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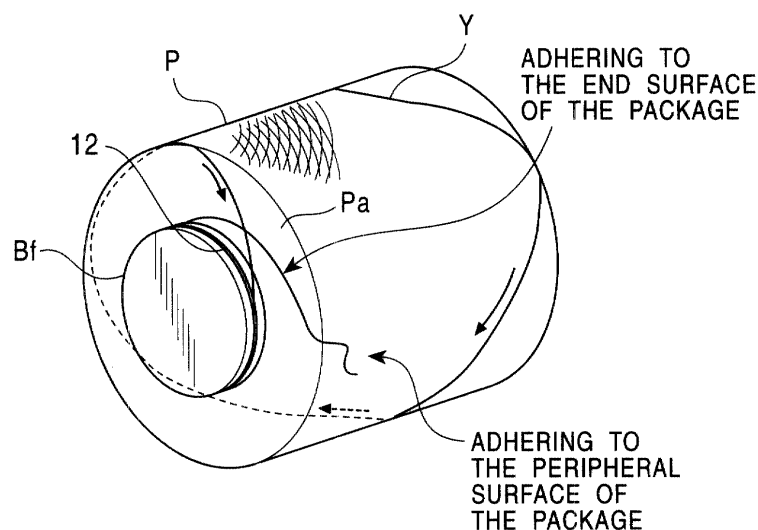
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(54) **Elastic-yarn package and take-up winder for elastic yarn**

(57) In a take-up winder for elastic yarn, a yarn moved to a bobbin end due to a yarn transferring operation forms a bunch winding at the bobbin end of a full package. The number of windings in the bunch winding, however, may be insufficient. Additionally, the mere formation of the bunch winding makes it difficult to pick up a yarn end from the package during a subsequent step. An end of an elastic yarn Y wound into a yarn layer P of a package falls from the yarn layer P onto a position of

a bobbin Bf which is separate from a yarn layer-formed position, and the yarn end is wound around the bobbin Bf three or more times to form an elastic-yarn package. Additionally, the end of the elastic yarn Y wound into the yarn layer P of the package falls from the yarn layer onto the position of the bobbin which is separate from the yarn layer-formed position, and the yarn end is then wound on the bobbin once or more and adheres to an end surface Pa of the yarn layer, thereby forming an elastic-yarn package.

FIG. 6



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Description

Field of the Invention

[0001] The present invention relates to a take-up winder for elastic yarn comprising a traverse device and others, the traverse device including two bobbin holders, a touch roller, and a traverse guide, wherein bobbin holder position changing means such as a turret can switch the two bobbin holders between a winding position and a standby position. More specifically, the present invention relates to the take-up winder to transfer a yarn wound around a yarn layer-formed bobbin provided in one of the bobbin holders, to an empty bobbin installed in the other bobbin holder, and to a yarn layer-formed bobbin (package) manufactured by this method.

Background of the Invention

[0002] A take-up winder for elastic yarn has been well known which can switch two bobbin holders between a winding position and a standby position by rotating a turret. In such a take-up winder, a touch roller is provided above and near the bobbin holder located at the winding position so as to come into pressure contact with a yarn layer on a bobbin so that the bobbin can be rotationally driven by driving the touch roller. Thus, an elastic yarn traversed by a traverse device is sequentially around the bobbin located at the winding position to form a package.

[0003] Once a full package is obtained at the winding position, the turret is rotated to move the full package to the standby position, while the bobbin holder located at the standby position and having an empty bobbin is moved to the winding position. Due to the needs for a yarn transferring operation of picking up the yarn from the full package and winding it around a next empty bobbin around which the yarn is to be wound, the take-up winder has yarn transferring means called a "yarn switching guide".

[0004] The yarn switching guide moves the yarn on the yarn layer of the full package to a bobbin end separate from a yarn layer-formed position so as to slacken the yarn using a difference in peripheral speed (difference in peripheral speed between an outer periphery of the package and an outer periphery of the bobbin). The slackened yarn is entangled with a yarn spun out above the empty bobbin so that a winding operation can be smoothly performed on the empty bobbin, and the winding operation on the empty bobbin produces a yarn tension between the full package and the empty bobbin again to cut the slackened yarn. With this configuration, the winding operation can automatically and sequentially shift to an empty bobbin each time a full package is formed.

[0005] In the above described yarn transferring operation, the yarn moved to the bobbin end forms a bunch winding at the bobbin end of the full package to allow a

yarn end to be easily found. The number of windings in the bunch winding, however, may conventionally be insufficient, causing the bunch winding to slip out while the package is being transported. Additionally, the mere formation of the bunch winding makes it difficult to pick up the yarn end from the package during a subsequent step.

[0006] It is thus an object of the present invention to provide a package that allows a yarn end to be easily found, that can prevent a bunch winding from slipping out during transportation, and that also allows the yarn end to be easily picked up, and to provide a take-up winder for elastic yarn which is suitable for manufacturing the package.

Summary of the Invention

[0007] The problems to be solved by the invention have been described, and means for solving the problems will be described below.

[0008] An elastic-yarn package is formed wherein an end of an elastic yarn wound into a yarn layer of a package falls from the yarn layer onto a bobbin located at a position separate from a yarn layer-formed position, and the yarn end is then wound on the bobbin once or more and adheres to an end surface of the yarn layer. In this case, the yarn is preferably wound on the bobbin three or more times.

[0009] Additionally, a take-up winder for elastic yarn is provided which comprises two bobbin holders and yarn transferring means so that when a yarn is wound around a bobbin in one of the bobbin holders to form a yarn layer and the amount of yarn in the yarn layer then reaches a predetermined value, the yarn is transferred to a bobbin provided in the other bobbin holder and having no yarn layer formed thereon, wherein during yarn transfer, the yarn transferring means operates to move the yarn wound around the yarn layer-formed bobbin, to a position separate from a yarn layer-formed position on the yarn layer-formed bobbin and then to the yarn layer-formed position.

[0010] In addition, a take-up winder for elastic yarn is provided which comprises two bobbin holders and yarn transferring means so that when a yarn is wound around a bobbin in one of the bobbin holders to form a yarn layer and the amount of yarn in the yarn layer then reaches a predetermined value, the yarn is transferred to a bobbin provided in the other bobbin holder and having no yarn layer formed thereon, wherein before yarn transfer, rotation speed of the one of the bobbin holders is increased above rotation speed for normal winding.

Brief Description of the Drawings

[0011] Figure 1 is a front view of a take-up winder for elastic yarn for winding an elastic yarn such as a polyurethane rubber yarn which can be stretched and contracted easily.

[0012] Figure 2 is a view showing that a turret is being rotated to change bobbins.

[0013] Figure 3 is a transition view showing how a yarn is transferred.

[0014] Figure 4 is a view showing how production winding on an empty bobbin is started.

[0015] Figure 5 is a view showing how a yarn guide is operating.

[0016] Figure 6 is a perspective view of a package according to the present invention.

Detailed Description of the Preferred Embodiments

[0017] Next, embodiments of the present invention will be described with reference to the accompanying drawings.

[0018] The entire configuration of a take-up winder 5 will be roughly described with reference to Figure 1.

[0019] The take-up winder 5 has an elevating frame 1 that can elevate and lower relative to a machine frame 8, and two parallel bobbin holders 15,16 below the elevating frame 1. The bobbin holders 15,16 are cantilevered by a rotatable turret 2 acting as position changing means so that the vertical positions of the bobbin holders 15,16 can be changed by integrally rotating the bobbin holders 15,16 and the turret 2 around a rotating shaft 14 using a drive source such as an induction motor (not shown in the drawing). The turret 2 is supported on the machine frame 8 and the bobbin holders 15,16 are independently rotated by each motor (not shown in the drawing).

[0020] The two bobbin holders 15,16 each have a number of cylindrical bobbins installed thereon in a longitudinal direction thereof. In the state shown in Figure 1, one 15 of the bobbin holders 15,16 is located at a winding position K, which is located above, while the other bobbin holder 16 is located at a standby position L, which is located below. In the following, for the sake of description, a bobbin having a yarn layer P formed thereon is described as a yarn layer-formed bobbin B (also referred to as a "package Bf"), while a bobbin having no yarn layer formed thereon is described as an empty bobbin Be.

[0021] The elevating frame 1 has a touch roller 3 and a traverse device 4 supported thereon, and the touch roller 3 comes into pressure contact with the yarn layer P on the yarn layer-formed bobbin Bf located at the winding position K, to rotationally drive the bobbin. Additionally, the traverse device 4 has a traverse guide 6 that traverses a filament yarn (elastic yarn) Y spun out and fed into the machine frame from above, to form the yarn layer P around an outer periphery of the bobbin.

[0022] A yarn switching guide 7 acting as yarn transferring means comprises a pivoting arm 17 journaled to a lower part of the machine frame 8 (on a tip side of the bobbin holders 15,16) and a guide bar 18 attached to a tip of the pivoting arm 17. The pivoting arm 17 is provided on the tip side of the bobbin holders 15,16 and can-

tilers the guide bar 18, which is extended from the tip side to a root side the bobbin holders 15,16. The pivoting arm 17 can be rotationally moved around a rotating shaft 19, and is configured such that when the empty bobbin Be is at a yarn switching position M, shown in Figure 3, the pivoting arm 17 is rotationally moved to move the guide bar 18 to a position where the yarn Y can be wound around the empty bobbin Be, as described later.

[0023] The guide bar 18 has a guide groove 9 for positioning the yarn Y at a desired position in an axial direction of the bobbin, as shown in Figures 5A and 5B. In Figures 5A and 5B, only one empty bobbin Be and only one full package (yarn layer-formed bobbin) Bf are shown, but the bobbin holders 15,16 have a plurality of empty bobbins Be or full packages Bf arranged thereon in the longitudinal direction thereof and as many guide grooves 9 as the empty bobbins Be (or the full packages Bf). Additionally, the guide bar 18 can slide in the axial direction of the bobbin so that the slide operation of the guide bar 18 changes the position of the guide groove 9 in the axial direction of the bobbin.

[0024] When a bobbin end side where a bunch winding 12, described later, is formed is defined as one end side, the guide groove 9 is normally located at a central position of the bobbin and is moved to the one end side of the bobbin as shown in Figure 5A when the bunch winding 12 is to be formed, thereby guiding the yarn Y to a position on the one end side which is separate from the yarn layer P-formed position. Although not shown, the traverse device 4 has on its upstream side, a yarn removing guide for removing the yarn from the traverse device 4 and a yarn holding guide for holding the removed yarn at a central position of a traverse width (the central position of the bobbin).

[0025] Next, the yarn transferring method executed by the take-up winder 5 according to the present invention will be explained with reference to Figures 2 and 5.

[0026] In Figure 2A, once the package Bf becomes full, the yarn removing guide removes the yarn Y from the traverse guide 6 of the traverse device 4, the yarn holding guide holds the yarn Y at the central position of the bobbin, and the turret 2 is rotated counterclockwise. The turret 2 is further rotated from the state shown in Figure 2B (that is, the state where the positions of the bobbin holders 15 and 16 are mutually changed after the turret 2 has been rotated through about 180 degrees), and the rotation of the turret 2 is stopped when the empty bobbin Be is located at the yarn switching position M as shown in Figure 3A.

[0027] At this time, the elastic yarn Y is urged against a surface of the empty bobbin Be and travels while contacting with the surface over about one-third of the overall circumference of the empty bobbin Be. In the following, for the sake of description, a portion of the yarn Y which corresponds to an upstream side of the empty bobbin Be is defined as Yb, whereas a portion of the yarn Y which corresponds to a downstream side of the empty bobbin Be is defined as Ya.

[0028] In addition, since the yarn Y is removed from the traverse guide 6, it is biased to the central positions of the empty bobbin Be and the package Bf.

[0029] When the empty bobbin Be reaches the yarn switching position M and the yarn switching guide 7 is rotationally moved counterclockwise around the empty bobbin Be, the yarn Y biased to the central positions of the empty bobbin Be and the package Bf is caught in the guide groove 9 (the yarn Ya corresponding to the downstream side of the empty bobbin Be is caught).

[0030] Then, as shown in Figure 3B, the yarn switching guide 7 is rotationally moved until the yarn Ya, located on the downstream side of the yarn switching guide 7, approaches the yarn Yb, located on the upstream side thereof, that is, until the yarn Y rotates substantially completely around the empty bobbin Be. In this state, the yarn Y is still wound on a periphery of the yarn layer P of the package Bf. Subsequently, the rotation speed of the bobbin holder on the package Bf side is increased above a rotation speed for normal winding. The amount of increase in rotation speed is such that the difference between the peripheral speed of an outer periphery of the yarn layer and the peripheral speed of an outer periphery of one end of the bobbin is eliminated, for example, the rotation speed is increased by about 20% above the rotation speed for normal winding. Since the yarn Y is elastic, it does not cut despite an increase in tension caused by the increased speed. The rotation speed may be increased when the rotational movement of the yarn switching guide 7 is started or when the positions of the bobbin holders start to be changed, but this must be executed at least before the yarn Y falls from the yarn layer P of the package Bf onto the outer periphery of the one end of the bobbin.

[0031] After the speed has been increased, the yarn switching guide 7 (guide bar 18) is slid toward the one end side of the bobbins Be, Bf in the axial direction thereof so that the yarn Ya caught in the guide groove 9 is located at the one end of the bobbin, which is separate from the yarn layer P-formed position, as shown in Figure 5A. During the sliding step, the yarn Ya falls from the periphery of the yarn layer P of the package Bf onto a periphery of the bobbin which corresponds to the one end of the package Bf and which is separate from the yarn layer P-formed position (this state is shown in Figure 5A). The falling yarn Ya is wound around the periphery about three to five times. At the same time, the yarn tension decreases substantially due to the difference between the peripheral speed of the outer periphery of the yarn layer P and the peripheral speed of the outer periphery of the bobbin Bf having no yarn layer P formed thereon. The decrease in yarn tension causes the yarn Y to slacken without the need to rapidly brake the bobbin holder 15 on the package Bf side, thereby bringing the yarn Ya into contact with the yarn Yb (this state is shown in Figure 3C). The yarn Ya is entangled with the yarn Yb and then drawn and cut, whereby the yarn Y is wound around the one end of the empty bobbin Be.

[0032] In this manner, a winding-end bunch winding 12 is formed at one end of the full package Bf. A winding-start bunch is also formed at the one end of the empty bobbin Be. In this connection, to enhance the slackening of the yarn Ya, the bobbin holder 15 on the full-package Bf side may be rapidly braked.

[0033] In the above described operation, after the Ya has fallen onto the outer periphery of the one end of the bobbin, the yarn switching guide 7 (guide bar 18) is immediately slid toward the other end side of the bobbins Be and Bf (the yarn layer P-formed side of the package Bf) in the axial direction of the bobbin (see Figure 5B). Thus, a yarn end bunch-wound at the one end of the package Bf is biased to the yarn layer P and placed on the outer periphery thereof or at least adheres to an end surface Pa of the yarn layer.

[0034] Through the above yarn transferring process, the yarn Y is wound around the one end of the empty bobbin Be to form the winding-start bunch to thereby complete the yarn transfer. Then, the turret 2 is rotated clockwise to move the empty bobbin Be to the winding position K to bring the empty bobbin Be into contact with the touch roller 3, as shown in Figure 4. In addition, the yarn Y is brought into engagement with the traverse guide 6 of the traverse device 4 to allow production winding (a normal winding operation) to be started. In this manner, the yarn layer P is sequentially formed on the empty bobbin Be located at the standby position L. The full package Bf with the winding-end bunch winding formed thereon is removed from the bobbin holder 15. A new bobbin Be is then installed on the bobbin holder 15.

[0035] The yarn switching guide 7 acts as both as yarn transferring means for transferring the yarn Y from the package Bf to the empty bobbin Be by using the guide groove 9 to move the yarn Y from the surface of the yarn layer P of the full package Bf to the bobbin Bf and as winding-end bunch forming means for forming the winding-end bunch winding 12 at the end of the package Bf and winding-start bunch forming means for forming the winding-start bunch at the end of the empty bobbin Be.

[0036] As described above, according to the present invention, when the yarn switching guide 7 moves the yarn Ya to the end of the package Bf, the rotation speed of the bobbin holder (in the embodiment in Figure 2, the bobbin holder 15) is increased above the rotation speed for normal winding. This control provides such an amount of yarn required for the winding-end bunch winding that the winding-end does not slip out during the package Bf transporting after it has moved onto the end of the bobbin Bf and before it is cut, thereby enabling a sufficient bunch winding 12 to be formed on the end of the bobbin Bf. For example, the yarn end is prevented from getting loose even during transportation if the bunch winding 12 is formed of the yarn wound three to five times.

[0037] Additionally, the above described control provides a sufficient amount of yarn to form the bunch wind-

ing 12 and causes the yarn end of the bunch winding 12 wound around the end of the full package Bf to further extend to adhere to the yarn layer end surface Pa of the full package Bf as shown in Figure 6. That is, when the rotation speed of the bobbin holder with the full package Bf is increased, the yarn Ya wound around the end of the bobbin Bf about three to five times still has an excess amount that has not been wound around the bobbin. Additionally, the guide bar 18 guides the yarn Ya to a position separate from the yarn layer P of the full package Bf, but since that position is close to the yarn layer end surface Pa of the full package Bf, the cut and bunch-wound yarn end comes into contact with the end surface Pa and thus adheres thereto and to the outer peripheral surface of the yarn layer P of the full package Bf. To ensure that the bunch-wound yarn end adheres to the yarn layer end surface Pa, the guide bar 18 may be moved to the yarn layer P-formed side as described above.

[0038] Figure 6 shows an elastic-yarn package manufactured by the take-up winder for elastic yarn according to this embodiment. The end of the elastic yarn Y wound into the yarn layer P of the elastic-yarn package Bf is dropped from the outer peripheral surface of the yarn layer P onto a position of the bobbin which is separate from the yarn layer P-formed position. The yarn end is then wound around the bobbin once or more (about three to five) times and then adheres to the end surface Pa of the yarn layer P in a fashion traversing the end surface Pa. Finally, the yarn end rests on the outer peripheral surface of the yarn layer P. Moreover, the yarn end is looser than the portion of the yarn forming the yarn layer after it has fallen from the yarn layer P and before it moves back onto the yarn layer P.

[0039] Thus, in this package, the yarn end is held on the yarn layer end surface Pa of the package Bf and on the outer peripheral surface of the yarn layer P of the package Bf, and adheres to the yarn layer end surface Pa in a fashion traversing the flow of the yarn wound into the yarn layer P of the package Bf, thereby enabling an operator to visually find the yarn end easily. Furthermore, after the yarn end has fallen from the yarn layer P of the package and before it moves back onto the yarn layer P, it is wound more loosely than the portion of the yarn wound into the normal yarn layer P. Accordingly, during a subsequent step, not only the yarn end can be mechanically picked up smoothly but a manual process can also be easily carried out. Consequently, the take-up winder can form packages having appropriately processed yarn ends.

[0040] In this embodiment, the yarn switching guide 7 is used as the yarn transferring means, the winding-end bunch forming means, and the winding-start bunch forming means, but the yarn transferring means and both bunch winding forming means may be separately provided and controlled.

[0041] Additionally, in this embodiment, the yarn switching position M is located halfway between the

winding position K and the standby position L, but the yarn switching operation may be performed at the winding position K, to which the empty bobbin Be has been moved.

[0042] The present invention, configured as described above, has the following effects.

[0043] An elastic-yarn package is formed wherein an end of an elastic yarn wound into a yarn layer of a package falls from the yarn layer onto a position of a bobbin which is separate from a yarn layer-formed position, and the yarn end is then wound on the bobbin once or more and adheres to an end surface of the yarn layer. Thus, the yarn end adheres to the yarn layer end surface in a fashion traversing the flow of the yarn wound into the yarn layer of the package, thereby enabling an operator to visually find the yarn end easily. Additionally, after the yarn end has fallen from the yarn layer of the package and before it moves back onto the yarn layer, it is wound more loosely than the portion of the yarn wound into the normal yarn layer. Accordingly, during a subsequent step, not only the yarn end can be mechanically picked up smoothly but a manual process can also be easily carried out. In this case, when the end of the elastic yarn wound into the yarn layer of the package is wound on the bobbin three or more times, the bunch winding is sufficient and can be prevented from getting loose during transportation.

[0044] Additionally, a take-up winder for elastic yarn is provided which comprises yarn transferring means including two bobbin holders so that when a yarn is wound around a bobbin in one of the bobbin holders to form a yarn layer and the amount of yarn in the yarn layer then reaches a predetermined value, the yarn is transferred to a bobbin provided in the other bobbin holder and having no yarn layer formed thereon, wherein during yarn transfer, the yarn transferring means operates to move the yarn wound around the yarn layer-formed bobbin, to a position separate from a yarn layer-formed position on the yarn layer-formed bobbin and then to the yarn layer-formed position. Consequently, the cut and bunch-wound yarn end comes into contact with the yarn layer end surface and thus adheres thereto and to an outer peripheral surface of the yarn layer.

[0045] In addition, a take-up winder for elastic yarn is provided which comprises yarn transferring means including two bobbin holders so that when a yarn is wound around a bobbin in one of the bobbin holders to form a yarn layer and the amount of yarn in the yarn layer then reaches a predetermined value, the yarn is transferred to a bobbin provided in the other bobbin holder and having no yarn layer formed thereon, wherein before yarn transfer, rotation speed of the one of the bobbin holders is increased above rotation speed for normal winding. Consequently, a sufficient amount of yarn can be obtained for bunch winding.

Claims

1. An elastic-yarn package **characterized in that** an end of an elastic yarn wound into a yarn layer of a package falls from the yarn layer onto a position of a bobbin which is separate from a yarn layer-formed position, and the yarn end is then wound on the bobbin once or more and adheres to an end surface of the yarn layer.
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2. A take-up winder for elastic yarn comprising two bobbin holders and yarn transferring means so that when a yarn is wound around a bobbin in one of the bobbin holders to form a yarn layer and the amount of yarn in the yarn layer then reaches a predetermined value, the yarn is transferred to a bobbin provided in the other bobbin holder and having no yarn layer formed thereon, the take-up winder being **characterized in that** during yarn transfer, the yarn transferring means operates to move the yarn wound around said yarn layer-formed bobbin, to a position separate from a yarn layer-formed position on the yarn layer-formed bobbin and then to the yarn layer-formed position.
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3. A take-up winder for elastic yarn comprising two bobbin holders and yarn transferring means so that when a yarn is wound around a bobbin in one of the bobbin holders to form a yarn layer and the amount of yarn in the yarn layer then reaches a predetermined value, the yarn is transferred to a bobbin provided in the other bobbin holder and having no yarn layer formed thereon, the take-up winder being **characterized in that** before yarn transfer, rotation speed of said one of the bobbin holders is increased above rotation speed for normal winding.
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FIG. 1

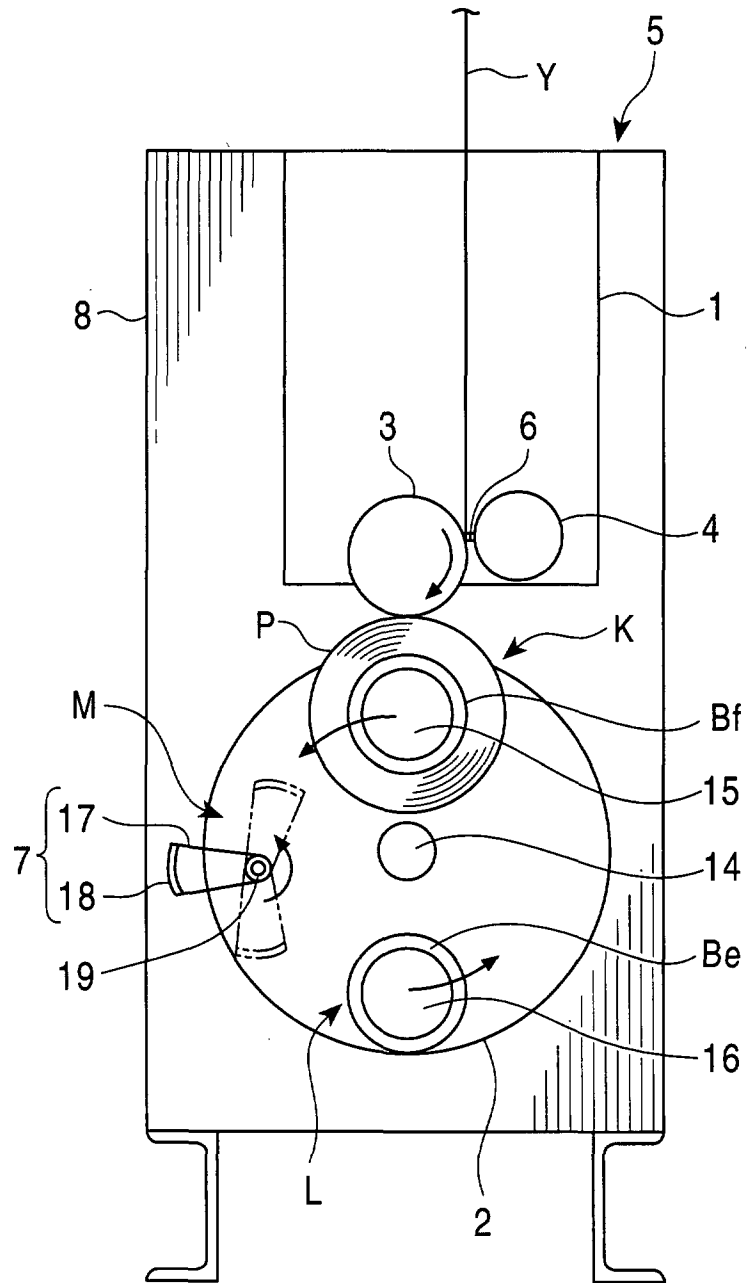


FIG. 2A

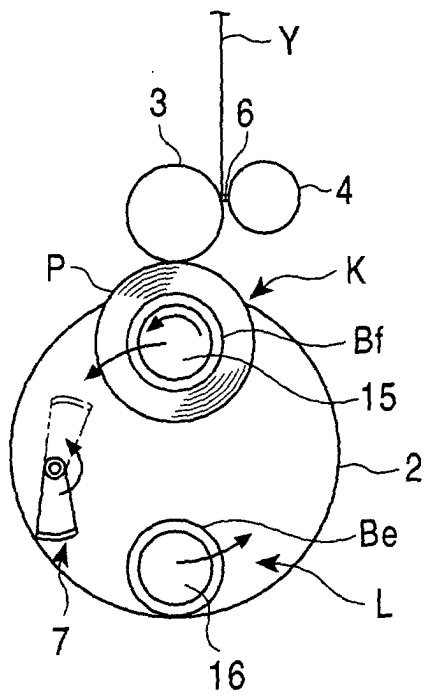


FIG. 2B

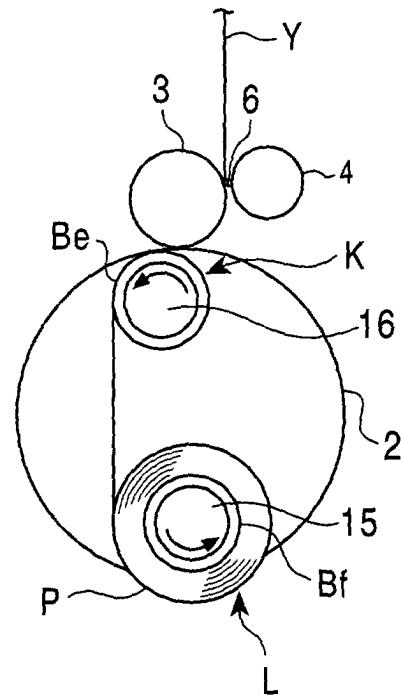


FIG. 3A

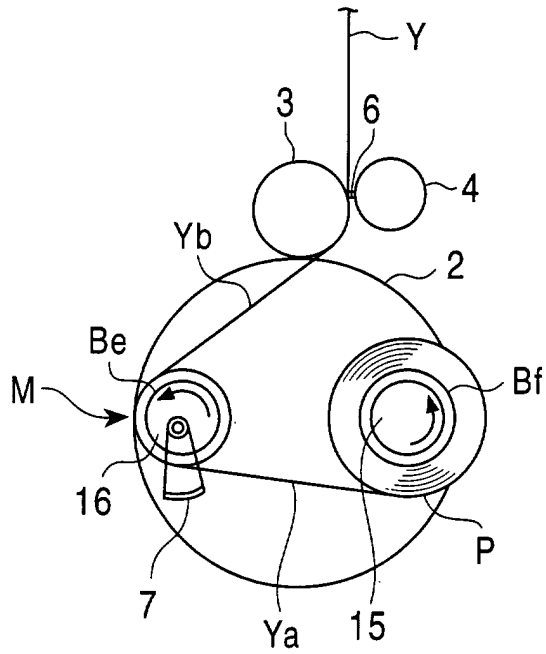


FIG. 3B

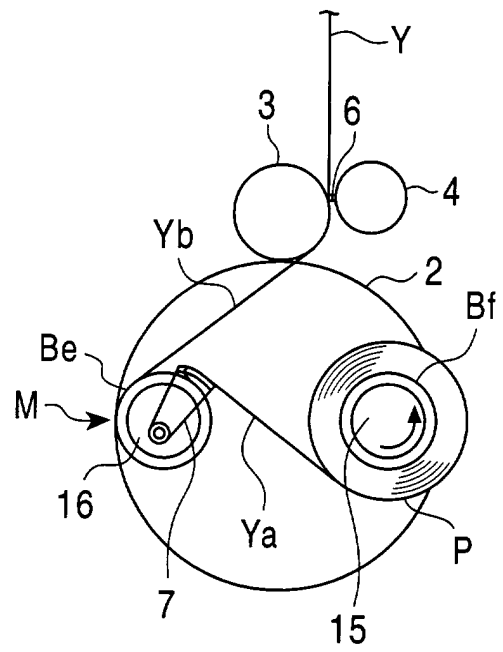


FIG. 3C

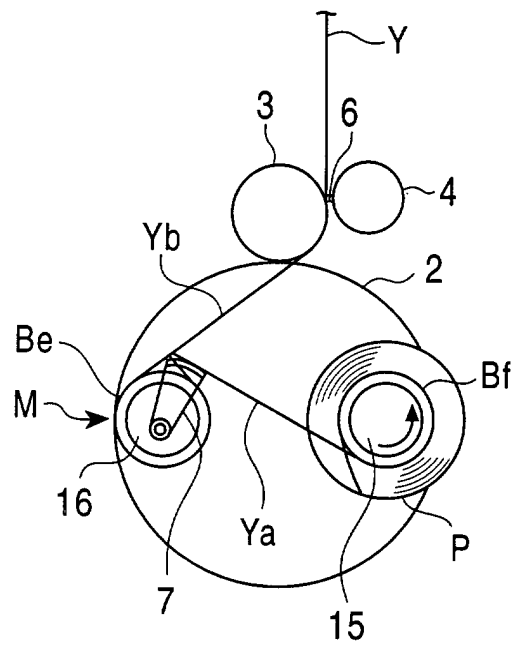


FIG. 4

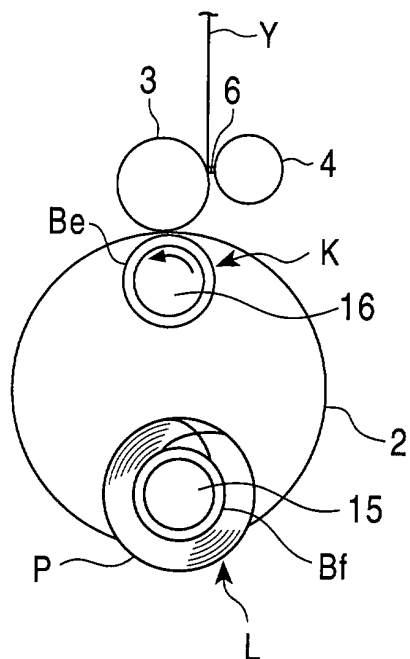


FIG. 5A

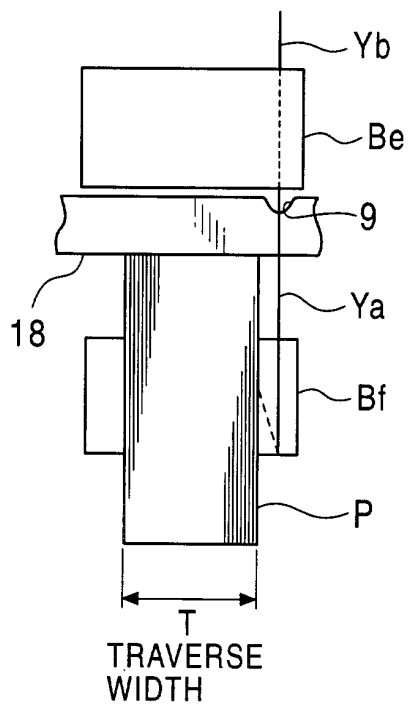


FIG. 5B

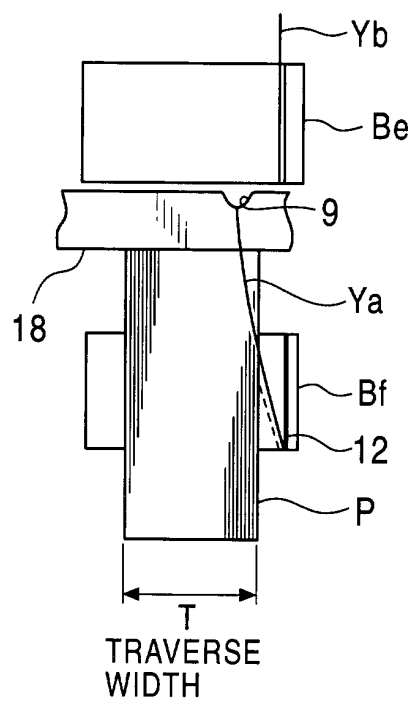


FIG. 6

