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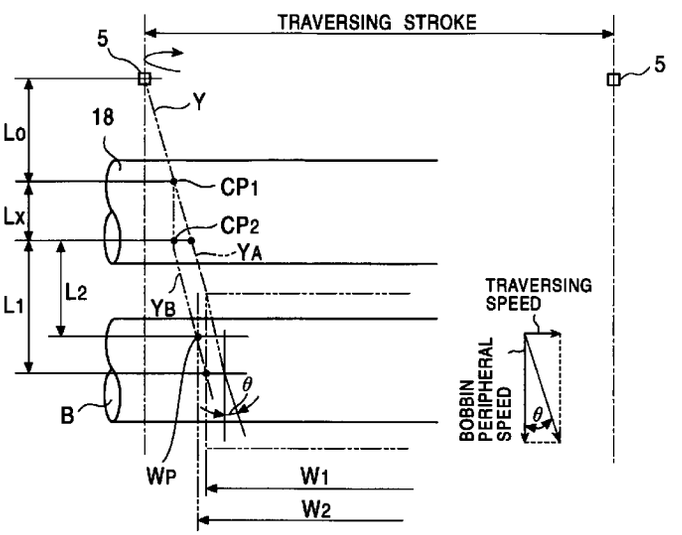
(54) Yarn winding method and take-up winder for yarn

(57) To prevent "saddle-bagging" from being formed at the axial ends of yarn layers of a package a yarn winding method for a take-up winder for using a traverse device 4 to traverse a continuously supplied yarn Y and rotating a contact roller 3 in contact with a bobbin B to wind the yarn around the bobbin is disclosed, wherein a yarn-feeding roller 18 is provided on the upstream side of the contact roller, and wherein the distance between the point CP_2 at which the yarn leaves the yarn-feeding roller and the first point WP at which the yarn comes in contact with the bobbin is set as a free length L that can be changed during winding so that the free length is increased to reduce the winding width W in order to prevent "saddle-bagging" from being formed at the axial ends of yarn layers in a package.

FIG. 4



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Description

Field of the Invention

[0001] The present invention relates to a yarn winding method, and in particular a yarn winding method for a filament yarn take-up winder which uses a traverse device to traverse a continuously supplied filament yarn, and a contact roller rotated in contact with a bobbin brought to the winding position by a turret and which winds the yarn around the bobbin and forms a package such that the axial ends of the yarn layers of the package will not bunch up and leave a valley in the center of the package, creating a "saddle bag" shape.

Background of the Invention

[0002] As is well known, a turret type filament yarn take-up winder uses a traverse device to traverse the continuously supplied yarn, rotates a turret to switch each of two bobbin holders mounted on the turret between a winding position and a standby position, and allows the contact roller to contact and rotationally drive the bobbin at the winding position in order to wind the supplied traversed yarn around the bobbin.

[0003] In such a take-up winder which uses the traverse device to traverse the continuously supplied yarn while winding the yarn around the bobbin in order to provide the bobbin as a package, the axial ends of the yarn layers of the package bulge, creating a "saddle bag" shape, thereby preventing high-quality yarn package from being formed.

[0004] The present invention is proposed in view of the problem that occurs in the above conventional technique, and its object is to provide a winding method wherein a yarn-feeding roller is provided on the upstream side of a contact roller, and wherein the distance over which the yarn is unrestrained between the point at which yarn leaves the yarn-feeding roller and the first point at which the yarn comes in contact with the bobbin is set as a free length that is changed during winding, thereby enabling the winging width to be changed in the axial direction of the bobbin in order to prevent suddle bag shape from being formed at both axial ends of a yarn layer of the package.

Summary of the Invention

[0005] To achieve this object, the present invention provides a yarn winding method which uses a traverse a device to traverse a continuously supplied yarn and rotates a contact roller in contact with a bobbin to wind the yarn around the bobbin, wherein: a yarn-feeding roller is provided on the upstream side of the contact roller so that the distance between the point at which the yarn leaves the yarn-feeding roller and the first point at which the yarn comes in contact with the bobbin can be changed during winding.

[0006] Furthermore, the present invention provides a take-up winder which includes a turret that supports two bobbin holders on which bobbins are installed and that is rotated to alternatively switch the bobbin on each of the two bobbin holders between a winding position and a standby position, wherein the turret is rotated during winding to change the distance between the point at which the yarn leaves the yarn-feeding roller and the first point at which the yarn comes in contact with the bobbin.

[0007] The present invention also provides a yarn winding method wherein the distance between the point at which the yarn leaves the yarn-feeding roller and the first point at which the yarn comes in contact with the bobbin is increased or decreased.

[0008] The present invention also provides a yarn winding method for providing tapered-end packages wherein the progress of winding increases the distance between the point at which the yarn leaves said yarn-feeding roller and the first point at which the yarn comes in contact with the bobbin, thereby reducing the winding width.

Brief Description of the Drawing

[0009]

Figure 1 is a schematic front view showing the basic configuration of a take-up winder for implementing a winding method according to the present invention, when an empty bobbin is in the winding position at the start of winding.

Figure 2 is a schematic front view showing the take-up winder when the bobbin has been fully wound after the occurrence of a yarn-winding process subsequent to the state shown in Figure 1.

Figure 3 is a schematic side view showing the take-up winder in Figure 1.

Figure 4 is a schematic explanatory drawing describing the principle that the winding width increases with a decrease in free length, whereas the winding width decreases with an increase in the free length according to the winding method for the take-up winder according to the present invention, and shows the yarn path formed when the yarn is being wound at a traverse angle θ.

Figure 5 is a graph showing examples of patterns of the change in free length based on the relationship between the free length and the winding diameter (winding time).

Figure 6 shows an example of a configuration of a take-up winder for implementing the winding method according to the present invention (a contact roller and a feed roller shift together depending on the winding diameter). Figure 6A is a schematic front view showing the essential element of the state in which the free length is reduced by the rotational movement of the turret (the winding width is

increased). Figure 6B is a schematic front view showing the essential element of the state in which the free length is increased (the winding width is reduced).

Figure 7 shows another example of a configuration of a take-up winder for implementing the winding method according to the present invention (the contact roller shifts relative to the feed roller to change the free length). Figure 7A is a schematic front view showing the essential element of the state in which the free length is reduced by the rotational movement of the turret (the winding width is increased). Figure 7B is a schematic front view showing the essential element of the state in which the free length is increased (the winding width is reduced).

Detailed Description of the Preferred Embodiments

[0010] A winding method according to the present invention is described below in detail based on the specific embodiment shown in the drawings.

[0011] Figure 1 is a schematic front view showing a specific example of a take-up winder wherein a yarn-feeding roller is provided on the upstream side of a contact roller, when an empty bobbin is in the winging position at the start of winding. Figure 2 is a schematic front view showing the take-up winder when the bobbin has been fully wound after a winding process occurring subsequent to the state shown in Figure 1. Figure 3 is a schematic side view showing a take-up winder corresponding to Figure 1 as seen from the side.

[0012] First, the basic structure of a filament yarn take-up winder M according to the present invention is described with reference to Figures 1, 2, and 3.

[0013] In Figures 1 and 2, the take-up winder M includes a machine frame 7 having an elevating box 1 capable of elevating and lowering a rotatable turret plate 2 and a fixed frame 8 having a control panel 9 on its front surface at one end thereof.

[0014] A contact roller 3 and a traverse device 4 are held on the elevating box 1. The contact roller 3 applies pressure against the surface layers of yarn on a bobbin B at a winding position P1, and is rotationally driven by a drive source 10, as shown in Figure 3, in such a way as to rotate the bobbin B around which yarn is being wound counterclockwise in Figure 1.

[0015] In addition, the traverse device 4 has a traverse guide 5 that engages a filament yarn Y to travel within a traversing range in order to traverse the yarn Y.

[0016] The turret plate 2 can be rotated by a rotational driving apparatus (not shown in the drawings) positioned around a rotating shaft 6, and two bobbin holders 11 and 12 are supported on the turret plate 2 in such a manner as to rotatably protrude therefrom. A plurality of (in the figure, six) bobbins B are installed on each of the two bobbin holders 11, 12, and one 11 of the bobbin holders 11, 12 is located at the winding position P1, while the other 12 is located at a standby position P2.

[0017] The yarn Y is wound around the bobbin B on the bobbin holder 11 located at the winding position P1, and the turret plate 2 is rotated 180° each time the bobbin B becomes a full bobbin (FB) in such a way that the full bobbin FB at the winding position P1 is moved to the standby position P2, while an empty bobbin EB at the standby position P2 is moved to the winding position P1. A yarn-transfer mechanism then transfers the yarn Y from the full bobbin FB to the empty bobbin EB for continuous winding.

[0018] The plurality of (in the example shown in Figure 3, six) bobbins B are installed on each of the two bobbin holders 11, 12, with one 11 of the bobbin holders 11, 12 located at the winding position P1 and the other 12 located at a standby position P2 during winding.

[0019] According to the present invention, a yarn-feeding roller 18 is disposed on the upstream side of the contact roller 3 in the take-up winder M. The yarn Y passes through the traverse guide 5 and around the yarn-feeding roller 18, and is then introduced to the bobbin B at the winding position P1.

[0020] The yarn-feeding roller 18 provided on the upstream side of the contact roller 3 is important in the present invention. The yarn-feeding roller 18 guides the yarn Y traversed by the traverse guide 5 in the traverse device 4 to the bobbin B at the winding position through a free length L between the point at which the yarn leaves the yarn-feeding roller and the first point at which the yarn comes in contact with the bobbin.

[0021] Next, the relationship between the free length L, set by the yarn-feeding roller 18 and the bobbin 18, and the axial winding width W of the bobbin B will be explained with reference to Figures 4 and 5.

[0022] Figure 4 is a schematic explanatory drawing describing the principle that the winding width increases as the free length decreases, whereas the winding width decreases as the free length increases according to a winding method for the take-up winder according to the present invention, and showing a yarn path formed when the yarn is wound at a traverse angle θ. Figure 5 is a graph showing examples of patterns of the change in free length based on the relationship between the free length and the winding diameter (winding time).

[0023] The yarn-feeding roller 18 is a driving roller that is driven by a drive source (not shown in the drawings) and is located between the traverse guide 5 and the contact roller 3 to divert the traversed yarn Y and guide it between the contact roller 3 and the bobbin B. In this case, the yarn Y is held in contact with the yarn-feeding roller 18 over a contact distance Lx while the yarn Y is run.

[0024] The first free-length portion L_0 (fixed length portion) is the distance between the traverse guide 5 and the contact start point CP_1 of the contact distance Lx at the yarn-feeding roller 18, and the second free length portion (variable length portion) changing between free lengths L1 and L2 is the distance between the contact end point CP_2 of the contact distance Lx at

the yarn-feeding roller 18 and the first point WP at which the yarn comes in contact with the bobbin B at the winding position.

[0025] According to the illustrated take-up winder M, the traverse angle θ is determined by the traversing speed of the traverse guide 5 in the traverse device 4 and the peripheral speed of the bobbin B, as shown in the vector diagram in Figure 4. Figure 4 shows the yarn path formed when the yarn Y is being wound around the bobbin B at a traverse angle θ. As shown in Figure 4, when the traverse guide 5 reaches the traversing end, the yarn Y travels along a yarn path YA, and shifts to a path YB while the traverse guide 5 is turning. In this case, when the free length is changed between L1 and L2, the winding width increases to W2 with the shorter free length L2, whereas the winding width decreases to W1 with the longer free length L1.

[0026] According to the winding method for the take-up winder according to the present invention, the following methods are possible: a method for intermittently changing the free length L between L2 and L1 every specified period to wind the yarn, as shown by pattern A in Figure 5, a method employed during winding for sequentially and alternatively changing the free length between L2 and L1 to wind the yarn, as shown by pattern B, and a method employed during winding to gradually change the free length from L2 to L1 at a constant rate to wind the yarn, as shown by pattern C. Patterns A and B serve to prevent the uneven "saddle bag" package from being formed, and pattern C serves to form a tapered-end package. According to the present invention, pattern A or B can be combined with pattern C. Furthermore, the free length may be randomly changed.

[0027] Figures 6 and 7 show specific examples of configurations for changing the free length L according to the winding method for the take-up winder according to the present invention. Figure 6 shows a configuration wherein the contact roller 3 and the feed roller 18 are supported on the elevating box 1 and elevates together depending on the winding diameter of the package. Figure 6A shows the state in which the free length is reduced by the rotational movement of the turret (the winding width is increased), and Figure 6B shows the state in which the free length is increased (the winding width is reduced).

[0028] Figure 7 shows an example of a configuration in which the feed roller 18 is fixed to and supported on the elevating box 1 while the contact roller 3 is supported on the elevating box 1 so as to be able to rise and full relative to the elevating box 1, and wherein the contact roller 3 shift relative to the feed roller 18, depending on the winding diameter, thereby changing the free length. Figure 7A shows the state in which the free length is reduced by the rotational movement of the turret (the winding width is increased), and Figure 7B shows the state in which the free length is increased (the winding width is reduced).

[0029] With respect to the traverse device, the take-up winder to which the winding method according to the present invention is applied is not limited to the illustrated cam traverse device but may be a blade traverse device. In addition, the winding method according to the present invention is applicable to a friction-drive or a spindle-drive take-up winder.

[0030] According to the present winding method of the above configuration, the yarn-feeding roller is provided on the upstream side of the contact roller, and the distance (free length) between the point at which the yarn leaves the yarn-feeding roller and the first point at which the yarn is led to the bobbin can be changed during winding so that the free length can be increased to reduce the axial winding width of the bobbin. Thus, the present invention is very effective in providing a well-formed package that prevents "saddle-bagging" from being formed at the respective axial ends of the bobbin.

[0031] Furthermore, the winding method according to the present invention is also very effective because it can provide a tapered-end package by setting the machine so that, during winding, the yarn is wound while the free length is gradually increased.

Claims

1. A yarn winding method for using a traverse device to traverse a continuously supplied yarn and rotating a contact roller in contact with a bobbin to wind the yarn around the bobbin, characterized in that:

   a yarn-feeding roller is provided on the upstream side of said contact roller so that the distance between the point at which the yarn leaves said yarn-feeding roller and the first point at which the yarn comes in contact with the bobbin can be changed bring winding.

2. A yarn winding method as in claim 1, characterized in that the distance between the point at which the yarn leaves said yarn-feeding roller and the first point at which the yarn comes in contact with the bobbin is increased or decreased.

3. A yarn winding method as in claim 1, characterized in that in response to the progress of winding the distance between the point at which the yarn leaves said yarn-feeding roller and the first point at which the yarn comes in contact with the bobbin is increased.

4. A filament yarn take-up winder for using a traverse device to traverse a continuously supplied filament yarn, rotating a contact roller in contact with a bobbin to wind the yarn around the bobbin, and including a turret that supports two bobbin holders on which said bobbins are installed and that is rotated to alternatively switch the bobbin on each of said

two bobbin holders between a winding position and a standby position, characterized in that a yarn-feeding roller is provided on the upstream side of said contact roller so that said turret can be rotated during winding to change the distance between the point at which the yarn leaves said yarn-feeding roller and the first point at which the yarn comes in contact with the bobbin.

5. A filament yarn take-up winder for using a traverse device to traverse a continuously supplied yarn and rotating a contact roller in contact with a bobbin to wind the yarn around the bobbin, characterized in that a yarn-feeding roller is provided on the upstream side of said contact roller, while said contact roller is arranged so that the position of the contact roller can be shifted relative to the yarn-feeding roller during winding to change the distance between the point at which the yarn leaves said yarn-feeding roller and the first point at which the yarn comes in contact with the bobbin.

FIG. 1

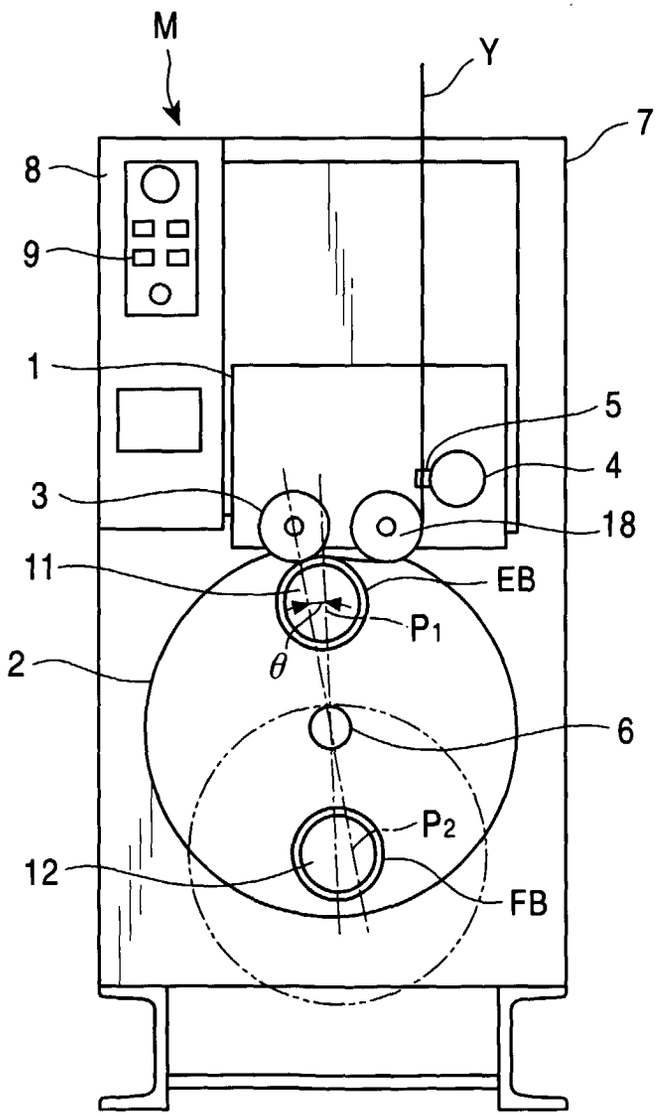

FIG. 2

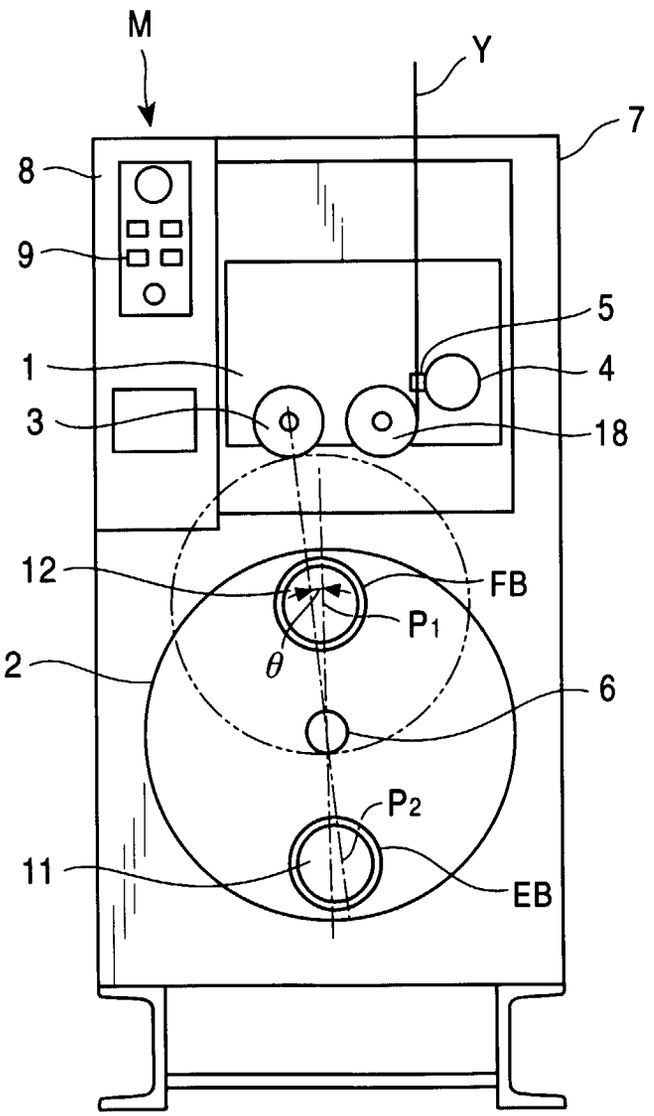

FIG. 3

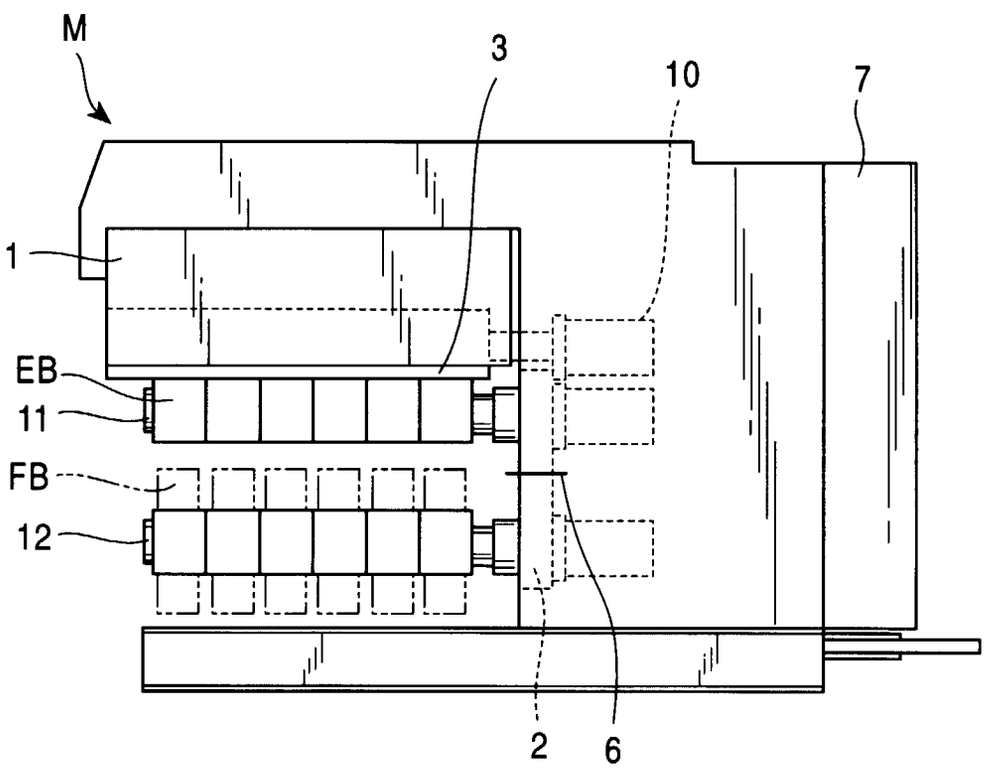

FIG. 4

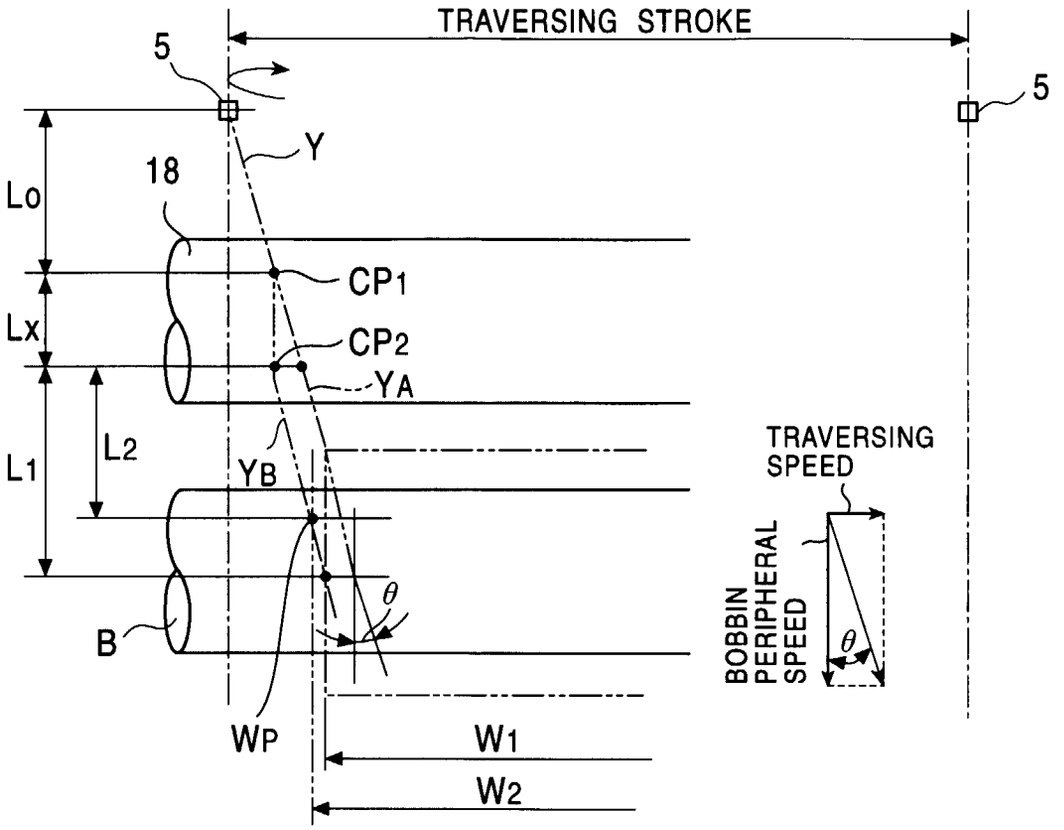
TRAVERSING STROKE
5
5
Y
18
Lo
CP1
Lx
CP2
YA
L1
L2
YB
θ
B
WP
W1
W2
TRAVERSING SPEED
BOBBIN PERIPHERAL SPEED
θ

FIG. 5

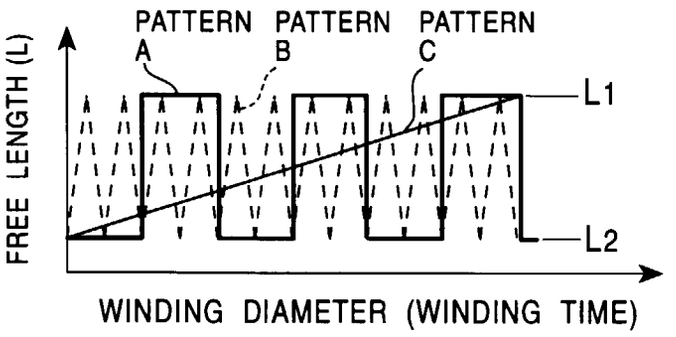
PATTERN A
PATTERN B
PATTERN C
L1
L2
FREE LENGTH (L)
WINDING DIAMETER (WINDING TIME)

FIG. 6

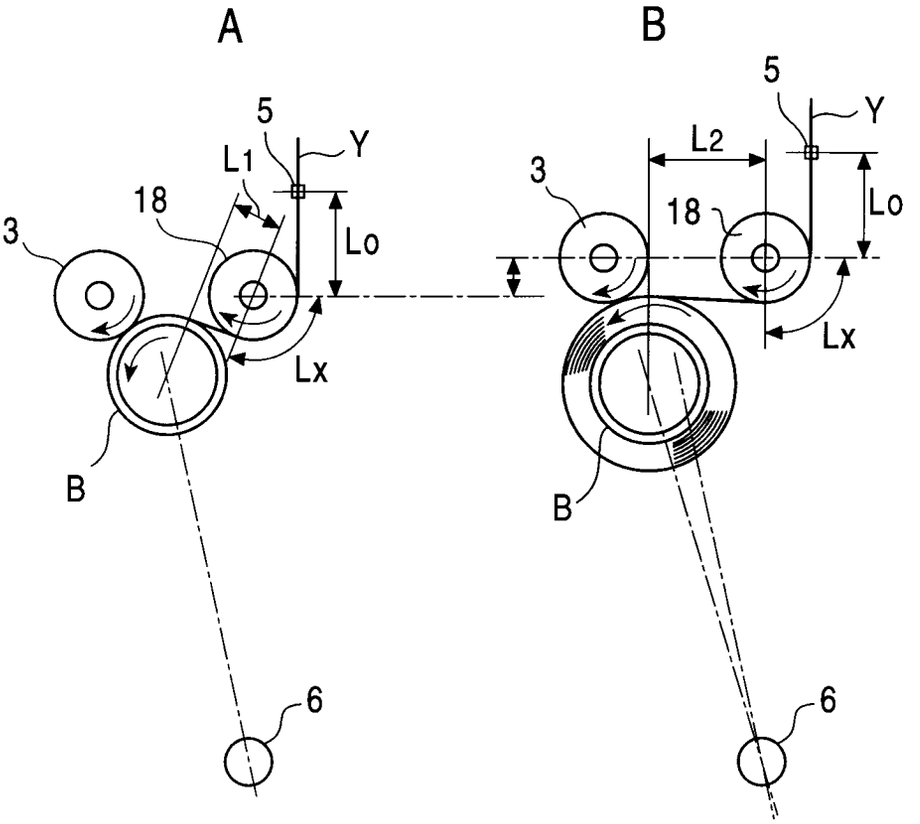

FIG. 7