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(71) Applicant: **Murata Kikai Kabushiki Kaisha**
Minami-ku, Kyoto-shi, Kyoto 601 (JP)

(72) Inventor: **Nakagawa, Osamu,**
Raionzumanshon-shugakuin 310
Sakyo-ku, Kyoto (JP)

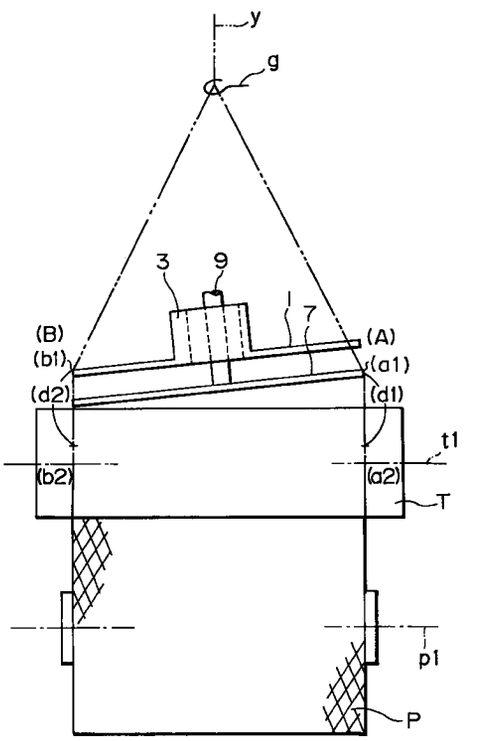
(74) Representative: **Liedl, Christine, Dipl.-Chem. et al**
Albert-Rosshaupter-Strasse 65
81369 München (DE)

(54) Yarn traverse device

(57) A yarn traverse device U wherein the plane of rotation of an upper rotating wing 1 and lower rotating wing 7 which rotate in opposite directions to each other is slanted with respect to the lines of the axis of rotation t1,p1 of the touch roller T or package P so that the free lengths(d1), (d2) of the yarn y at the yarn transfer points at the left and right edges are equal.

As the plane of rotation of the rotating wings is angled so that the free lengths of the yarn at the yarn transfer points at the left and right edges are equal, a package can be produced having a good shape and identical left and right edges.

FIG. 3



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Description

TECHNICAL FIELD

The present invention is related to a yarn traverse device which moves a yarn along a guide member to one end of the guide member by a rotating wing that rotates in a predetermined direction, then transfers the yarn at one end of the guide member to a similar rotating wing that rotates in a direction opposite to the above rotating wing, carries out the transfer of yarn at both edges of the guide member between the two rotating wings that rotate in directions opposite to each other so that the yarn moves in the opposite direction and comprises a plurality of yarn traverse units which traverse yarn.

BACKGROUND ART

Conventionally, a yarn traverse device has been known that positions in the vertical direction at a predetermined spacing a pair of propeller shaped rotating wings arranged so that they rotate in opposite directions and that plane of rotation is parallel with respect to the axis of rotation of the touch roller or package (For example, Japanese Patent Publication Number 3-72544, Japanese Patent Publication Number 4-27151 etc.). This kind of conventional yarn traverse device moves a yarn along a guide member to one edge of the guide member by one of the rotating wings rotating in a predetermined direction. In continuance, the yarn is received at one end of the guide member by one of the rotating wings that is rotating in the opposite direction to the above rotating wing and is thus moved in the opposite direction. Yarn transferral is carried out at both edges of the guide member between the two rotating wings that rotate in directions opposite to each other and thus traversing of the yarn is carried out.

Using Figure 9 being a schematic front elevation of the above mentioned conventional yarn traverse device, the problems the present invention attempts to solve will be described.

c1 is the upper rotating wing of one pair of rotating wings positioned so that they rotate in opposite directions to each other and rotates about a rotation shaft c1'. c2 is the lower rotating wing which rotates in a direction opposite to the aforementioned upper rotating wing c1 about a rotation shaft c2'. c3 is a publicly known touch roller. c4 is the package formed by the winding of yarn y on a bobbin c5 supported by a publicly known support device (not shown in the drawing). Furthermore, c6 is a yarn guide at the traverse point of the yarn y. It should be noted that for convenience, the yarn y is moved to the right by the upper rotating wing c1 and to the left by the lower rotating wing c2.

When yarn y is moved to the right by the upper rotating wing c1 and reaches the right edge transfer position (A), the yarn y separates from the upper rotating wing c1 and connects with the lower rotating wing c2 and is moved to the left. However, when this kind of transfer occurs at the right edge transfer position (A), the distance from point (a1) where the yarn y seperates from the upper rotating wing c1 and connects with the lower rotating wing c2 to the contact point (a2) where the yarn y contacts the touch roller c3 is the so-called yarn y free length (d1).

Furthermore, when the yarn y is moved to the left by the lower rotating wing c2 and reaches the left edge transfer position (B), the yarn y separates from the lower rotating wing c2 and connects with the upper rotating wing c1 and is moved to the right. However, when this kind of transfer occurs at the left edge transfer position (B), the distance from point (b1) where the yarn y seperates from the lower rotating wing c2 and connects with the upper rotating wing c1 to the contact point (b2) where the yarn y contacts the touch roller c3 is the so-called yarn y free length (d2).

On the conventional yarn traverse device as described above, the free length (d1) at the right transfer position (A) and the free length (d2) at the left transfer position (B) are different. Thus if the free lengths at the left and right edges are different, differences in shape are generated at the left and right edges of the package c4 and the package c4 of improper shape is manufactured.

On each yarn traverse unit of the aforementioned conventional yarn traverse device, as the rotating wings that rotate in the same direction are positioned on the same plane of rotation and the rotation circle drawn by the tip of adjacent rotating wing that rotate in the same direction are positioned so as to partially overlap, when one yarn traverse unit is damaged and the rotation of the rotating wing stops or when differences appear between the rotational velocity of one rotating wing and the rotational velocity of a rotating wing of another yarn traverse unit, adjacent rotating wings positioned on the same plane of rotation may interfere with each other and collide and accordingly the rotating wings may be damaged.

SUMMARY OF THE INVENTION

in order to solve the problems present on the aforementioned conventional yarn traverse device, it is a first aim of the present invention to propose a yarn travers device which is able to reduce the total length of the yarn traverse device when a plurality of yarn travese devices are arranged in a line.

It is a second aim of the present invention to propose a yarn traverse device that reduces the maintenance inspection operations of the yarn traverse device.

In order to achieve the aforementioned first aim, the present invention firstly slots with respect to the axis of rotation of the touch roller or the axis of rotation of the package the plane of rotation of the upper rotating wing and lower rotating wing that rotate in opposite direction to each other so that the yarn free length at the left and right yarn transfer positions are equal, secondly partially

overlaps the plane of rotation of adjacently positioned rotating wings of the yarn traverse device, and thirdly, along the touch roller, makes all the heights from the touch roller of the plurality of arranged yarn traverse devices the same.

In order to achieve the second aim, the present invention firstly differs all four of the planes of rotation of the pair of rotating wings that rotate in opposite directions to each other and comprise the yarn traverse unit and partially overlaps when viewed by a top plan view the plane of rotation of the rotating wings of adjacent yarn traverse units, secondly inserts between the pair of rotating wings of the adjacent yarn traverse unit the upper rotating wing of the pair of rotating wings that rotate in opposite directions to each other and comprise the yarn traverse unit, and thirdly, arranges between yarn traverse unit groups comprising a plurality of yarn traverse units a height adjustment pulley member having two pulleys which are capable of rotating together and drives the yarn traverse units comprising one yarn traverse unit group by a drive belt arranged on one pulley of the height adjustment pulley member and drives the yarn traverse units comprising another yarn traverse unit group by a drive belt arranged on another pulley of the height adjustment pulley member.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a top plan view of the yarn traverse device of the present invention.

Figure 2 is a vertical sectional view along the line II-II of Figure 1 of the yarn traverse device of the present invention.

Figure 3 is a schematic front view of the yarn traverse device of the present invention.

Figure 4 is a schematic front view of a plurality of yarn traverse devices of the present invention arranged in combination.

Figure 5 is a schematic front view of a plurality of the yarn traverse device of a second embodiment of the present invention arranged in combination.

Figure 6 is a schematic front view of the yarn traverse device of a third embodiment of the present invention.

Figure 7 is a schematic front view of a fourth embodiment of the yarn traverse device of the present invention.

Figure 8 is a schematic front view of a fifth embodiment of the yarn traverse device of the present invention.

Figure 9 is a schematic front view of a conventional yarn traverse device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Henceforth an embodiment of the present invention will be described but, provided the aims are not surpassed, the present invention is not limited to the present embodiment.

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

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 suitable attachment means such as a screw 6 or the like to a rotating cylinder 5 positioned 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 a length the same 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 suitable attachment means such as a screw 10 or the like on the lower part of a rotating shaft 9 positioned via a bearing 8 inside the cylindrical frame 3.

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 arc 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. It should be noted that arrangement of the guide member 11 below the lower rotating wing 7 or between the upper rotating wing 1 and the lower rotating wing 7 are possible.

A spur gear 12 is mounted on the outer periphery of the rotating cylinder 5 positioned 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 positioned 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 positioned via a bearing inside the cylindrical frame (not shown in the drawings) mounted a 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.

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) as explained for the conventional traverse devices 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. It should be noted that g in Figure 3 is the yarn guide is the traverse fulcrum of the yarn y.

Next, the traverse actions and driving and the like of the yarn y of the yarn traverse device having the above described structure will be described.

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.

Furthermore, as previously described, when the pulley 17 rotates due to the drive belt (not shown in the drawings), 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.

As previously described, 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.

For convenience, the upper rotating wing 1 rotates in a counter clockwise direction in Figures 1 and 3 and the lower rotating wing 7 is shown to rotate in a clockwise direction. Also, in Figure 1, the point in time is shown where the yarn y has been transferred along the yarn guide surface 11a of the yarn guide member 11 from one 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 one tip 7b of the lower rotating wing 7 that is positioned at the right edge of the guide member 11 and is rotating in a clockwise direction.

The yarn y which has been transferred to one 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 one tip 7b of the lower rotating wing 7 is transferred from one 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 a counter clockwise direction. This yarn y is then moved to the right along the yarn guide surface 11a of the guide member 11.

Then, the yarn y which has been moved from the left edge to the right edge of the guide member 11 by one tip 1c of the upper rotating wing 1 is transferred from one tip 1c of the upper rotating wing 1 to one tip 7c of the lower rotating wing 7 that has rotated to the right edge of the guide member 11 and is rotating in a 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 transferral 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.

In the present invention, 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 device 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.

Next, using Figure 4, the arrangement in series along the touch roller T of a plurality of yarn traverse units U having the above mentioned structure will be described.

In the present embodiment, yarn traverse devices U are arranged in series such that the upper rotating wing 1 and lower rotating wing 7 of the yarn traverse device U positioned on the right is positioned below the upper rotating wing 1 and lower rotating wing 7 of the yarn traverse device U positioned on the left side. Also, not only are the planes of rotation of the upper rotating wing 1 or the planes of rotation of the lower rotating wing 7 of adjacent yarn traverse devices U positioned so as to each partially overlap, 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 device 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 arranged so as to be all different.

A drive belt b is wound on the pulley 17 attached to the rotating shaft 15 of each yarn traverse device U and

the pulley 17 is rotated by the running of the drive belt b by a motor (not shown in the drawing) thus driving each yarn traverse device U. It should be noted that 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. described using Figures 1 and 2.

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 devices U are positioned so as to each partially overlap, adjacent yarn traverse devices U may be arranged in close proximity to each other and accordingly, when a plurality of yarn traverse devices U are arranged in series, the entire length of the yarn traverse device U may by shortened.

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 device 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 arranged so as to be all different, even if one yarn traverse device 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 device U with the rotational velocity of the rotating wings 1, 7 of another yarn traverse device U, there is no interference or collision between the rotating wings 1, 7 of adjacent yarn traverse devices U.

Yet further, as the plane of rotation of the upper rotating wing 1 and the lower rotating wing 7 of each yarn traverse device 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.

Yet further still, as the height from the touch roller of the plurality of yarn traverse devices 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 device U and accordingly a package of uniform shape may be produced.

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

In this embodiment, the plane of rotation of the lower rotating wing 7 of the yarn traverse device U positioned on the left side and the plane of rotation of the upper rotating wing 1 of the yarn traverse device 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 device U positioned on the left side and the direction of rotation of the upper rotating wing 1 of the yarn traverse device U positioned on the right side is the same direction. The lower rotating wing 7 of the yarn traverse device U positioned on the left side and the upper rotating wing 1 of the yarn traverse device 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 or the like so that they do not interfere with each other when rotating.

On the aforementioned embodiment, the plane of rotation of the upper rotating wing 1 and the lower rotating wing 7 of each yarn traverse device 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 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 device 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 device U and accordingly a package of uniform shape may be produced.

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

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 arranged so as to be all different.

In the present embodiment, 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 is arranged so as to be 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.

Furthermore, each pulley 17 of the yarn traverse group G1 comprising a predeterined number of adjacent yarn traverse units U (in the present embodiment, the yarn traverse 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 as described before, 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 the yarn traverse group G2 comprising the same predeterined number of yarn traverse units U and being adjacent to that yarn traverse 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. It should be noted that the pulley 17 may be a sprocket and the drive belt b2 may be a chain that is wound on the sprocket.

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 pulley m1 positioned 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. Also, the 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.

As described above, 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 or the like (not shown in the drawing) 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. It should be noted that the rectangle d shown below the plate frame 2 in Figure 6 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. described using Figures 1 and 2.

When all of the pulleys 17 of the yarn traverse units U are rotated by a single drive belt, 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 becomes as large as that at the yarn traverse unit U positioned to the right. Accordingly, the length of the rotating shaft 15 on which is mounted the pulley 17 must be changed 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.

In the present embodiment as described above, the plurality of yarn traverse units U are so arranged that, 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 is arranged so as to be 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. The yarn traverse units U arranged in this way are divided into yarn traverse unit groups G1, G2 comprising a predetermined number of yarn traverse units U. As the drive belts b1,b2 of adjacent yarn traverse unit groups G1, G2 are connected via the height adjustment pulley member M, there is no requirement to change the length of the rotating shaft 15 of all the yarn traverse units U and a few or small number of yarn traverse units U of different types having different lengths of the rotating shaft 15 may be prepared.

When the yarn traverse unit groups G1, G2 are comprised of 3 yarn traverse units U as in the present embodiment, a yarn traverse device arranged with a plurality of yarn traverse units U may be arranged if yarn traverse units U having three types of the rotating shaft 15 of differing lengths are provided. Further, as the drive belts b1, b2 of adjacent yarn traverse unit groups G1, G2 are linked by the height adjustment pulley member M, the rotating shaft 15 to which is attached the pulley 17 need not be long and accordingly, there is deformation of the rotating shaft 15 due to loads from the drive belts b1, b2.

In the embodiment shown in Figure 7, when the yarn traverse device is viewed from the front, the planes of rotation of the upper rotating wing 1 and lower rotating wing 7 of each yarn traverse unit U1-U4 are positioned parallel without any slanting with respect to the line of axis of rotation t1 of the touch roller T as in the previously described embodiments. Furthermore, the planes of rotation of every other upper rotating wing 1 and lower rotating wing 7 of yarn traverse units U1, U3 or U2, U4 are respectively the same and the upper rotating wing 1 or the lower rotating wing 7 of the yarn traverse units U2 or U3 positioned in the middle are arranged so as to be inserted into between the upper rotating wing 1 and lower rotating wing 7 of every other yarn traverse unit U1, U3 or U2, U4. In this case also, 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 units U1, U2 are arranged so as to be all different.

In the embodiment shown in Figure 8, when the yarn traverse device is viewed from the front, the planes of rotation of the upper rotating wing 1 and the lower rotatinng wing 7 of each yarn traverse unit U1-U4 are positioned parallel without any slanting with respect to

the line of axis of rotation t1 of the touch roller T as in the previously described embodiments. Furthermore, the planes of rotation of every other upper rotating wing 1 and lower rotating wing 7 of yarn traverse units U1, U3 or U2, U4 are respectively the same and the upper rotating wing 1 or the lower rotating wing 7 of the yarn traverse units U2 or U3 positioned in the middle are arranged so as to be above or below the upper rotating wing 1 and the lower rotating wing 7 of every other yarn traverse unit U1, U3 or U2, U4. Moreover, pairs of planes of rotation of the lower rotating wings 7 or pairs of planes of rotation of the upper rotating wings 1 of adjacent yarn traverse units U1, U2 are respectively arranged so as to partially overlap. In this case also, 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 units U1, U2 are arranged so as to be all different.

As the present invention is so arranged that pairs of planes of rotation of the lower rotating wings 7 or pairs of planes of rotation of the upper rotating wings 1 of adjacent yarn traverse units U are respectively arranged so as to partially overlap and 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 units U are arranged so as to be all different, even if one yarn traverse unit 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.

Furthermore, in the present invention, 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 device U comprising adjacent yarn traverse units U are arranged so as to be all different, there is no interference no matter what the value of the rotational phase difference of the rotating wings 1, 7 of adjacent yarn traverse units U and moreover, there is no need to skew the rotational phase difference of the rotating wings 1, 7 of adjacent yarn traverse units U. However, by skewing the rotational phase difference of the rotating wings 1, 7 of adjacent yarn traverse units U by 90 degrees or 45 degrees, the drive balance of the entire yarn traverse device arranged with multiple yarn traverse units U is improved and accordingly, the vibration and noise of the yarn traverse device may be reduced.

Yet further, as described above, as only the length of the rotating shaft 15 to which is attached the pulley 17 has a number of different types and other members are common to all yarn traverse units U, maintenance inspection of the yarn traverse unit U is simplified.

The present invention as described above demonstrates the following advantages.

As the plane of rotation of the rotating wings are slanted so that the yarn free lengths at the laft and right edge yarn transfer positions are equal, a package of good shape with the left and right edges of the package being the same may be produced.

As the planes of rotation of the rotating wings of adjacent yarn traverse devices partially overlap, the entire length of the yarntraverse device when a plurality of yarn traverse units are arranged in combination may be reduced.

As all the heights of the yarn traverse devices from the touch roller are the same, there is no traverse dispersion at each yarn traverse device and accordingly, a package of uniform shape may be produced.

As the four planes of rotation of rotating wings comprising adjacent yarn traverse units are positioned so as to be all different, even if one yarn traverse unit becomes faulty and the rotation of the rotating wings stop or a difference is generated between the rotational velocity of the rotating wings of one yarn traverse unit with the rotational velocity of the rotating wings 1, 7 another yarn traverse unit, there is no interference or collision between the rotating wings of adjacent yarn traverse units U and accordingly no damage.

As the four planes of rotation of rotating wings comprising adjacent yarn traverse units are positioned so as to be all different, each yarn traverse unit can be individually stopped and accordingly maintenance inspections procedures are simplified.

As the distance of each yarn traverse unit from the touch roller or package is approximately the same due to the slanting of the planes of rotation of the rotating wings with respect to the line of axis of rotation of the touch roller or package and the insertion of the upper rotating wings of the pair of rotating wings that rotate in opposite directions and comprise the yarn traverse unit between the pair of rotating wings of the adjacent yarn traverse unit, the traverse conditions of each yarn traverse unit are approximately uniform.

As adjacent yarn traverse unit groups are driven via a height adjustment pulley member, the length of the rotating shaft to which is attached the pulley may be reduced and accordingly, deformation of the rotating shaft such as bending may be prevented.

As the rotating wings of adjacent yarn traverse units do not interfere with each other, use of a timing belt or the like for synchronisation is unnecessary. Accordingly, use of a cheaper round belt or flat belt is possible. Furthermore, arrangement of a drive source such as an electronic motor or the like on each yarn traverse unit

and the individual driving of each yarn traverse unit is possible.

Claims

1. A yarn traverse device, where
the planes of rotation of an upper rotating wing and lower rotating that rotate in opposite direction to each other are slanted with respect to the line of the axis of rotation of a touch roller or the line of axis of rotation of a package so that the yarn free lengths at the left and right edges of the yarn transfer positions are the same.

2. A yarn traverse device as in claim 1, wherein the plane of rotation of therotating wings of adjacently positioned yarn traverse devices partially overlap.

3. A yarn traverse device as in claim 2, wherein the heights of the plurality of yarn traverse devices arranged in combination along the touch roller are all the same.

4. A yarn traverse device, where
the planes of rotation of the pair of rotating wings that rotate in opposite directions to each other and comprise a yarn traverse unit are all different at all four of the rotating wings of adjacent yarn traverse units and the planes of rotation of the rotating wings of adjacent yarn traverse units partially overlap when viewed from above.

5. A yarn traverse device as in claim 4, wherein the upper rotating wing of the pair of rotating wings that rotate in opposite directions to each other and comprise the yarn traverse unit is inserted between the pair of rotating wings of the adjacent yarn traverse unit.

6. A yarn traverse device as in claim 4 or claim 5, wherein a height adjustment pulley member having two pulleys which rotate in unison is arranged between yarn traverse unit groups comprising a plurality of yarn traverse units and the yarn traverse units of one yarn traverse unit group are driven by a drive belt wound on one pulley of the height adjustment pulley member and the yarn traverse units of the other yarn traverse unit group are driven by a drive belt wound on the other pulley of the height adjustment pulley member.

FIG. 1

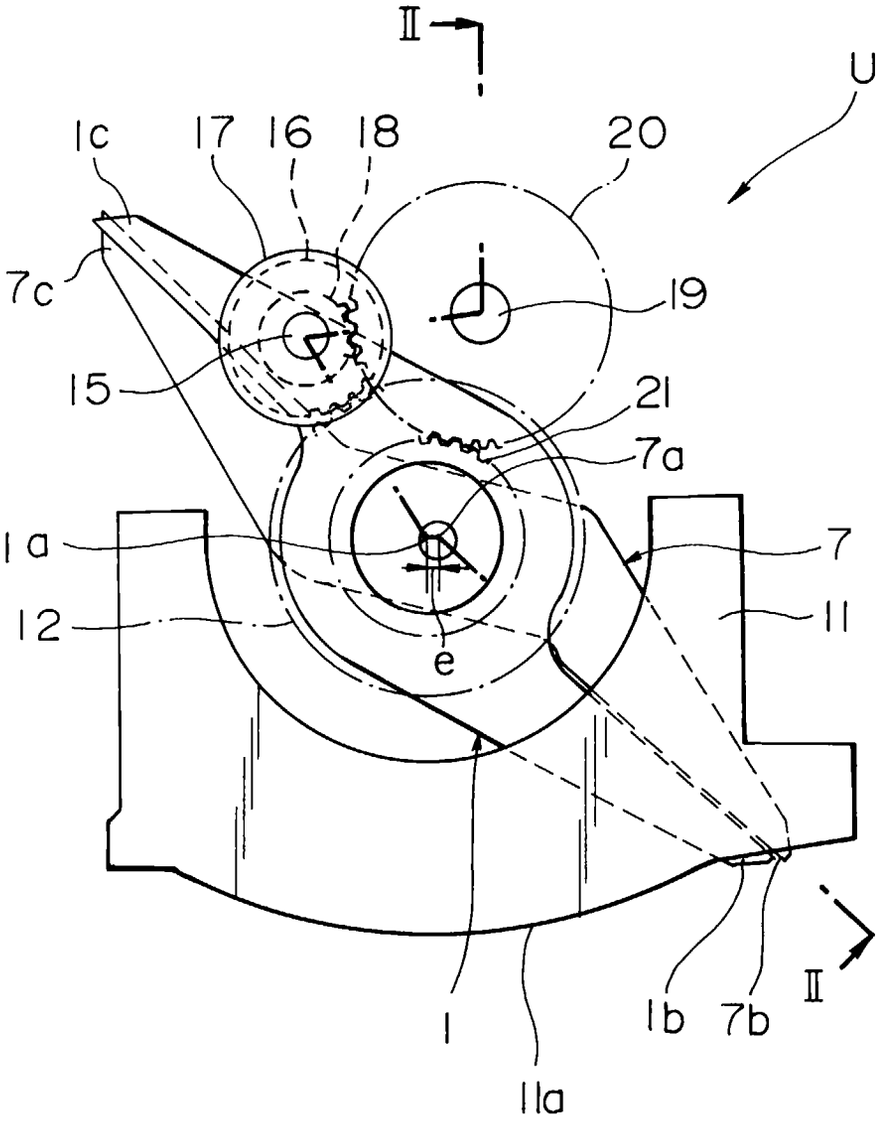


FIG. 2

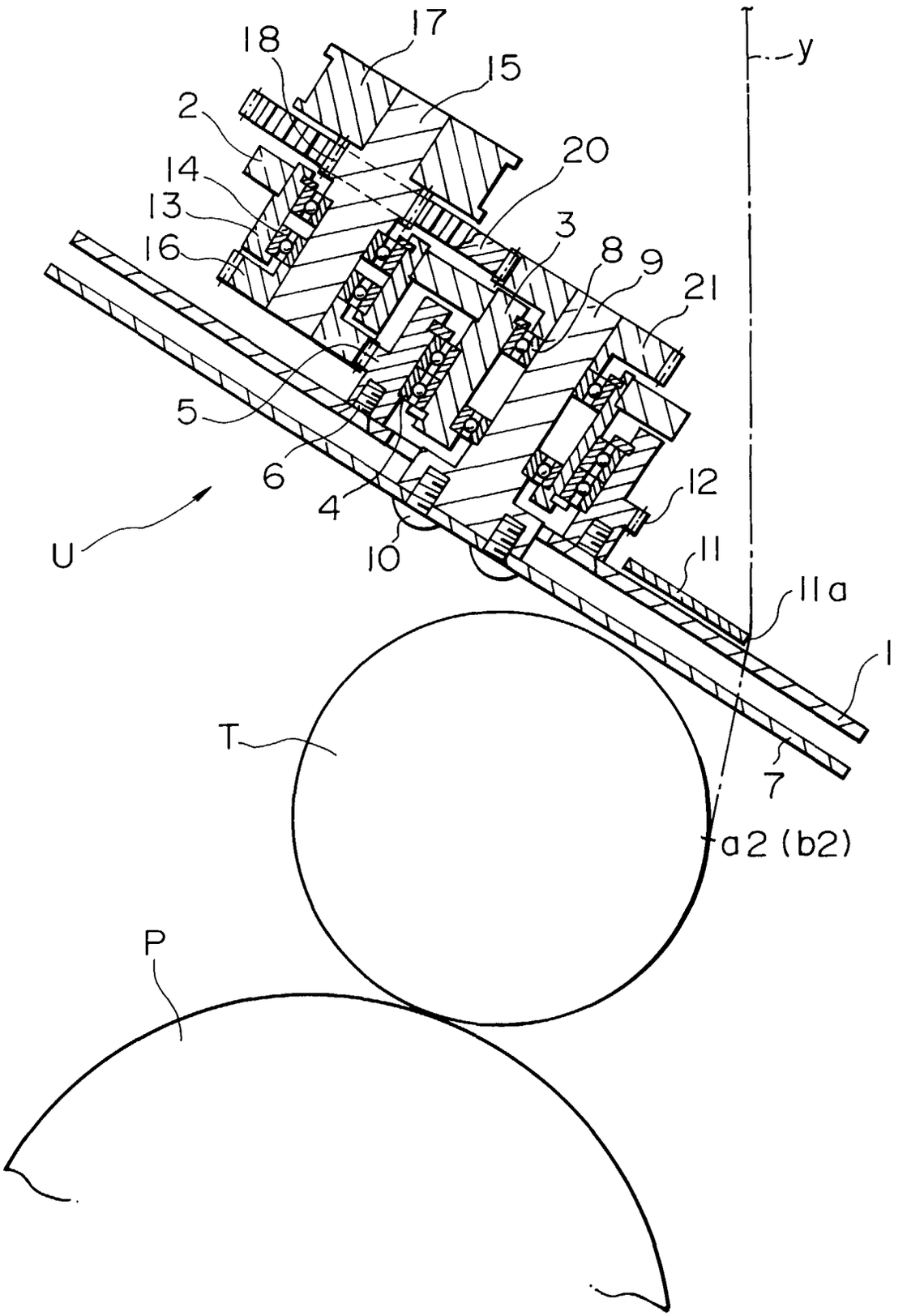


FIG. 3

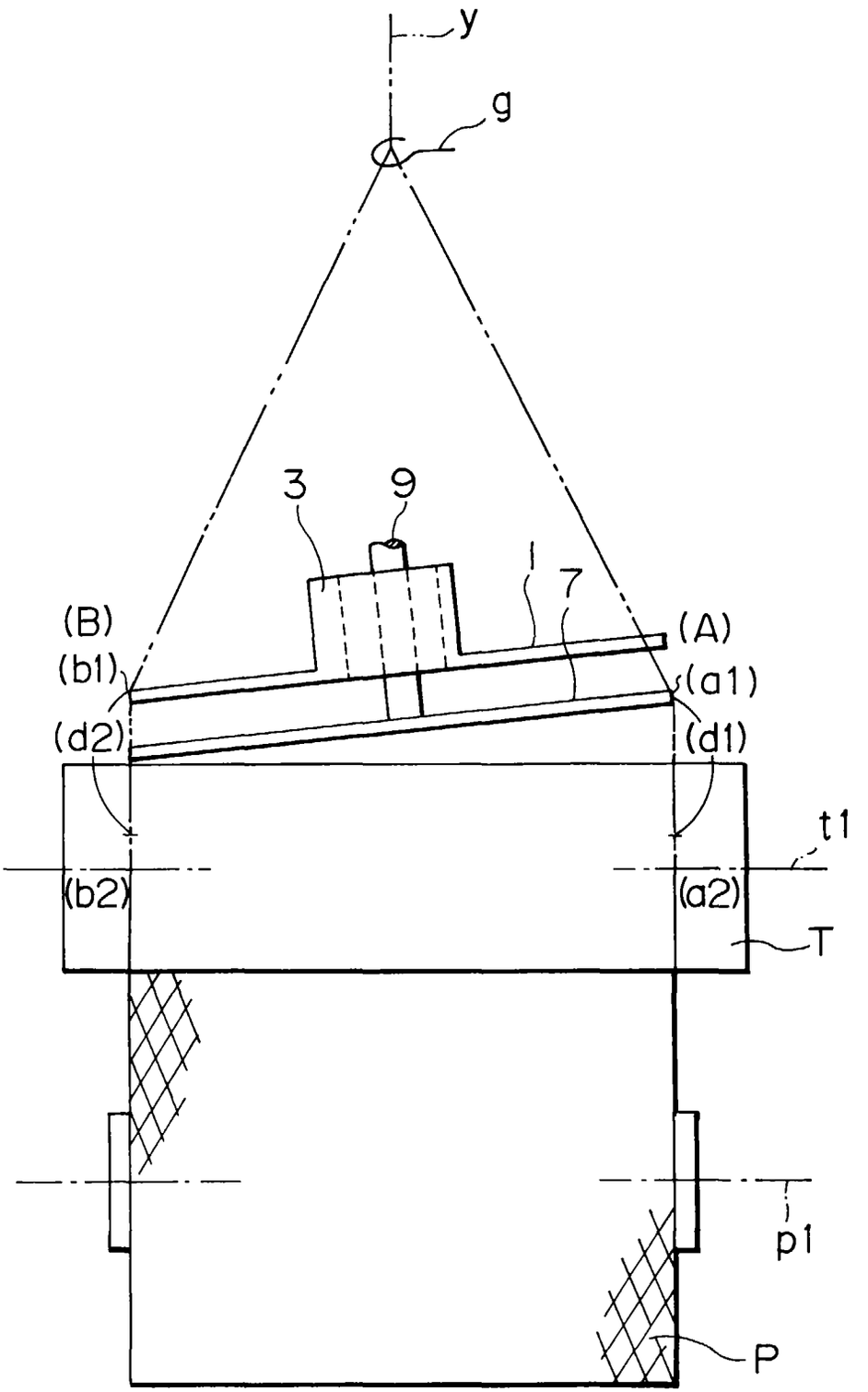


FIG. 4

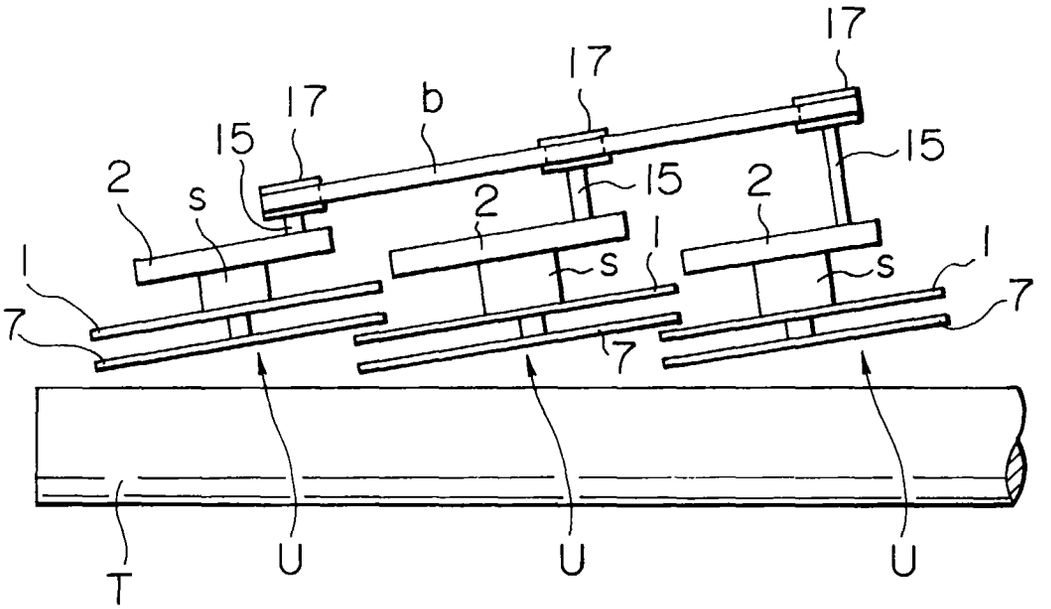


FIG. 5

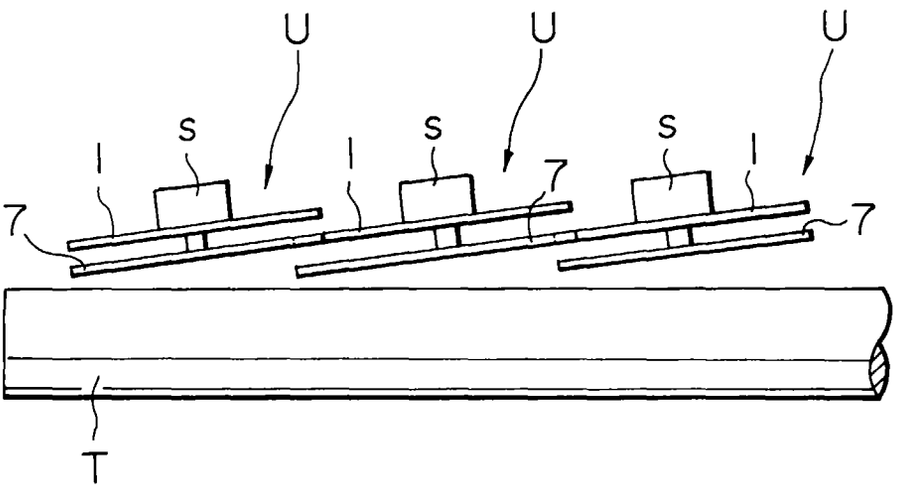
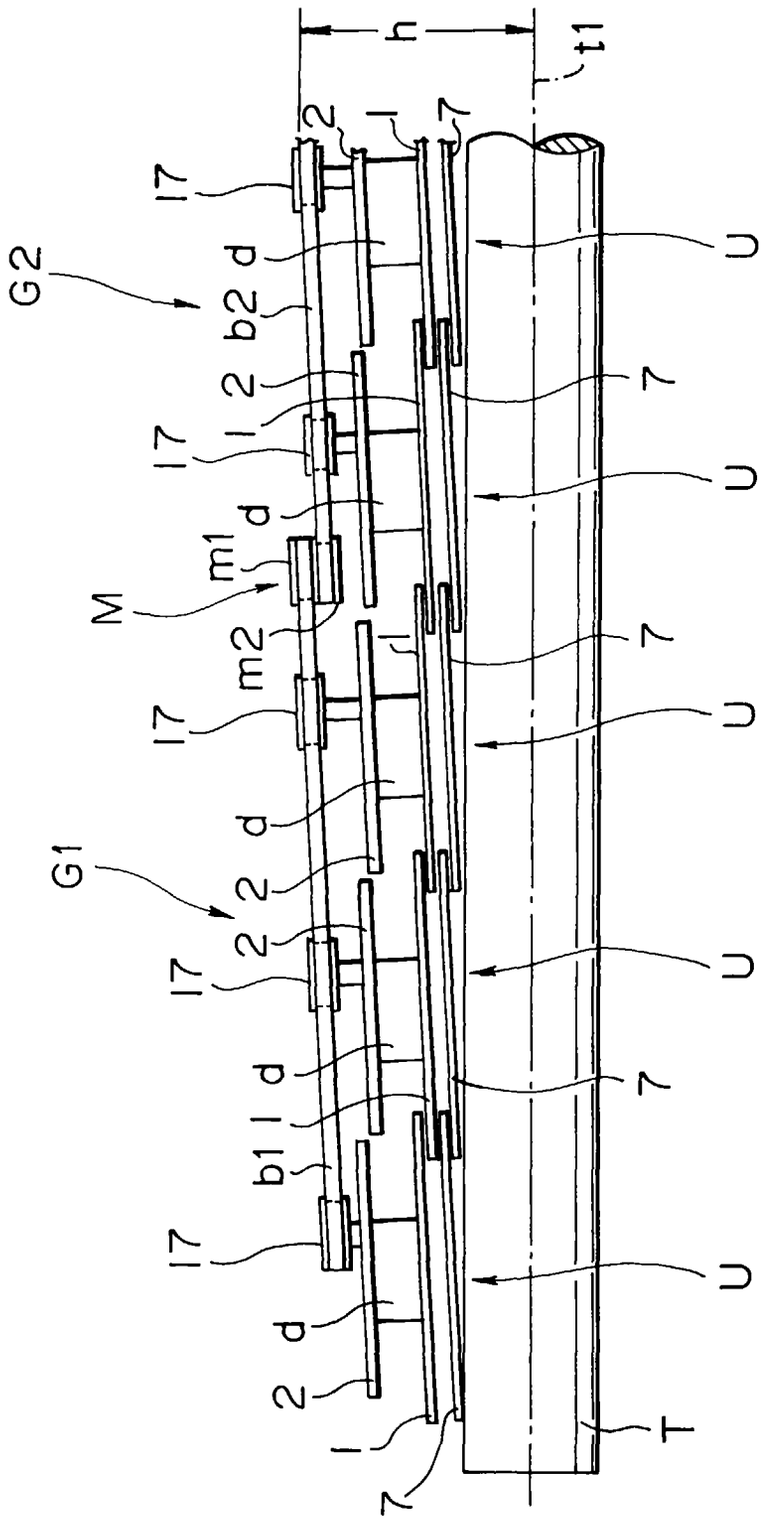


FIG. 6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I7
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FIG. 7

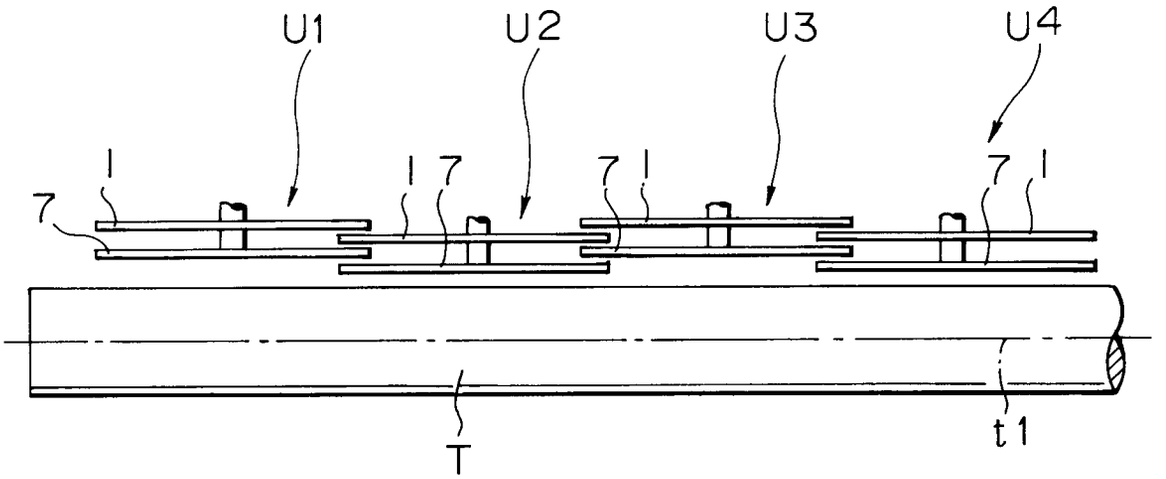


FIG. 8

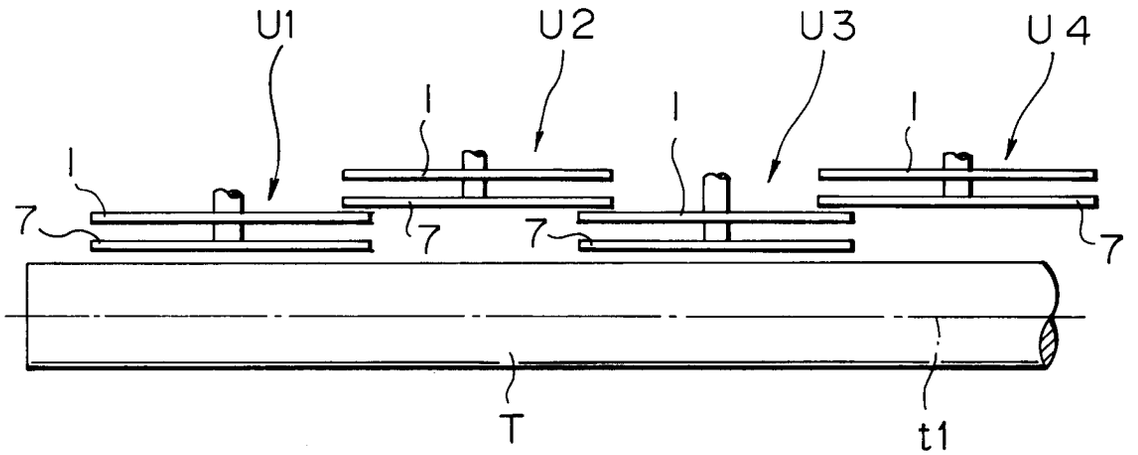
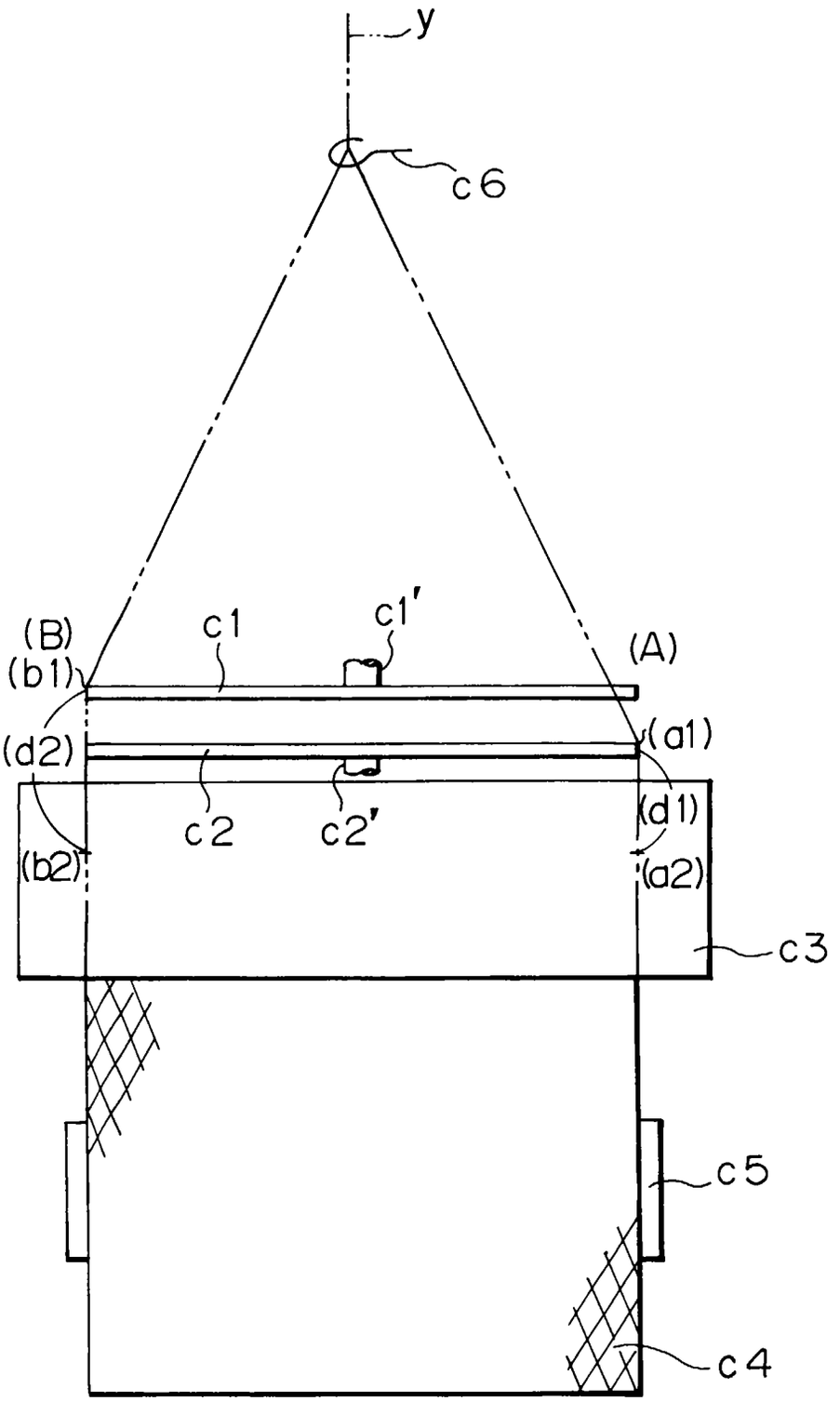


FIG. 9



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 10 2984

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)
X	DE 44 25 133 A (NEUMAG NEUMUENSTERSCHE MASCHIN) 18 January 1996 * column 1, line 55 - column 2, line 4; claims; figures * ---	1-5	B65H54/28
A	EP 0 114 642 A (BARMAG BARMER MASCHF) 1 August 1984 * figure 16 * ---	1,4,5	
A	PATENT ABSTRACTS OF JAPAN vol. 017, no. 304 (M-1427), 10 June 1993 & JP 05 024740 A (TORAY IND INC), 2 February 1993, * abstract * -----	1-6	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 July 1997	Tamme, H-M

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