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(54) **Spinning winder**

Spinnaufwickler

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a spinning winder for winding yarns spun out from a spinning unit onto bobbins.

[0002] A spinning winder recited in Patent Literature 1 (Japanese Unexamined Patent Publication No. 2000-272835) is arranged so that yarns spun out from a spinning machine are distributed, via a pair of godet rollers, one by one to respective distribution guides (traversal fulcrum guides) that are aligned along the axial directions of a bobbin holder. The yarns distributed to the distribution guides are bended at the distribution guides, conveyed to bobbins attached to the bobbin holder, and wound onto the bobbins.

[0003] In this spinning winder of Patent Literature 1, because the yarns are bended at the distribution guides as described above, the contact pressure applied from the distribution guide to the yarn is high when the bending angle (winding angle) of the yarn is large, resulting in serious damage on the yarn. In this regard, while the bending angle is small when the godet rollers are highly positioned, the apparatus becomes large in size as the godet rollers are highly positioned. In the meanwhile, when a large number of yarns are spun out from the spinning machine and a lot of distribution guides are aligned along the axial directions of the bobbin holder, the distribution guides provided on the outer sides in the axial directions of the bobbin holder are remote from the godet rollers, and the bending angle of the yarn is large at such outer distribution guides. In this regard, in order to keep the bending angle of the yarn to be small, the positions of the godet rollers are required to be higher as the number of yarns spun out from the spinning unit increases. As such, the increase in size of the apparatus becomes a serious problem.

[0004] To solve this problem, a winding device recited in Patent Literature 2 (PCT Application Entering National Phase in Japan No. 2005-534825) is arranged so that, as the distribution guides are rotatably supported or are rotated by a driving unit, the distribution guides rotate in accordance with the running of the yarns. The damage to the yarn is restrained by this arrangement, even if the godet rollers are positioned low and the bending angle of the yarn is large at the distribution guide.

[0005] The winding device of Patent Literature 2, however, is disadvantageous in that, when the distribution guides are rotatably supported, because the distribution guides rapidly rotate as the yarns rapidly run, frequent maintenance is required to restrain the components such as bearings provided between the distribution guides and their supporting axes from being worn away.

[0006] On the other hand, when the distribution guides are rotated by a driving unit, each distribution guide receives torque from the driving unit and hence a force generated by the torque is exerted to the yarn contacting

the distribution guide. Because the magnitude of the torque that the distribution guide receives from the driving unit is determined by the number of revolution of the distribution guide, more or less the same degree of force is exerted to the yarn, irrespective of the thickness or the like of the yarn. Therefore, a large force is exerted from the distribution guide to the yarn when the yarn is thin, and the yarn may be seriously damaged.

10 SUMMARY OF THE INVENTION

[0007] An object of the present invention is to provide a spinning winder in which damage on a bended yarn is minimized irrespective of the thickness of the yarn when the bending angle of the yarn is large at a distribution guide and frequent maintenance is unnecessary.

[0008] A spinning winder according to the first aspect of the invention includes: a winding spindle to which a plurality of bobbins are attached in series along an axis and which winds a plurality of yarns spun out from a spinning unit onto the bobbins; and a plurality of distribution guides that bend the yarns spun out from the spinning unit and distribute the yarns to the respective bobbins attached to the winding spindle, curvature radii of the distribution guides at sliding surfaces on which the yarns slide being not shorter than 3mm and not longer than 8mm.

[0009] According to the present invention, the damage on the yarn is restrained even if the yarn is bended to some degree at the distribution guide, because the curvature radius of the distribution guide at the sliding surface on which the yarn slides is arranged to be within the range of 3mm to 8mm. This makes it possible to increase the bending angle of the yarn at the distribution guide while restraining the height of the spinning winder. Furthermore, because the distribution guide does not rotate while the yarn is running, the yarn is not damaged by a large force exerted from the rotating distribution guide to the yarn, and frequent maintenance of the distribution guide is unnecessary.

[0010] According to the second aspect, the spinning winder of the first aspect is arranged so that a bending angle of each of the yarns at each of the distribution guides is not larger than 30 degrees.

[0011] According to the present invention, when the bending angle of the yarn at the distribution guide is 30 degrees or lower, the damage on the yarn is restrained by keeping the curvature radius of the distribution guide at the sliding surface on which the yarn slides to be not shorter than 3mm and not longer than 8mm.

[0012] According to the third aspect, the spinning winder of the second aspect further includes a sliding position change mechanism for changing sliding positions where the yarns slide on the corresponding distribution guides.

[0013] After the yarn slides on a particular part of the outer circumference of the distribution guide for a long time, the treatment on that part of the distribution guide for facilitating smooth sliding of the yarn becomes inef-

fective. In this regard, the life of the distribution guide is elongated according to the present invention because the sliding position between the distribution guide and the yarn is changeable.

[0014] According to the fourth aspect, the spinning winder of the third aspect is arranged so that the distribution guides are columns having outer circumferences on which the yarns slide, and the sliding position change mechanism is provided with a guide rotation mechanism that changes the sliding positions by rotating the distribution guides about their axes.

[0015] According to the present invention, when the distribution guide is column-shaped, the sliding position between the distribution guide and the yarn is changed by rotating the distribution guide about its axis.

[0016] According to the fifth aspect, the spinning winder of the fourth aspect is arranged so that the guide rotation mechanism includes: an endless belt that is mounted on the distribution guides to connect the distribution guides with one another; and a belt driving unit for driving the belts.

[0017] According to the present invention, the sliding positions between the distribution guides connected with one another by the belt and the yarns are changed altogether by simply driving a single belt driving unit.

[0018] According to the sixth aspect, the spinning winder of one of the first to fifth aspects is arranged so that the distribution guides extend in a predetermined direction that intersects with axial directions of the winding spindle, and the sliding position change mechanism is provided with a guide movement mechanism that changes the sliding positions by moving the distribution guides in the predetermined direction.

[0019] According to the present invention, when the distribution guide extends in the predetermined direction intersecting with the axial directions of the winding spindle, the sliding position between the distribution guide and the yarn is changed by moving the distribution guide in the predetermined direction.

[0020] According to the seventh aspect, the spinning winder of one of first to sixth aspects further includes a restraining means for restraining the yarns threaded on the distribution guides from moving in directions orthogonal to a running direction of the yarns at parts where the yarns slides on the distribution guides.

[0021] According to the present invention, it is possible to prevent the yarn from dropping off from the distribution guide.

[0022] According to the present invention, the damage on the yarn is restrained even if the yarn is bended to some degree at the distribution guide, because the curvature radius of the distribution guide at the sliding surface on which the yarn slides is arranged to be within the range of 3mm to 8mm. This makes it possible to increase the bending angle of the yarn at the distribution guide while restraining the height of the spinning winder. Furthermore, because the distribution guide does not rotate while the yarn is running, the yarn is not damaged by a

large force exerted from the rotating distribution guide to the yarn, and frequent maintenance of the distribution guide is unnecessary.

5 BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

Fig. 1 is a schematic view of a spinning winder according to an embodiment of the present invention. Fig. 2 is a perspective view of the fulcrum guide of Fig. 1 and its surroundings.

Fig. 3 shows the inside of the fulcrum guide of Fig. 2 from above.

Fig. 4 is a cross section of Fig. 3 taken at IV-IV line. Fig. 5 shows the winding angle of the yarn at the fulcrum guide, the contact pressure that the yarn receives from the fulcrum guide, or the like.

Fig. 6 shows the measurement result of the physical property of the yarn when the yarn is distributed by fulcrum guides with various radii.

Fig. 7 relates to a modification 1 and is equivalent to Fig. 4.

25 DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0024] The following will describe a preferred embodiment of the present invention.

[0025] A spinning winder 1 includes a winding unit 3, a frame-shaped frame 14 provided to be further than the winding unit 3 for the viewer of Fig. 1, two godet rollers 11 and 12 that receive a plurality of yarns 10 supplied from a spinning machine 2, and a plurality of fulcrum guides 13 (distribution guides) that distribute the yarns 10 wound on the godet roller 12 on the downstream side to bobbins B attached to a bobbin holder 7 of the winding unit 3, respectively, and function as fulcrums at the time of traversal by a traverse guide 8.

[0026] As shown in Fig. 1, the spinning winder 1 serially supplies the yarns 10, which are spun out from the spinning machine 2, to the winding unit 3 below by the two godet rollers 11 and 12 while aligning the yarns 10 in the directions orthogonal to the plane of Fig. 1, and winds the yarns 10 by the winding unit 3.

[0027] The winding unit 3 will be discussed. The winding unit 3 is provided below the spinning machine 2, and forms packages P by winding the yarns 10 supplied from the spinning machine 2 via the two godet rollers 11 and 12 onto the respective bobbins B.

[0028] This winding unit 3 includes components such as: a main body frame 5; a disc-shaped turret 6 which is rotatably provided on the main body frame 5, two bobbin holders 7 (winding spindles) each of which is supported by the turret 6 at one end and to each of which a plurality of bobbins B are attached in series along an axis 7a; a plurality of traverse guides 8 that are provided above the respective bobbins B attached to the bobbin holder 7 and traverse the yarns 10 that are to be wound onto the bob-

bins B; and a contact roller 9 which is arranged to be vertically movable with respect to the main body frame 5 and contacts or move away from the bobbins B attached to the bobbin holder 7.

[0029] The winding unit 3 rotates the bobbin holder 7 by an unillustrated drive motor so as to rotate the bobbins B attached to this bobbin holder 7 and winds the yarns 10 onto the respective rotating bobbins B. In this regard, the yarn 10 wound onto the bobbin B is, immediately before being wound, traversed in the axial directions of the bobbin B by the traverse guide 8 which is capable of reciprocating in the axial directions of the bobbin B, with the later-described fulcrum guide 13 functioning as a fulcrum. In this way, a package P is formed. The contact roller 9 rotates while imparting a predetermined contact pressure to the package P when the yarn is wound onto the bobbin B, so that the package P is properly shaped.

[0030] As shown in Fig. 1, the two godet rollers 11 and 12 are rotatably supported by the frame 14, above the main body frame 5 of the winding unit 3. The axes 11a and 12a of these rollers are orthogonal to the axis 7a of the bobbin holder 7. The godet rollers 11 and 12 are drive rollers driven by an unillustrated drive motor. The godet roller 11 is provided immediately below the spinning machine 2. The godet roller 12 is provided above the godet roller 11 and is deviated from the godet roller 11 in the axial direction of the bobbin holder 7.

[0031] The godet roller 12 is movable, by an elevation mechanism 16 such as a linear motor, between a yarn winding position (indicated by full lines in Fig. 1) above the substantial center of the fulcrum guides 13 in their alignment directions and a yarn threading position (indicated by two-dot chain lines in Fig. 1) which is close to the godet roller 11 below as compared to the yarn winding position.

[0032] The fulcrum guides 13 are provided below the downstream-side godet roller 12 at the yarn winding position and above the traverse guides 8. These fulcrum guides 13 are aligned immediately above the respective traverse guides 8 and the respective bobbins B attached to the bobbin holder 7, along the axis 7a of the bobbin holder 7 and at the same intervals as the centers of the respective bobbins B in the axial directions.

[0033] Each of the fulcrum guides 13 is, as shown in Fig. 2 to Fig. 4, a column with a radius R of not shorter than 3mm and not longer than 8mm and extends in horizontal directions orthogonal to the axial directions of the bobbin holder 7 (i.e., in predetermined directions intersecting with the axis of the bobbin holder 7). The yarn 10 supplied from the godet roller 12 is threaded on the outer circumference of the fulcrum guide 13. In other words, the curvature radius of the fulcrum guide 13 is not shorter than 3mm and not longer than 8mm at the sliding surface on which the yarn 10 slides.

[0034] In addition to the above, the fulcrum guides 13 are made of, for example, a ceramic material, and are attached to the guide supporting members 21 at the base end portions, as shown in Fig. 2 to Fig. 4. Furthermore,

on guide supporting members 21 corresponding to two neighboring fulcrum guides 13 among the fulcrum guides 13, a belt 22 is mounted. In addition to this, a pulley 23 is provided to oppose a guide supporting member 21 neighboring a guide supporting member 21 corresponding to one of the outermost two fulcrum guides 13 (i.e., the rightmost guide supporting member 21 in Fig. 3), and a belt 22 is also mounted on the guide supporting member 21 and the pulley 23. The pulley 23 is connected to a motor 24. As the pulley 23 is rotated by driving the motor 24, the guide supporting members 21 connected to one another by the belts 22 and the fulcrum guides 13 attached to the guide supporting members 21 rotate about their axes. As each fulcrum guides 13 rotates, the sliding position at which the yarn 10 slides on each fulcrum guide 13 is changed. That is to say, according to the present embodiment, the belts 22, the pulley 23, and the motor 24 constitute a guide rotation mechanism of the present invention, which constitutes a sliding position change mechanism of the present invention.

[0035] In the meanwhile, the outer circumference of the fulcrum guide 13, on which the yarn 10 slides, is treated to facilitate smooth sliding of the yarn 10, in order to reduce the friction with the yarn 10. However, the treatment on the fulcrum guide 13 becomes ineffective after the yarn 10 slides on a particular part of the outer circumference of the fulcrum guide 13 for a long time.

[0036] In this regard, the present embodiment is arranged, as described above, so that the sliding position between the fulcrum guide 13 and the yarn 10 is changeable by rotating the fulcrum guide 13, with the result that the life of the fulcrum guide 13 is extended. The sliding position between the fulcrum guide 13 and the yarn 10 is changed in such a way that, for example, the fulcrum guide 13 is rotated for a predetermined angle each time the spinning winder 1 is driven for a predetermined period.

[0037] In addition to the above, the guide supporting members 21 and the pulley 23 attached to the motor 24 are connected with one another by the belts 22. For this reason, as the motor 24 is driven, the pulley 23 and the fulcrum guides 13 rotate and hence the sliding positions between the yarns 10 and the fulcrum guides 13 are changed at once.

[0038] In addition to the above, immediately above the respective fulcrum guides 13, a restraining guide 25 is provided. The restraining guide 25 extends along the axial directions of the bobbin holder 7 and has a slit 25a which is open at the edge which is on the back side in Fig. 2. The yarn 10 threaded on the fulcrum guide 13 is arranged to pass through the slit 25a. The walls of the slit 25a therefore restrain the yarn 10 from moving in the axial directions (predetermined directions) of the fulcrum guide 13. This makes it possible to prevent the yarn 10 from dropping off from the fulcrum guide 13.

[0039] In the spinning winder 1 arranged as described above, as shown in Fig. 1, the yarns 10 supplied from the spinning machine 2 are transported downward and

then wound onto the godet roller 11 to be aligned along the axis 11a. Thereafter, the yarns 10 wound onto the godet roller 11 obliquely run while being kept to be in parallel to each other, and are passed to the godet roller 12 which is at the yarn winding position. The yarns 10 wound onto the godet roller 12 are threaded on the respective fulcrum guides 13, are bended at the fulcrum guides 13, and are transported downward toward the winding unit 3.

[0040] When the yarn 10 is bended at the fulcrum guide 13, as shown in Fig. 5, the yarn 10 receives a contact pressure F from the fulcrum guide 13. This contact pressure increases as the winding angle θ of the yarn 10 with respect to the fulcrum guide 13 (i.e., bending angle of the yarn 10) increases. The higher the contact pressure F is, the more the yarn 10 is damaged.

[0041] In the meanwhile, the winding angle θ is decreased as the position of the godet roller 12 that supplies the yarn 10 to the fulcrum guide 13 is arranged to be higher. For this reason, when the winding angle θ is decreased (to not larger than 15 degrees, for example) by arranging the godet roller 12 at a high position, the contact pressure F that the yarn 10 receives from the fulcrum guide 13 is reduced and the damage on the yarn 10 is reduced. However, arranging the godet roller 12 at a high position leads to the increase in size of the apparatus.

[0042] In the meanwhile, the number of yarns 10 supplied from the spinning machine 2 is large in recent apparatuses. In this regard, when a lot of fulcrum guides 13 are provided for this reason, the fulcrum guides 13 on the outer sides in the axial directions of the bobbin holder 7 are significantly far from the godet roller 12, and hence the winding angle θ of the yarn 10 is large at each of these fulcrum guides 13 on the outer sides. On this account, when the decrease in the winding angle θ is achieved by providing the godet roller 12 at a high position, the position of the godet roller 12 gets higher as the number of the yarns 10 increases, with the result that the apparatus is significantly enlarged in size.

[0043] In this regard, according to the present embodiment, even if the winding angle θ is large (e.g., about 30 degrees), the curvature radius of the fulcrum guide 13 with respect to the yarn 10 is long because the fulcrum guide 13 is arranged to be a column whose outer circumference functions as a sliding surface on which the yarn 10 slides so that the contact pressure F that the yarn 10 receives from the fulcrum guide 13 is small.

[0044] However, provided that the winding angle θ is the same, the part of the yarn 10 sliding on the fulcrum guide 13 is elongated as the radius R of the fulcrum guide 13 (i.e., the curvature radius of the yarn 10 at the sliding surface) increases. For this reason, when the radius R of the fulcrum guide 13 is too long, the damage on the yarn 10 on account of the sliding on the fulcrum guide 13 is serious.

[0045] That is to say, when the winding angle θ of the yarn 10 at the fulcrum guide 13 is arranged to be large, the minimization of the damage on the yarn 10 requires

the radius R of the fulcrum guide 13 (i.e., the curvature radius of the yarn 10 at the sliding surface) to fall within a suitable range in consideration of the contact pressure F applied from the fulcrum guide 13 to the yarn 10 and the length of the part of the yarn 10 sliding on the fulcrum guide 13.

[0046] In this regard, the present embodiment is arranged so that the radius R of the column-shaped fulcrum guide 13 is arranged to be not shorter than 3mm and not longer than 8mm in order to minimize the damage on the yarn 10. With this, even if the godet roller 12 is positioned low and the winding angle θ is large, the damage on the yarn 10 at the fulcrum guide 13 is minimized as described below.

[Example]

[0047] Now, an example of the present invention will be described with reference to Fig. 6. Fig. 6 shows a result of measurement of the yarn property of the yarn 10 on the downstream of the fulcrum guide 13, when the yarn Y supplied from the godet roller 12 was distributed by using fulcrum guides 13 with various radii R . Note that, the yarn property indicates a ratio between a tensile stress at break of the yarn 10 in case where the yarn 10 is not bended is stretched and a tensile stress at break of the yarn 10 in case where the yarn 10 which is bended is stretched. The higher the yarn property is, the less the damage on the yarn 10 at the fulcrum guide 13 is. Furthermore, in the measurement shown in Fig. 6, the yarn 10 is a multi-filament yarn which is a polyester FDY of 150 denier, and the winding angle θ of the yarn 10 at the fulcrum guide 13 is 30 degrees, the running speed of the yarn 10 is 4800m/min, and the yarn tension in the part upstream of the fulcrum guide 13 is 0.25gr/de. To make sure that the yarn 10 wound onto the bobbin B is durable in practical use, the yarn property is preferably not lower than 90%. In this regard, according to the result shown in Fig. 6, it is understood that the yarn property of not lower than 90% is achieved when the radius R of the fulcrum guide 13 falls within the range of 3mm to 8mm.

[0048] Fig. 6 shows the case where the winding angle θ is 30 degrees. In this regard, when the winding angle θ is smaller than 30 degrees, the damage on the yarn 10 is smaller as compared to the case where the winding angle θ is 30 degrees on condition that the radius R of the fulcrum guide 13 is identical, because the contact pressure F is small and the part where the yarn 10 slides on the fulcrum guide 13 is short as compared to the case where the winding angle θ is 30 degrees. Therefore, even if the winding angle θ is smaller than 30 degrees, the yarn property of not lower than 90% is achieved by arranging the radius R of the fulcrum guide 13 to fall within the range of 3mm to 8mm. Furthermore, even if the type, thickness, running speed or the like of the yarn 10 are different from those in the example above, it is assumed that a yarn property similar to that of the measurement above is achieved when the winding angle θ is 30 degrees.

[0049] Now, various modifications of the present embodiment will now be described. It is noted that the description of the same arrangements as in the embodiment will be omitted.

[0050] In the embodiment above, neighboring two guide supporting members 21 (fulcrum guides 13) are connected with each other by the belt 22, the outermost guide supporting member 21 and the pulley 23 connected to the motor 24 are connected with each other by the belt 22, and the sliding positions between the fulcrum guides 13 and the yarns 10 are changed altogether by rotating the motor 24. This arrangement, however, is not prerequisite.

[0051] For example, a single belt may be mounted over all guide supporting members 21 and the pulley 23. Alternatively, a motor is individually provided for each fulcrum guide 13 to allow each fulcrum guide 13 to individually rotate.

[0052] In addition to the above, changing the sliding position between the fulcrum guide 13 and the yarn 10 may be achieved by a solution other than the rotation of the fulcrum guide 13. According to a modification (modification 1), as shown in Fig. 7, an air cylinder 30 is provided on the side opposite to the leading end of the fulcrum guide 13, and a piston 31 of the air cylinder 30 is attached to an end portion of the fulcrum guide 13 which portion is opposite to the leading end. As an air pressure in the internal space 32 of the air cylinder 30 is changed by using an unillustrated pump or the like, the piston 31 and the fulcrum guide 13 move together along the axial directions of the fulcrum guide 13. More specifically, the fulcrum guide 13 moves toward the leading end side in the axial directions when the air pressure in the internal space 32 is increased, or moves toward the base end side when the air pressure in the internal space 32 is decreased.

[0053] The sliding position between the fulcrum guide 13 and the yarn 10 is changed by moving the fulcrum guide 13 along the axial directions as above, and this makes it possible to elongate the life of the fulcrum guide 13. That is to say, in the modification 1, the air cylinder 30 is equivalent to a guide movement mechanism of the present invention, which is a part of the sliding position change mechanism of the present invention.

[0054] While in the modification 1 the fulcrum guide 13 is moved in its axial directions by the air cylinder 30, the fulcrum guide may be moved in its axial directions by a hydraulic cylinder or other mechanisms.

[0055] In addition to the above, as the mechanism for changing the sliding position between the fulcrum guide 13 and the yarn 10, the embodiment has only the mechanism for rotating the fulcrum guide 13 (i.e., belt 22, pulley 23, and motor 24) whereas the modification 1 has only the mechanism for moving the fulcrum guide 13 in its axial directions (i.e., air cylinder 30). In this regard, both of these two mechanisms may be concurrently provided. Such an arrangement further elongates the life of the fulcrum guide 13.

[0056] In addition to the above, while in the example above the mechanism for changing the sliding position between the fulcrum guide 13 and the yarn 10 is provided, such a mechanism may not be provided.

[0057] In addition to the above, while in the embodiment above the restraining guide 25 is provided above the fulcrum guide 13 to prevent the yarn 10 from moving along the axial directions of the fulcrum guide 13 and dropping off from the fulcrum guide 13, the arrangement to prevent the yarn 10 from dropping off from the fulcrum guide 13 is not limited to this. For example, the prevention of dropping off of the yarn 10 from the fulcrum guide 13 may be achieved by other arrangements, e.g., the fulcrum guide 13 is arranged to be wide in diameter at the leading end.

[0058] In addition to the above, when the fulcrum guide 13 is sufficiently long in the axial directions and the yarn 10 is unlikely to drop off from the fulcrum guide 13 even if the yarn 10 moves in the axial directions of the fulcrum guide 13, the above-described arrangement for preventing the yarn 10 from dropping off from the fulcrum guide 13 may be unnecessary.

[0059] While in the embodiment above the fulcrum guide 13 extends in the directions orthogonal to the axial directions of the bobbin holder 7 and is a column whose outer circumference functions as the sliding surface on which the yarn 10 slides, the fulcrum guide 13 may extend in directions which intersect the axial directions of the bobbin holder 7 and are inclined with respect to the directions orthogonal to the axial directions of the bobbin holder 7. Furthermore, the fulcrum guide may not be column-shaped but have a different shape in which the curvature radius at the sliding surface on which the yarn 10 slides is not shorter than 3mm and not longer than 8mm. Furthermore, the curvature radius of the fulcrum guide at the sliding surface on which the yarn 10 slides may not be constant but be different at different parts.

40 Claims

1. A spinning winder (1) comprising:

a winding spindle (7) to which a plurality of bobbins (B) are attached in series along an axis and which winds a plurality of yarns (10) spun out from a spinning unit (2) onto the bobbins (B); and a plurality of distribution guides (13) that bend the yarns (10) spun out from the spinning unit (2) and distribute the yarns (10) to the respective bobbins (B) attached to the winding spindle (7), **characterised by** curvature radii of the distribution guides (13) at sliding surfaces on which the yarns (10) slide being not shorter than 3mm and not longer than 8mm.

2. The spinning winder (1) according to claim 1, where-

in,
a bending angle of each of the yarns (10) at each of
the distribution guides (13) is not larger than 30 de-
grees.

3. The spinning winder (1) according to claim 1 or 2,
further comprising:

a sliding position change mechanism for chang-
ing sliding positions where the yarns (10) slide
on the corresponding distribution guides (13).

4. The spinning winder (1) according to claim 3, where-
in,
the distribution guides (13) are columns having outer
circumferences on which the yarns (10) slide, and
the sliding position change mechanism is provided
with a guide rotation mechanism (22, 23, 24) that
changes the sliding positions by rotating the distri-
bution guides (13) about their axes.

5. The spinning winder (1) according to claim 4, where-
in,
the guide rotation mechanism (22, 23, 24) includes:

an endless belt (22) that is mounted on the dis-
tribution guides (13) to connect the distribution
guides (13) with one another; and
a belt driving unit (23, 24) for driving the belt (22).

6. The spinning winder (1) according to any one of
claims 3 to 5, wherein,
the distribution guides (13) extend in a predeter-
mined direction that intersects with axial directions
of the winding spindle (7), and
the sliding position change mechanism is provided
with a guide movement mechanism that changes the
sliding positions by moving the distribution guides
(13) in the predetermined direction.

7. The spinning winder (1) according to any one of
claims 1 to 6, further comprising:

a restraining means (25) for restraining the yarns
(10) threaded on the distribution guides (13)
from moving in directions orthogonal to a run-
ning direction of the yarns (10) at parts where
the yarns (10) slides on the distribution guides
(13).

Patentansprüche

1. Spinnaufwickler (1) mit:

einem Wickeldorn (7), an den mehrere Spulen
(B) in Reihe entlang einer Achse angebracht
sind, und der mehrere Garne (10) auf die Spulen

(B) aufwickelt, die von einer Spinneinheit (2)
ausgesponnen wurden; und
mehreren Verteilungs- und Führungseinrichtun-
gen (13), welche die von der Spinneinheit (2)
ausgesponnen Garne (10) beugen und die Gar-
ne (10) an die jeweiligen Spulen (B) verteilen,
die an dem Wickeldorn (7) angebracht sind, **da-
durch gekennzeichnet, dass**
Krümmungsradien der Verteilungs- und Füh-
rungseinrichtungen (13) an Gleitflächen, auf de-
nen die Garne (10) gleiten, nicht kürzer als 3mm
und nicht länger als 8mm sind.

2. Spinnaufwickler (1) nach Anspruch 1, bei dem
ein Beugungswinkel von jedem der Garne (10) an
jedem der Verteilungs- und Führungseinrichtungen
(13) nicht mehr als 30 Grad beträgt.

3. Spinnaufwickler (1) nach Anspruch 1 oder 2, ferner
mit:

einem Gleitpositions-Änderungsmechanismus
zum Ändern von Gleitpositionen, an denen die
Garne (10) auf den entsprechenden Verteil-
ungs- und Führungseinrichtungen (13) gleiten.

4. Spinnaufwickler (1) nach Anspruch 3, bei dem
die Verteilungs- und Führungseinrichtungen (13)
Säulen sind, die Außenumfänge aufweisen, auf de-
nen die Garne (10) gleiten, und
der Gleitpositions-Änderungsmechanismus mit ei-
nem Führungs-Rotations-Mechanismus (22, 23, 24)
versehen ist, der die Gleitpositionen durch Rotieren
der Verteilungs- und Führungseinrichtungen (13) um
ihre Achsen ändert.

5. Spinnaufwickler (1) nach Anspruch 4, bei dem
der Führungs-Rotations-Mechanismus (22, 23, 24)
aufweist:

ein endloses Band (22), das an den Verteilungs-
und Führungseinrichtungen (13) derart ange-
bracht ist, dass es die Verteilungs- und Füh-
rungseinrichtungen (13) miteinander verbindet;
und
eine Bandantriebseinheit (23, 24) zum Antrei-
ben des Bandes (22).

6. Spinnaufwickler (1) nach einem der Ansprüche 3 bis
5, bei dem
sich die Verteilungs- und Führungseinrichtungen
(13) in eine vorbestimmte Richtung erstrecken, die
sich mit Axialrichtungen des Wicklungsdorns (7)
schneidet, und
der Gleitpositions-Änderungsmechanismus mit ei-
nem Führungs-Bewegungs-Mechanismus verse-
hen ist, der die Gleitpositionen durch Bewegen der
Verteilungs- und Führungseinrichtungen (13) in die

vorbestimmte Richtung ändert.

7. Spinnaufwickler (1) nach einem der Ansprüche 1 bis 6, ferner mit:

einer Rückhalteeinrichtung (25), um die auf die Verteilungs- und Führungseinrichtungen (13) gefädelten Garne (10) davon anzuhalten, sich in Abschnitten, in denen die Garne (10) auf den Verteilungs- und Führungseinrichtungen (13) gleiten, in Richtungen orthogonal zu einer Laufrichtung der Garne (10) zu bewegen.

Revendications

1. Bobinoir de filage (1) comprenant :

un fuseau de bobinage (7) auquel une pluralité de bobines (B) sont attachées en série le long d'un axe et qui enroule une pluralité de fils (10) filés en provenance d'une unité de filage (2) sur les bobines (B) ; et
une pluralité de guides de distribution (13) qui courbent les fils (10) filés en provenance de l'unité de filage (2) et qui distribuent les fils (10) aux bobines (B) respectives attachées au fuseau de bobinage (7), **caractérisé par**
des rayons de courbure des guides de distribution (13) au niveau de surfaces de coulissement sur lesquelles les fils (10) coulisent n'étant pas plus courts que 3 mm et pas plus longs que 8 mm.

2. Bobinoir de filage (1) selon la revendication 1, dans lequel,
un angle de courbure de chacun des fils (10) au niveau de chacun des guides de distribution (13) n'est pas plus grand que 30 degrés.

3. Bobinoir de filage (1) selon la revendication 1 ou 2, comprenant en outre :

un mécanisme de changement de position de coulissement pour changer des positions de coulissement où les fils (10) coulisent sur les guides de distribution (13) correspondants.

4. Bobinoir de filage (1) selon la revendication 3, dans lequel,
les guides de distribution (13) sont des colonnes ayant des circonférences extérieures sur lesquelles les fils (10) coulisent, et
le mécanisme de changement de position de coulissement est muni d'un mécanisme de rotation de guide (22, 23, 24) qui change les positions de coulissement en faisant tourner les guides de distribution (13) autour de leurs axes.

5. Bobinoir de filage (1) selon la revendication 4, dans lequel,
le mécanisme de rotation de guide (22, 23, 24) inclut :

une courroie sans fin (22) qui est montée sur les guides de distribution (13) pour relier les guides de distribution (13) les uns avec les autres ; et
une unité d'entraînement de courroie (23, 24) pour entraîner la courroie (22).

6. Bobinoir de filage (1) selon l'une quelconque des revendications 3 à 5, dans lequel,
les guides de distribution (13) s'étendent dans une direction prédéterminée qui croise des directions axiales du fuseau de bobinage (7), et
le mécanisme de changement de position de coulissement est muni d'un mécanisme de mouvement de guide qui change les positions de coulissement en déplaçant les guides de distribution (13) dans la direction prédéterminée.

7. Bobinoir de filage (1) selon l'une quelconque des revendications 1 à 6, comprenant en outre :

un moyen de restriction (25) pour contenir les fils (10) enfilés sur les guides de distribution (13) de se déplacer dans des directions orthogonales à une direction d'avancement des fils (10) au niveau de parties où les fils (10) coulisent sur les guides de distribution (13).

FIG.1

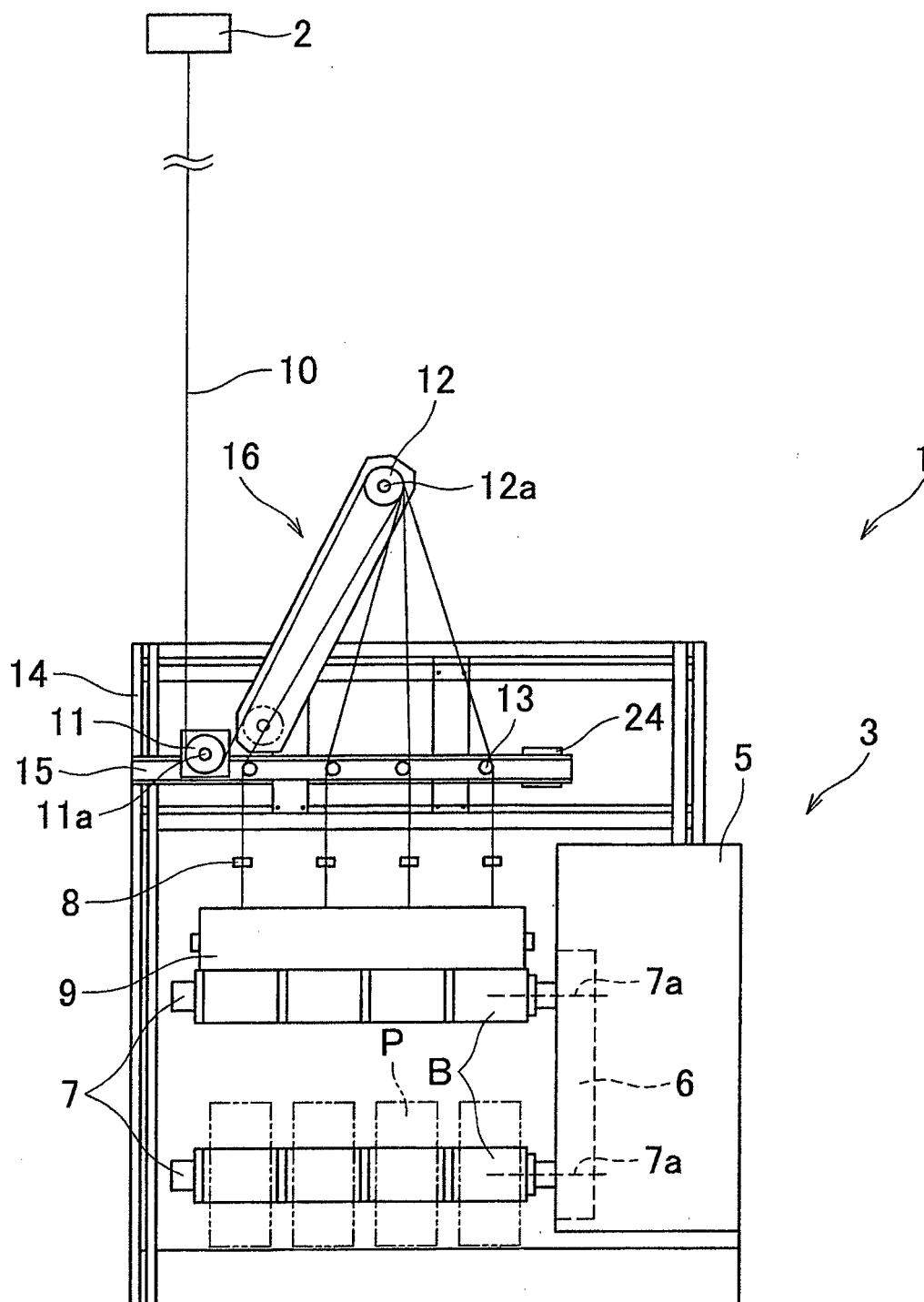


FIG.2

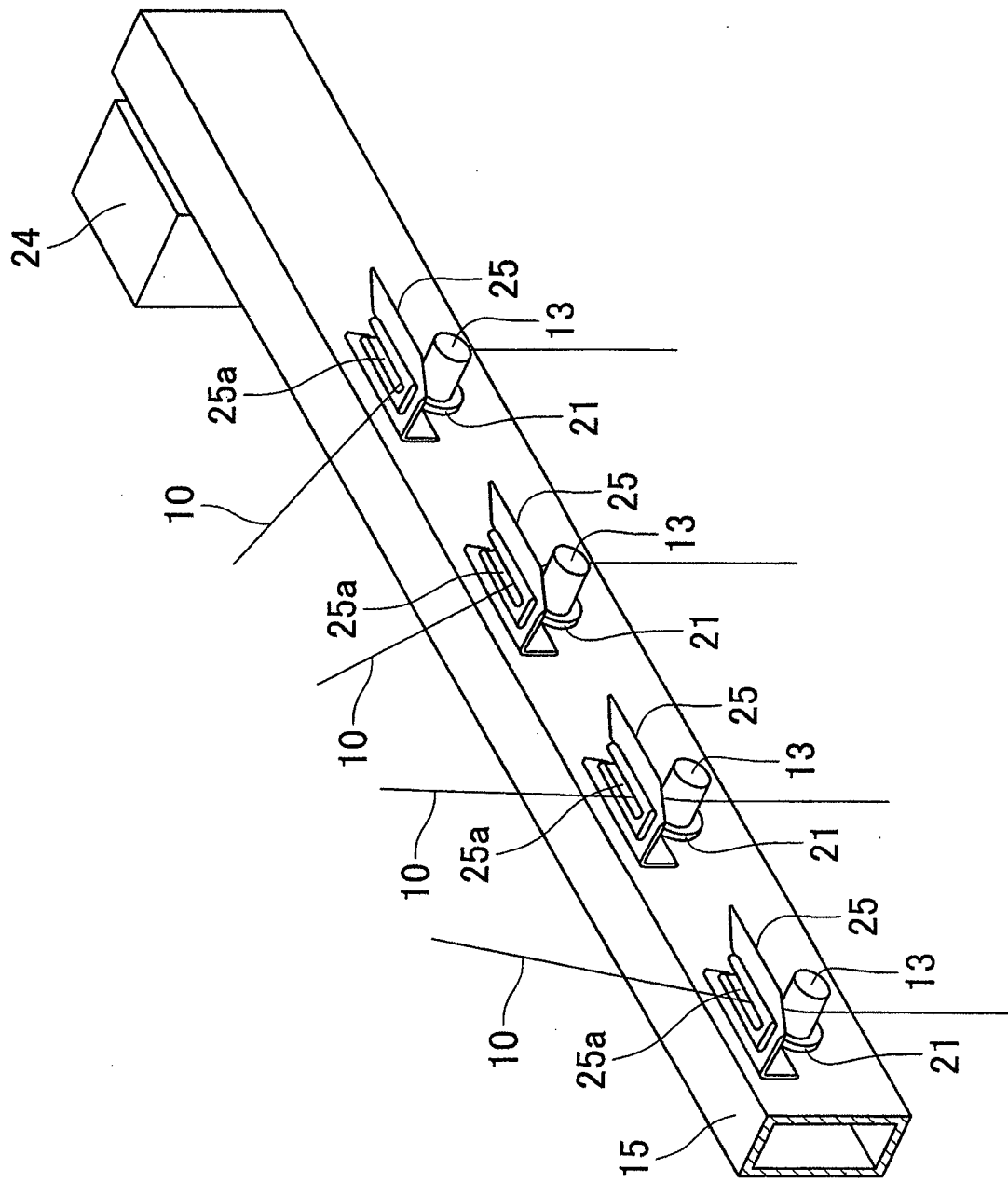


FIG.3

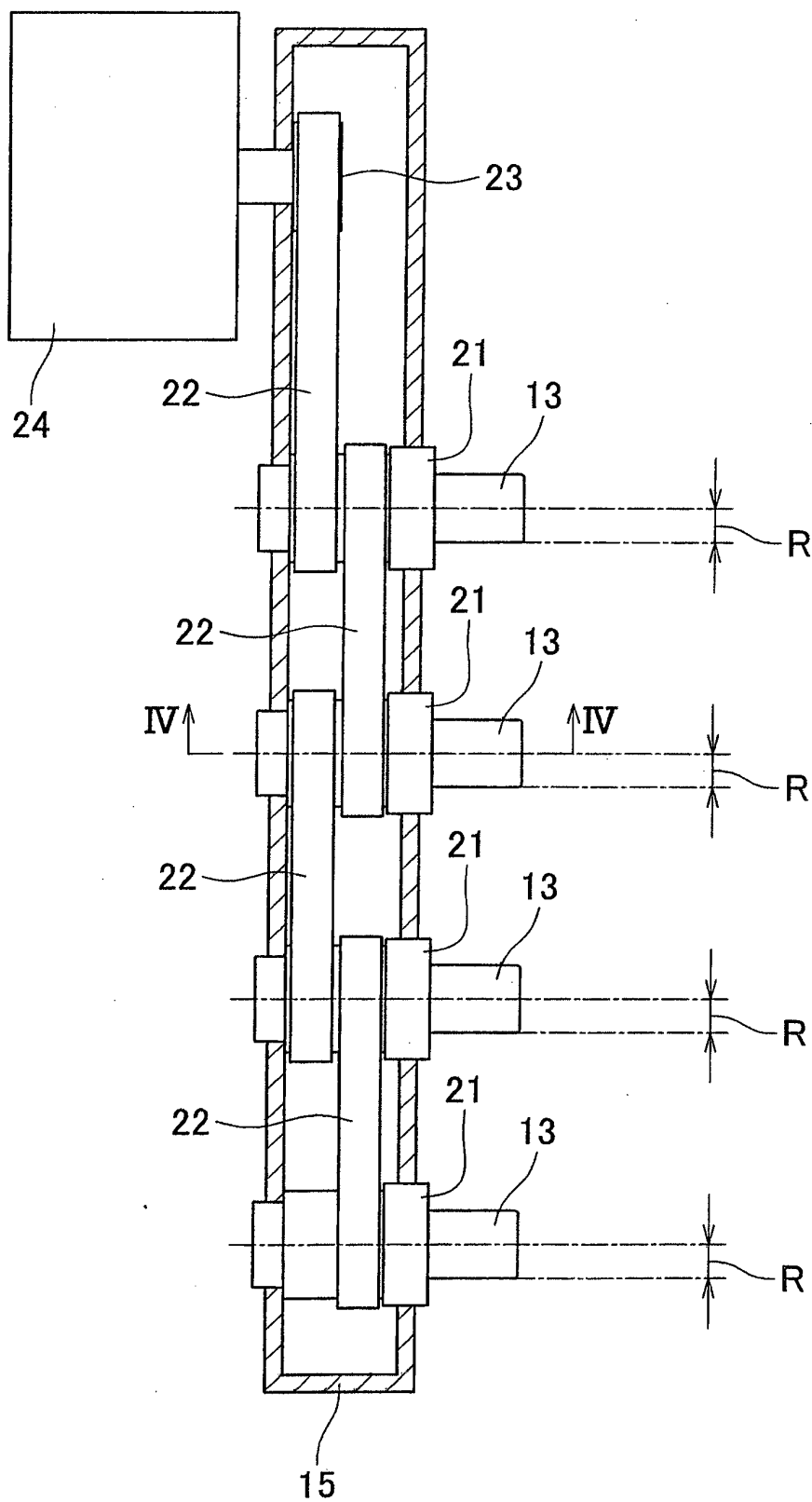


FIG.4

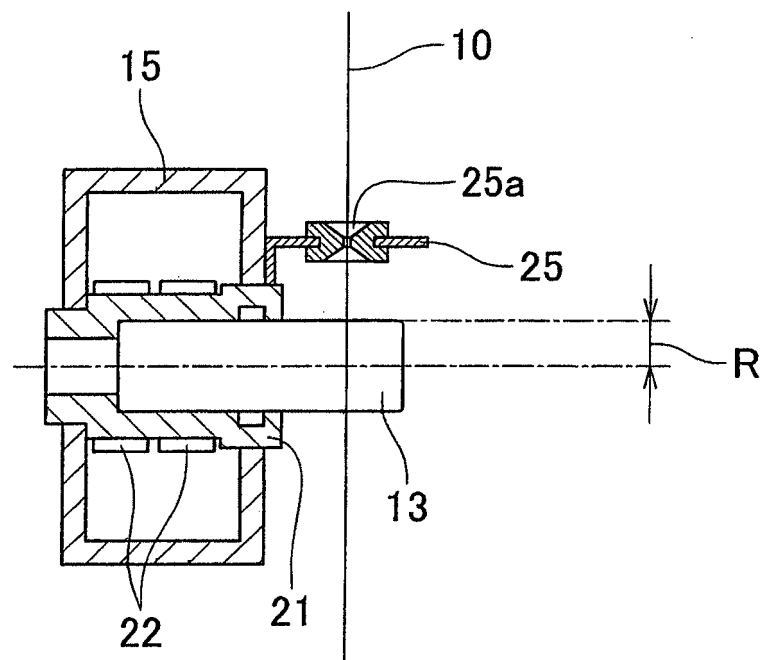


FIG.5

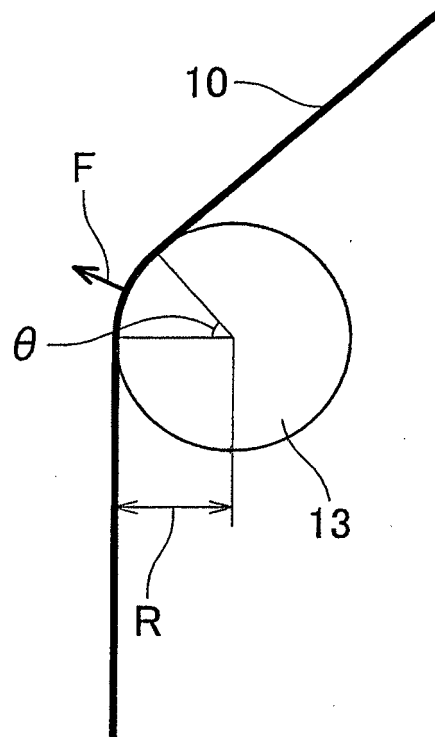


FIG.6

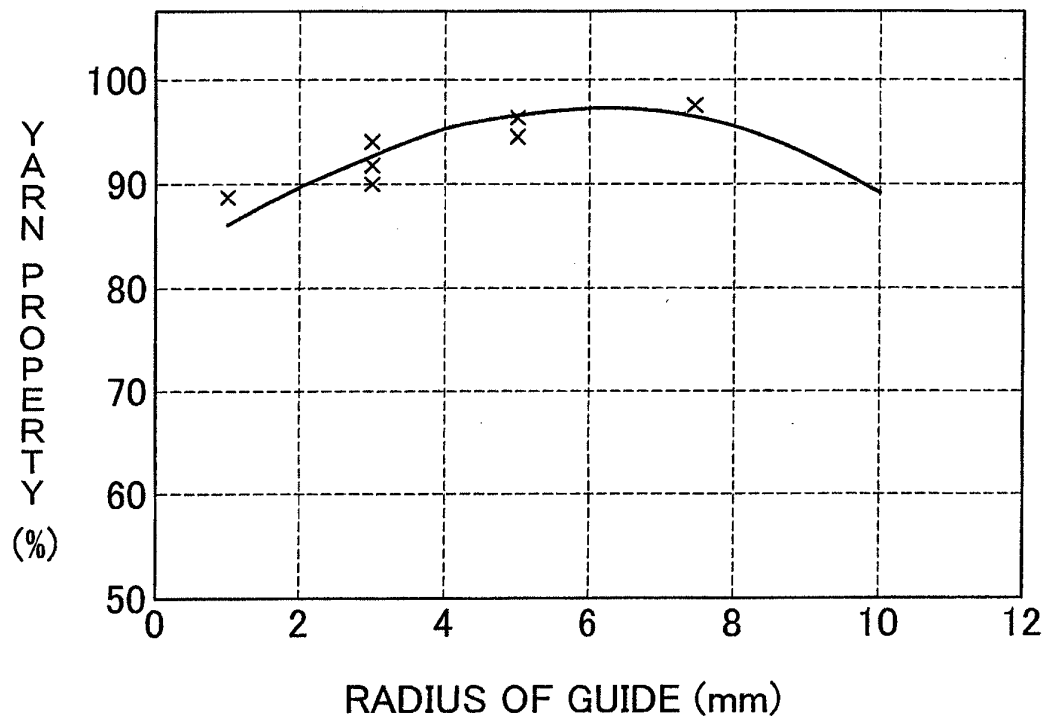
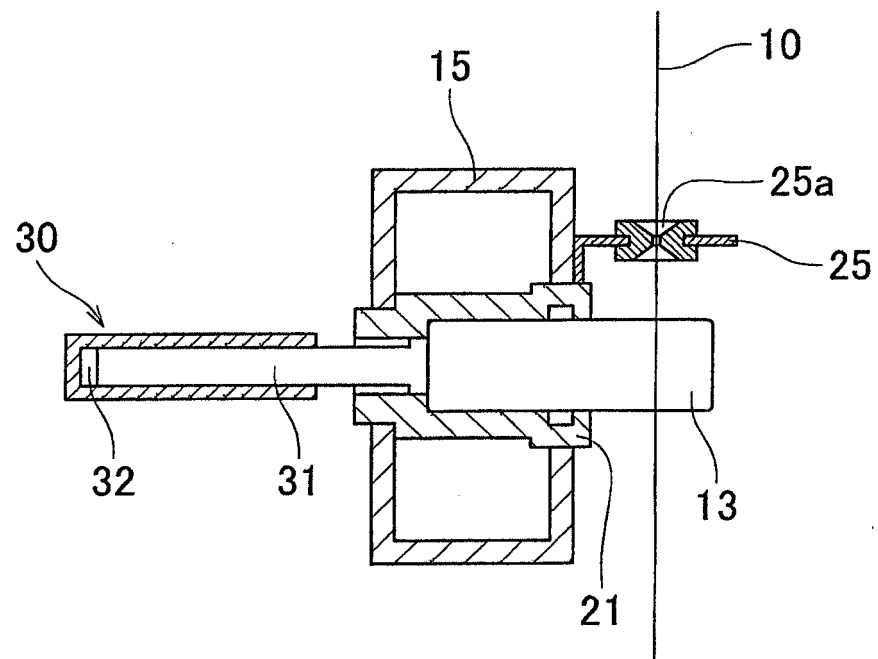


FIG.7



REFERENCES CITED IN THE DESCRIPTION

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