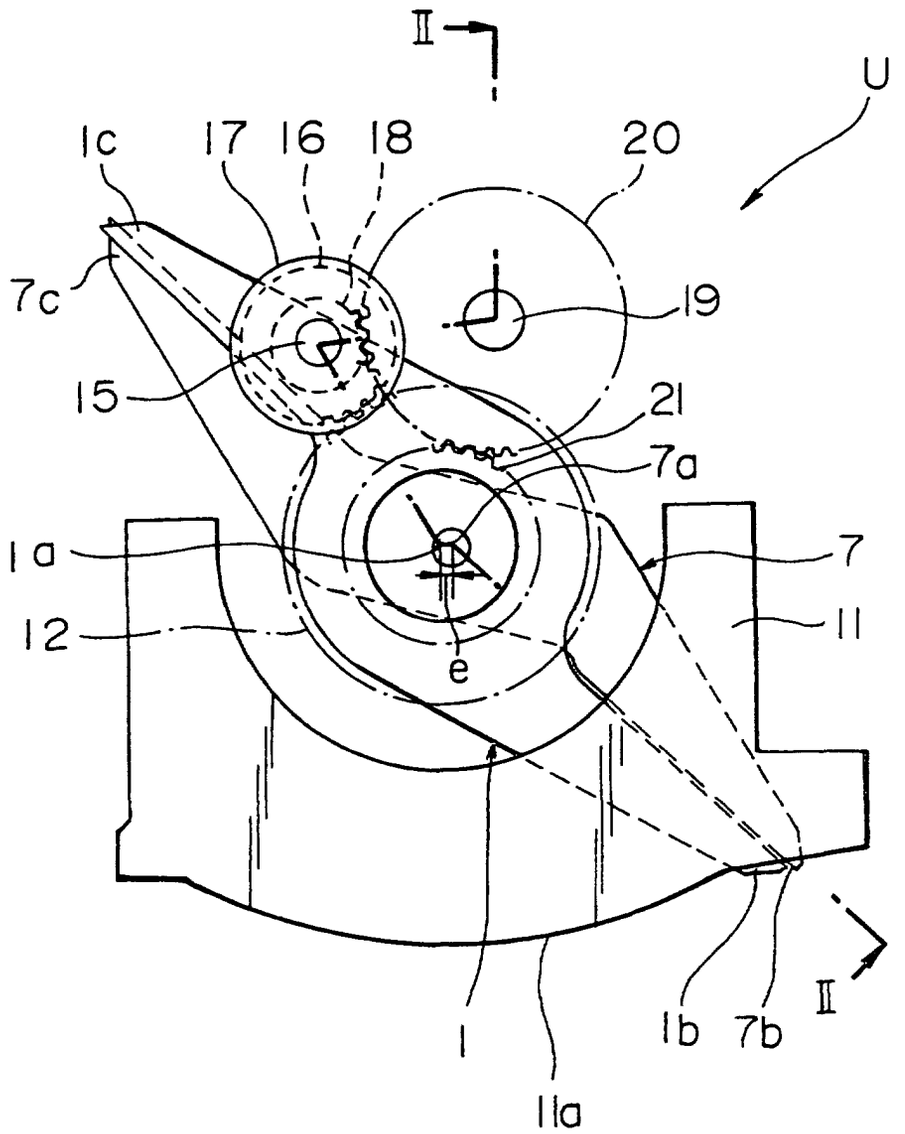

FIG. 2

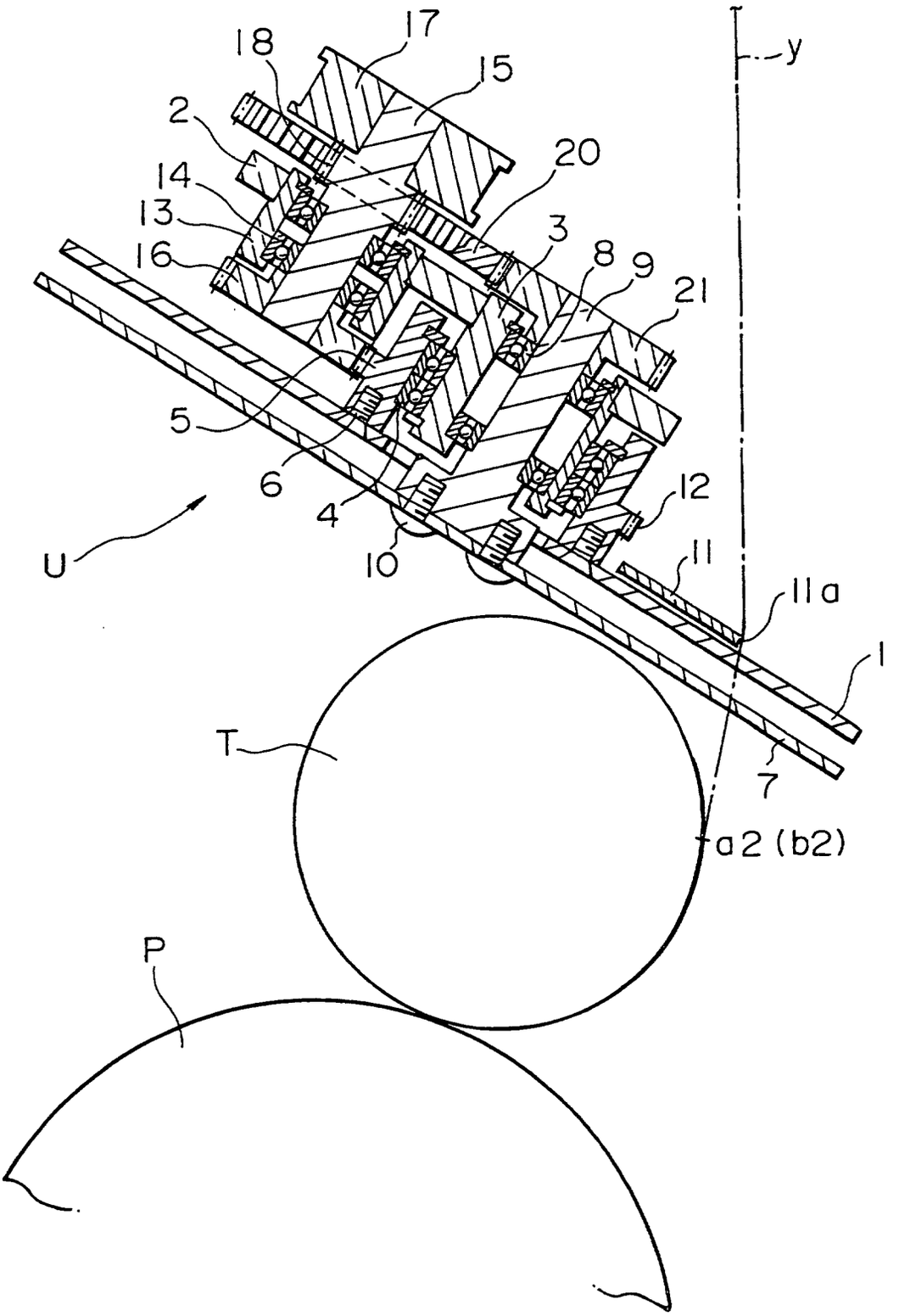

FIG. 3

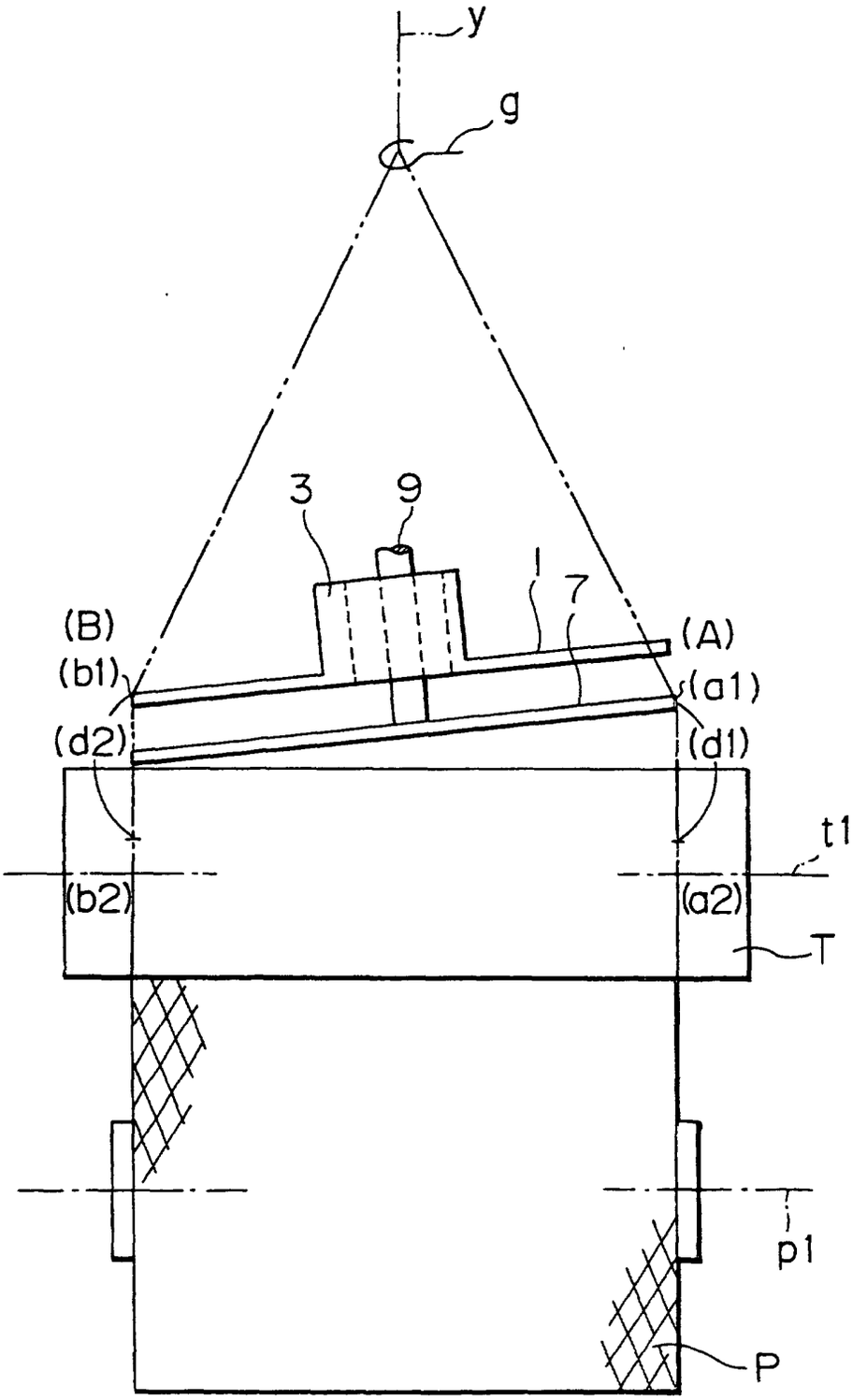

FIG. 4

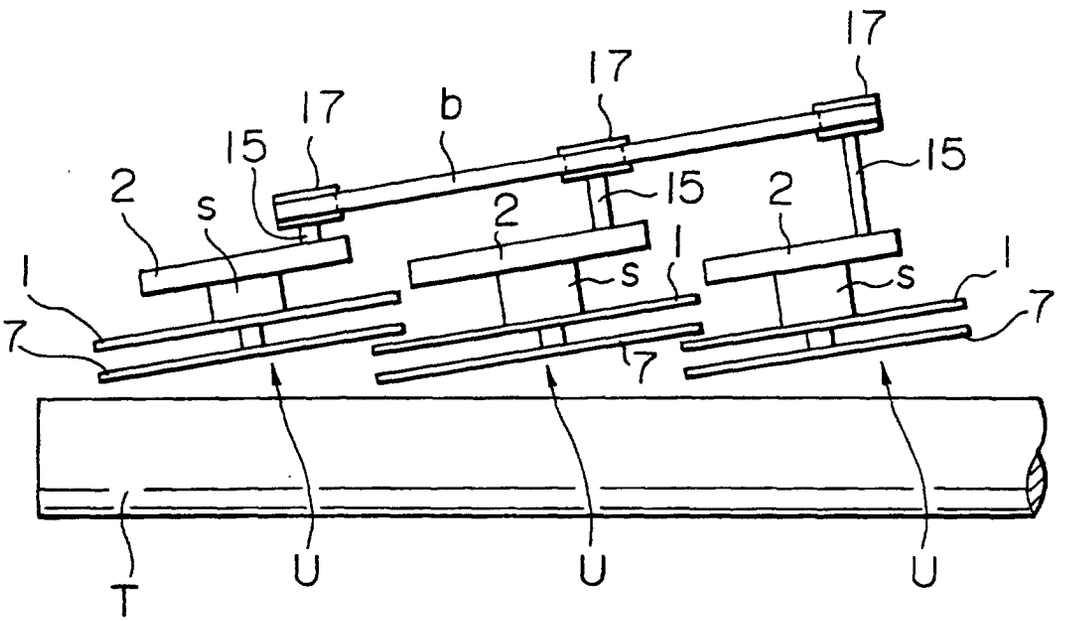

FIG. 5

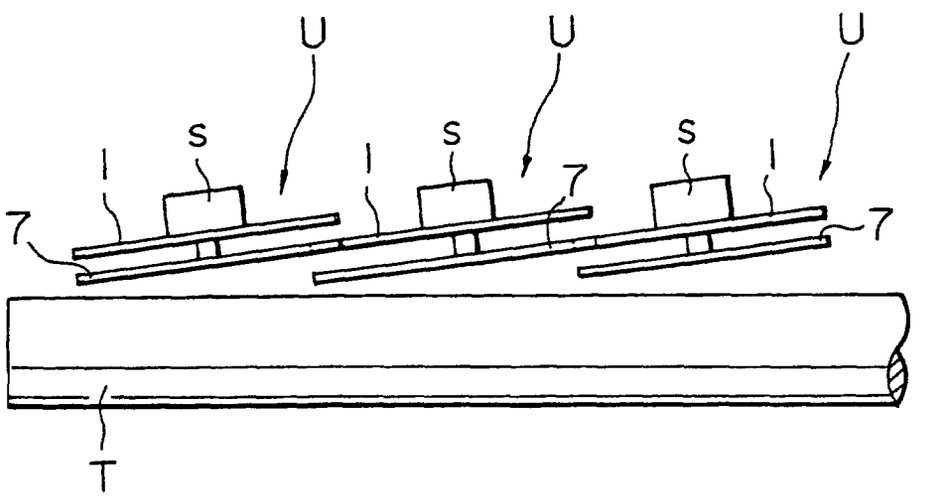

FIG. 6