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(54) Unnecessary yarn removal method and device for a winding package

(57) The present invention is characterized by removal of the yarn end wound last onto the full package on an auto-winder when doffing is carried out.

As a result, when doffing is carried out after yarn joining once a package (4) has become full, removal is possible of the joint (2c) of the yarn existing at the yarn end wound last onto the full package. Furthermore, when one winding package (4) is formed from one supply yarn package (1,1A), removal is possible of the inner layer yarn part (often damaged) of the supply package (1,1A).

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Description

TECHNICAL FIELD

The present invention relates to a method and a device on an auto-winder or the like for removing unnecessary yarn of a winding package such as a joint wound last onto the fully wound package, a yarn of different type, or the part of a yarn of an inner layer of the supply yarn package.

BACKGROUND ART

On an auto-winder or the like, when a winding package becomes full, the yarn joining the supply yarn package to the winding package is forcibly cut. However, as it is necessary for the doffing device to pick up the yarn that is joined to the supply yarn package when doffing is carried out, not only are the yarn end of the supply yarn package and the yarn end of the full winding package joined but doffing is carried out after the joint has been wound onto the last wound part of the full winding package.

PROBLEMS TO BE SOLVED BY THE INVENTION

As described above, a joint exists on the last wound part of the full winding package wound on a conventional winder or the like. Consequently, at the next process such as a warping frame or the like, a problem may occur whereby a number of joints existing in the last wound part of the winding package may overlap.

Further, on the aforementioned conventional auto-winder or the like, waste winding of a single winding package from a single supply yarn package is carried out but in this situation, if the wound-off supply yarn package and next supply yarn package are different types of yarn, problems whereby yarn of a different type wound on the next supply yarn package is wound into the last winding part of the full package may occur.

Yet further, the supply yarn package is sometimes wound after dyeing but this kind of the supply yarn package may have innermost layer parts with dyeing specks where the dye is darker or lighter than other parts and the layer parts with these kinds of dyeing specks are also erroneously wound.

Yet further still when a supply yarn package is formed, the innermost layer parts of that supply yarn package are damaged between the winding tube of that supply yarn package and the winding drum of the winder. Accordingly, it is not desirable for these damaged innermost layers to be wound onto the winding package.

SUMMARY OF THE INVENTION

It is an object of the present invention to propose an unnecessary yarn removal method and that device for a winding package for solving the problems present on a conventional auto-winder or the like.

In order to achieve the aforementioned object, a first aspect of the unnecessary yarn, removal method for a winding package is the removal of a predetermined amount of yarn of the last wound part of the winding package before or when doffing of the winding package is carried out. A second aspect is the removal of a predetermined amount of yarn of the innermost layer part of the supply yarn package which had been wound onto the last wound part of the winding package. A third aspect is the removal of the outer layer part of the next supply yarn package wound onto the last wound part of the winding package in continuance with the innermost layer part of the previous supply yarn package.

Furthermore, a first aspect of the unnecessary yarn removal device for a winding package is the provision of a means for sucking the yarn of the last wound part of the winding package, a means for rotating the winding package in the unwinding direction, and a means for cutting the yarn sucked by the suction means from the winding package, where each of these means operates in connection with the doffing device. A second aspect is the arrangement of a doffing device runs along the plurality of winding units, a dust box for storing the removed yarn of the last wound part in that doffing device and a removal mess for removing the yarn stored in the dust box on one side of the machine comprising the plurality of winding units.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a summarised front view of one winding unit of an auto-winder or the like showing the unnecessary yarn removal operations.

Figure 2 is a summarised perspective view of one winding unit of an auto-winder or the like showing the unnecessary yarn removal operations continuous with Figure 1.

Figure 3 is a summarised perspective view of one winding unit of an auto-winder or the like showing the unnecessary yarn removal operations continuous with Figure 2.

Figure 4 is a summarised front view of a auto-winder and doffing device and so on.

Figure 5 is a partially enlarged perspective view of the dust box and so on of the doffing device.

Figure 6 is a summarised perspective view of one winding unit of an auto-winder or the like showing the rewinding actions of the supply yarn package after dyeing.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Using the drawings, the unnecessary yarn (yarn of which removal is required) removal method and that device for a winding package of the present invention will be described. However, provided the aims are not surpassed, the present invention is not limited to the present embodiment.

As shown in Figure 1(A), the yarn wound off from a supply yarn package (1) on each winding unit (W) is wound onto a winding package (4) which contacts a traverse drum (3) and is driven by that drum (3). It should be noted that a winding tube (5) of the winding package (4) is supported by a publicly known cradle arm (not shown in the drawing) so that it may freely rotate. The supply yarn package (1) of the drawing is a spinning bobbin formed by a ring spinning machine. In the drawing, (M) is a yarn monitor that monitors whether the yarn (2) is running or not and detects yarn defects. (S) is a yarn piecing device such as a splicer or the like that joins the yarn end of the supply yarn package (1) and the yarn end of the winding package (4). (SN) is a supply yarn suction guide means that grips the yarn end of the supply yarn package (1) and guides it to the yarn piecing device (S). Furthermore, (SP) is a winding yarn suction guide means that grips the yarn end of the winding package (4) and guides it to the yarn piecing device (S).

When the winding package (4) becomes full (a predetermined amount has been wound), a cutter (6) arranged above the supply yarn package (1) operates via a suitable control device based on a signal from a publicly known full winding detector (not shown in the drawing). As shown in Figure 1(B), the yarn (2) is cut between the supply yarn package (1) and the winding package (4) and the cut yarn end (2a) of the supply yarn package (1) is sucked by the suction pipe (7).

Incidentally, it is necessary for the doffing device (labeled D in Figure 4) to pick up the supply yarn package (1) side yarn end (2a) when doffing operations are to be carried out but as it is difficult for the doffing device (D) to pick up the supply yarn package (1) yarn end (2a) sucked into the suction pipe (7) positioned below, as shown in Figure 1(C), the supply yarn package (1) side yarn end (2a) and a yarn end (2b) wound off from the full winding package (4) are joined by a piecing device (S) such as a splicer or the like. In order to carry this out, the suction opening of the winding yarn suction guide means (SP) is brought close to the winding package (4) as shown in Figure 1(B), the yarn end of the winding package (4) is sucked and gripped and by returning to its original position as shown in Figure 1(C), the yarn end of the winding package (4) is guided to the yarn piecing device (S). Furthermore, the suction opening of the supply yarn suction guide means (SN) is brought close to the suction pipe (7) as shown in Figure 1(B), the yarn end of the supply yarn package (1) is sucked and gripped from the suction pipe (7) and by returning to its original position as shown in Figure 1(C), the yarn end of the supply yarn package (1) is guided to the yarn piecing device (S).

Next, after the yarn ends are joined, driving of the traverse drum (3) is restarted and the winding package (4) rotates. The yarn (2) is run and the running (in short, whether the yarn (2) is joined) of the yarn (2) is confirmed by the yarn monitor (M). Afterwards, the drum (3) stops. Due to this, as shown in Figure 1(D), the joint (2c)

is attached to an approximately uniform position of the last wound part of the full winding package.

Figure 6 shows the case where a supply yarn package (1A) formed by the traversing of a yarn on the winding tube (1Aa) by an auto-winder or the like and dyed is wound off. In this example, a case is shown where a single winding package (4) is formed from a single supply yarn package (1A). In the drawing, a cheese shaped supply yarn package (1A) is shown but, of course, cone shaped is possible.

Figure 6(A) shows the state where the winding package (4) has become full. At this time, the supply yarn package (1A) has become an empty package. When the winding package (4) becomes full, a signal is sent from the full package detector similar to the case of Figure 1. Thus, the empty package (1A) is ejected from the winding unit (W) and as shown in Figure 6(B), a new fully wound supply yarn package (1A) is supplied to the winding unit (W). In continuance, the suction opening of the winding yarn suction guide means (SP) approaches the winding package (4) and the yarn end of the winding package (4) is held. Furthermore, the suction opening of the supply yarn suction guide means (SN) is positioned above the supply yarn package (1A) and moreover, due to the blowing of the yarn end inserted in the winding tube (1Aa) of the supply yarn package (1A) by the yarn end blowing means (BL), the yarn end of the supply yarn package (1A) is held by the supply yarn suction guide means (SN). Afterwards, similar to the case in Figure 1, the yarn end of the supply yarn package (1A) and the yarn end of the winding package (4) are joined (Figure 6(C)) and the ruining of yarn (2) is confirmed. As a result, the joint (2c) is wound onto the last wound part of the winding package (Figure 6(D)).

In the case of Figure 1 or Figure 6, a doffing signal is emitted after the aforementioned piecing operation has finished, that doffing signal is input to a suitable control device, the doffing device (D) that runs along a plurality of winding units (W) linked together runs to in front of the winding unit (W) that has emitted the doffing signal and doffing is carried out by the doffing device (D). The doffing device (D) is provided with a lever shaped yarn pick-up member (8), a lever shaped clamp cutter member (9) and a yarn suction member (10).

Firstly, as shown in Figure 2(A), the tip of the yarn pick-up member (8) contacts from behind the part of the yarn (2) positioned below the traverse drum (3) from the joint (2c) wound on the last part of the full winding, package to the supply yarn package (1, 1A) and the traverse drum (3) operates. As a result of this, a notch (8a) formed at the tip of the yarn pick-up member (8) traps the yarn (2).

Next, as shown in Figure 2(B), the yarn pick-up member (8) is rotated forwards and the yarn (2) is pulled upwards while being caught in the notch (8a) of the yarn pick-up member (8). Simultaneous with the operation of this yarn pick-up member (8), or rather immediately after or before, the clamp cutter member (9) is operated and the clamp cutter (9a) arranged on the tip of the

clamp cutter member (9) is moved to an operating position near to the yarn (2) which has been picked up by the yarn pick-up member (8). Also, the suction opening (10b) of the suction pipe (10a) of the yarn suction member (10) is arranged so that it is positioned between the clamp cutter (9a) moved to the aforementioned operating position and the winding package (4).

Next, the clamp cutter (9a) of the clamp cutter member (9) is operated and cuts the yarn (2) picked up by the yarn pick-up member (8) while gripping the yarn end (2e) of the yarn supply package (1, 1A) side produced after cutting. The cut yarn end (2d) of the winding package (4) side is sucked into the suction pipe (10a) from the suction opening (10b). Simultaneous with this suction operation or immediately after or before, the yarn pick-up member (8) returns to the stand-by position as shown in Figure 2(A) and the coupling of the yarn pick-up member (8) and the yarn end (2d) is released. Also, the traverse drum (3) reverse rotates and the full package (4) reverse rotates (rotation in the unwinding direction) until the joint (2c) wound into the last wound part of the full package (4) is sucked up by the dust box (10c) of the yarn suction member (10). This reverse rotation time of the full package (4) may be controlled by the reverse rotation count of the traverse drum (3) or the reverse rotation time of the traverse drum (3) as the position of the joint (2c) wound onto the last wound part of the full package (4) is approximately uniform. Further, a joint detection sensor may be arranged on the entrance (10c') or the like of the dust box (10c) and the rotation of the traverse drum (3) may be stopped when that joint detection sensor detects the joint (2c).

An arrangement is possible whereby instead of the cut yarn end (2d) of the winding package (4) being sucked by the suction opening (10b) of the suction pipe (10a) after the yarn (2) has been cut by the clamp cutter (9a) of the clamp cutter member (9) as described above, the clamp cutter (9a) is operated and the yarn (2) is cut after the uncut yarn (2) has been sucked by the suction opening (10b) of the suction pipe (10a).

After the joint (2c) wound onto the last wound part of the full package (4) is sucked into the dust box (10c) of the yarn suction member (10), the shutter/cutter (not shown in the drawing) positioned at the entrance (10c') of the dust box (10c) is operated and cuts the yarn (2) sucked into the dust box (10c) while the suction operation of the suction pipe (10a) stops. It should be noted that (10d) is a publicly known air suction device arranged at some point along the suction pipe (10a).

Next, if necessary, the traverse drum (3) is operated and due to the rotation of the winding package (4) in the winding direction, the yarn (2) remaining in the suction pipe (10a) or the like is wound onto the full package (4) and afterwards the rotation of the traverse drum (3) stops.

Afterwards, as is publicly known, the cradle arm that supports the full package (4) opens and doffing of the full package (4) is carried out. In short, the full pack-

age (4) is ejected from the winding position and as shown in Figure 3(A), a winding tube (5) is positioned between the gripping plates (11a,11b) of the cradle arm. Simultaneous with this positioning operation of the winding tube (5) between the gripping plates (11a,11b) of the cradle arm or immediately after or before that positioning operation, the clamp cutter (9a) of the clamp cutter member (9) that grips the yarn end (2e) of the yarn (2) at the supply yarn package (1,1A) is moved to above the aforementioned winding tube (5) and the yarn end (2e) by the clamp cutter (9a) is positioned between one edge (5a) of the winding tube (5) and one gripping plate (11b) of the cradle arm. Next, as is publicly known, the gripping plates (11a,11b) of the cradle arm are brought together and the yarn end (2e) gripped by the clamp cutter (9a) is trapped by one edge (5a) of the winding tube (5) and one gripping plate (11b) of the cradle arm.

Next, the cradle arm is rotated in the direction of the traverse drum (3) and the winding tube (5) supported on the cradle arm is contacted with the traverse drum (3). Winding of the yarn (2) restarts due to the rotation of the winding tube as shown in Figure 3(B).

After the aforementioned doffing operations have been completed, the doffing device (D) moves to the stand-by position or to the next winding unit (W) when a doffing operation is required.

As a predetermined amount of yarn of the last wound part of the full package (4) is removed before doffing or during doffing as described above, the joint wound onto the full package (4) may be removed from the winding package (4) and a winding package can be formed with no joint (2c) in a fixed position of the last wound part. Further, removal of the joint (2c) part also means removal of part of the yarn of the next supply yarn package (1A) in the case of Figure 6. Accordingly, there is no winding of the yarn of the next supply yarn package (1A) on the winding package (4). Furthermore, more yarn of the last wound part than the joint (2c) is removed. In short, in the case shown in Figure 6, if the yarn of the last wound part is removed so that the yarn of the innermost layer part of the supply yarn package (1A) may be removed, the yarn of the innermost layer part of the supply yarn package (1A) can be removed from the winding package (4) and a winding package (4) without dyeing speck can be produced.

If only carried out with the aim of removing yarn of the innermost layers of the supply yarn package (1A), when in the state as shown in Figure 6(B), a predetermined amount of the yarn of the last wound part of the winding package (4), in short, until the yarn of the innermost layer of the supply yarn package (1A) is unwound, may be removed by the winding yarn suction guide means (SP). In this case, the yarn wound on the winding package (4) is unwound by reverse rotating the traverse drum (3) and the unwound yarn is sucked by the suction guide means (SP). The sucked yarn is cut away from the winding package (4) by a cutter arranged on the yarn piecing device (S) and removed.

If the doffing device (D) is modified so that the yarn end of the supply yarn package (1,1A) may be directly gripped by the doffing device (D) close to the supply yarn package (1,1A), it is no longer necessary to join the yarn from the supply yarn package (1,1A) to the winding package (4) before doffing. Accordingly, if the yarn of the last wound part of the winding package (4) is removed by the winding yarn suction guide means (SP), it is no longer necessary to arrange a suction means such as the suction member (10) or the like on the doffing device (D). In this case, it is preferable not to allow yarn piecing after a joint has been formed.

On the aforementioned embodiment, an example where yarn (2) from the joint (2c) wound on the last wound part of the full package to the supply yarn package (1,1A) is picked up by a yarn pick-up member (8) has been described but, depending on the positioning of the clamp cutter (9a) of the clamp cutter member (9) or the positioning of the suction opening (10b) of the suction pipe (10a), the yarn (2) need not be picked up by the yarn pick-up member (8) and the yarn end of the winding package (4) may be directly sucked by the suction pipe (10a) or the yarn end of the supply yarn package (1,1A) may be directly gripped by the clamp cutter (9a) of the clamp cutter member (9). Thus, in this way, the yarn pick-up member (8) may be omitted.

Next, using Figures 4 and 5, the removal means for yarn waste stored in the dust box (10c) will be described.

The doffing device (D) is arranged so that it runs in front of the winding units (W) of the auto-winder along a rail (12) arranged in the ceiling or the like. Wheels (d1) that contact with the rail (12) are arranged on the doffing device (D). (10c) is the previously described dust box (10c) that stores yarn waste such as joints (2c) wound on the last wound part of the full package (4). (13) is a side box incorporated with a drive device and control device and the like arranged on one side of the auto-winder. An air suction device (14) provided with a filter is positioned in the side box (13).

(15) is a connector plate positioned on one side of the auto-winder and a hole (15a) is bored in the connector plate (15). The rear surface on which is positioned the hole (15a) of the connector plate (15) and the air suction device (14) are connected by a duct (16). (17) is a butterfly shutter of which the front elevation is V-shaped, which is positioned on the front surface of the connector plate (15) and is arranged so that it is able to swivel to the left and right about a shaft (18). The butterfly shutter (17) normally slants to the left as shown in Figure 4 so that the right side (17a) of the butterfly shutter (17) closes the hole (15a) bored in the connector plate (15). A hole (19) is bored on the rear side of the dust box (10c) and a pipe (20) is connected to that hole (19).

As shown in Figure 4, when the doffing device (D) suspended on the rail (12) runs in the direction of the side box (13), the pipe (20) attached to the rear side of the dust box (10c) enters the notch (17b) of the butterfly

shutter (17) which has closed the hole (15a) bored in the connector plate (15) and rotates the butterfly shutter (17) in a clockwise direction about the shaft (18). Thus the hole (15a) in the connector plate (15) opens, the hole (15a) and the pipe (20) of the dust box (10c) are connected and the yarn waste stored in the dust box (10c) is removed to the air suction device (14) via the duct (16) connected to the air suction device (14) normally in the operating state.

After removal of yarn waste stored in the dust box (10c), when the doffing device (D) suspended on the rail (12) runs in the direction opposite to the side box (13), the pipe (20) of the dust box (10c) which is inserted in the notch (17b) of the butterfly shutter (17) rotates the butterfly shutter (17) in a counter-clockwise direction about shaft (18). Thus the right side (17a) of the butterfly shutter (17) closes the hole (15a) in the connector plate (15) as shown in Figure 4.

The present invention having a construction as described above demonstrates the following advantages.

As yarn of different types and joints existing in the last wound part of the full winding package as well as yarn of the innermost layer of the supply yarn package can be removed, problems such as trouble at the next process such as a warping operation, the appearance of dyeing specks in the cloth and the like can be prevented.

Furthermore, when the package is full, the running speed of the yarn decreases as the package is stopped and in association with this, the yarn monitor may make erroneous detections thus stopping monitoring of a yarn by the yarn monitor. Due to this, yarn defects may exist in the last wound part but the present invention is able to remove these defects.

As the yarn waste stored in the doffing device can be automatically removed in association with the running of the doffing device, handling of the doffing device becomes easy.

Claims

1. An unnecessary yarn removal method for a winding package comprising, removal of a predetermined amount of yarn of the last wound part of a winding package before or during doffing of a winding package is to be carried out.
2. An unnecessary yarn removal method for a winding package as in claim 1, wherein a predetermined amount of yarn of the innermost layers of a supply yarn package wound onto the last wound part of a winding package.
3. An unnecessary yarn removal method for a winding package as in claims 1 or 2, wherein the outer layer part of the next supply yarn package wound onto the last wound part of the winding package can be removed in continuance with the innermost layer

part of the previous supply yarn package.

4. An unnecessary yarn removal device for a winding
package, having a means for sucking the yarn of the
last wound part of the winding package, a means 5
for rotating the winding package in the unwinding
direction, and a means for cutting the yarn sucked
by the suction means away from the winding pack-
age,
where each of these means operates in connection 10
with the doffing device.
5. An unnecessary yarn removal device for a winding
package as in claim 4, wherein the doffing device is
arranged so as to run along the plurality of winding 15
units, a dust box for storing the removed yarn of last
wound part is arranged on that doffing device and a
removal means for removing the yarn stored in the
dust box is arranged on one side of the machine
comprising the plurality of winding units. 20

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FIG.1A

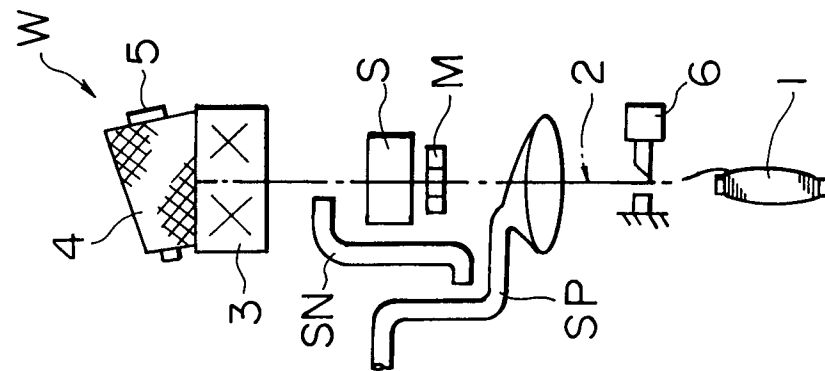


FIG.1B

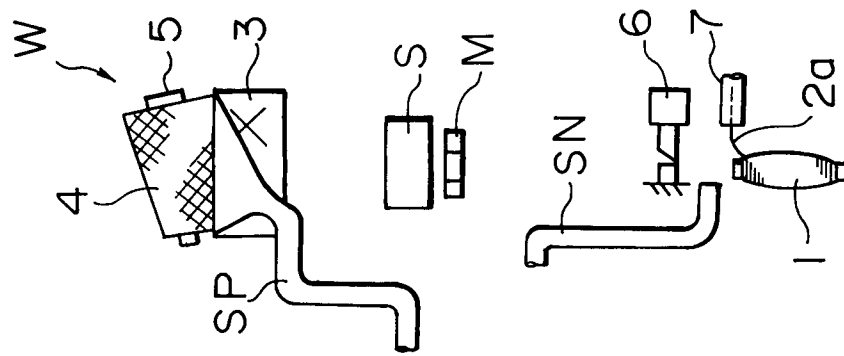


FIG.1C

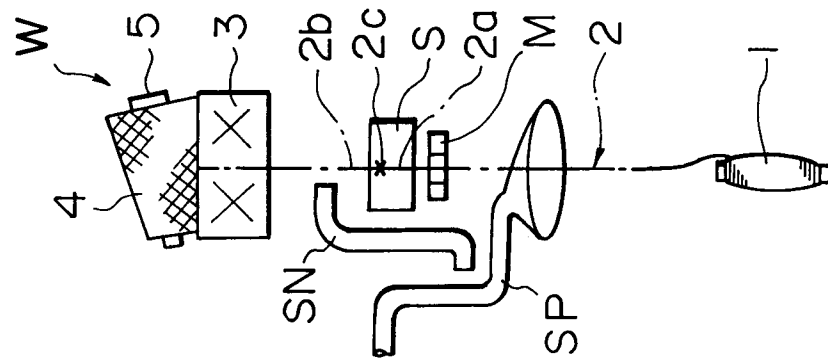


FIG.1D

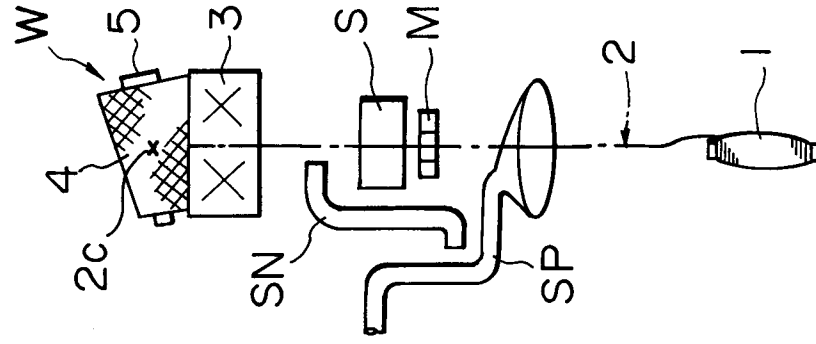


FIG. 2A

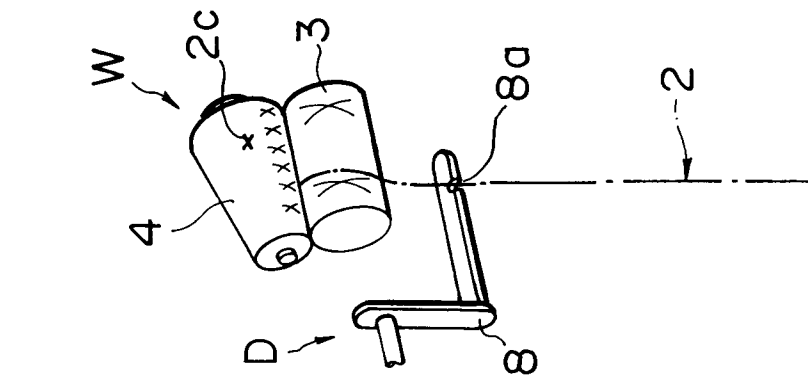


FIG. 2B

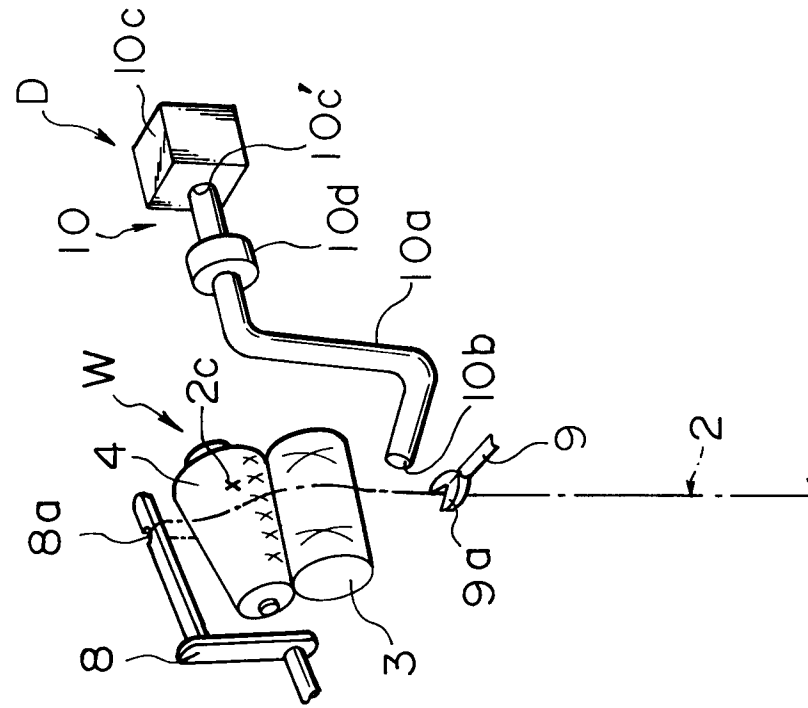


FIG. 2C

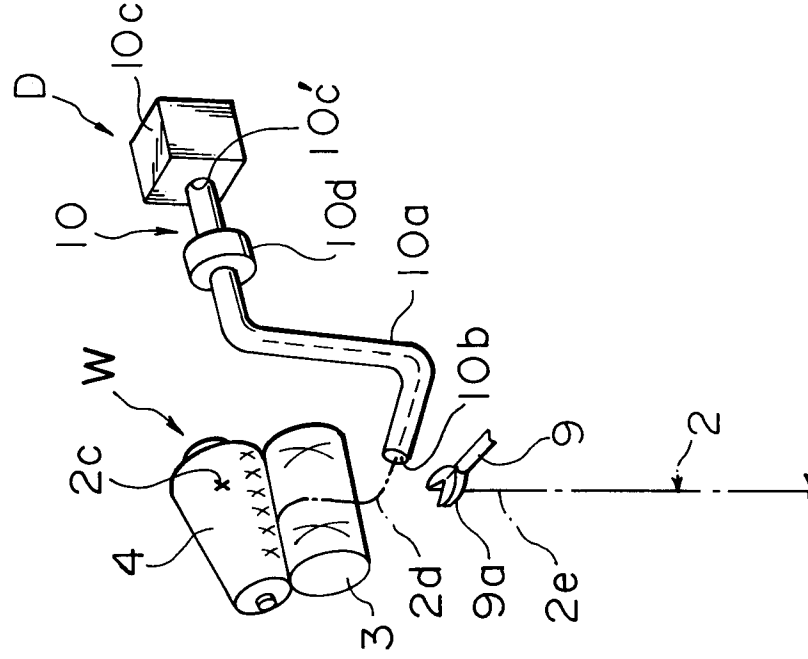


FIG. 3A

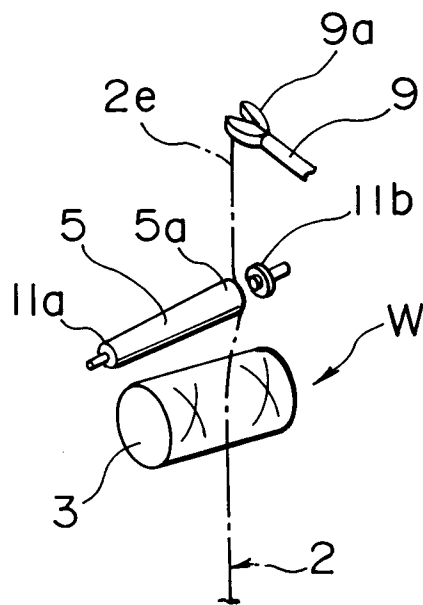


FIG. 3B

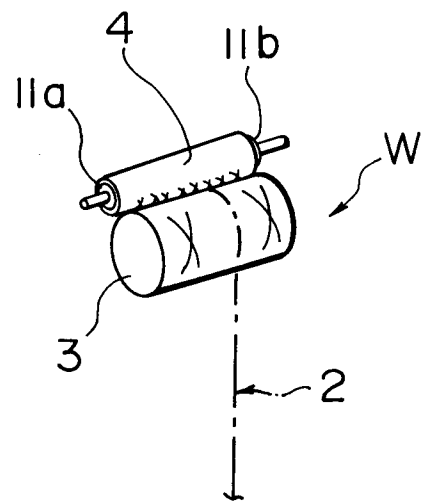


FIG. 4

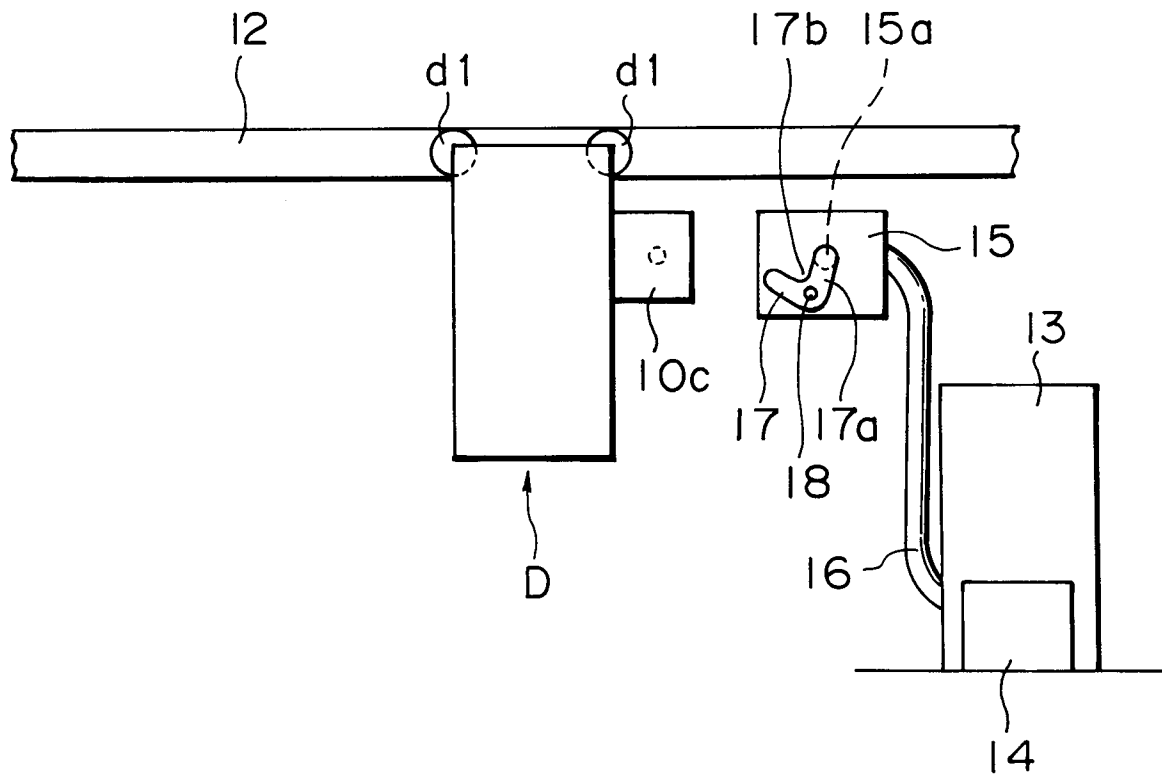


FIG. 5

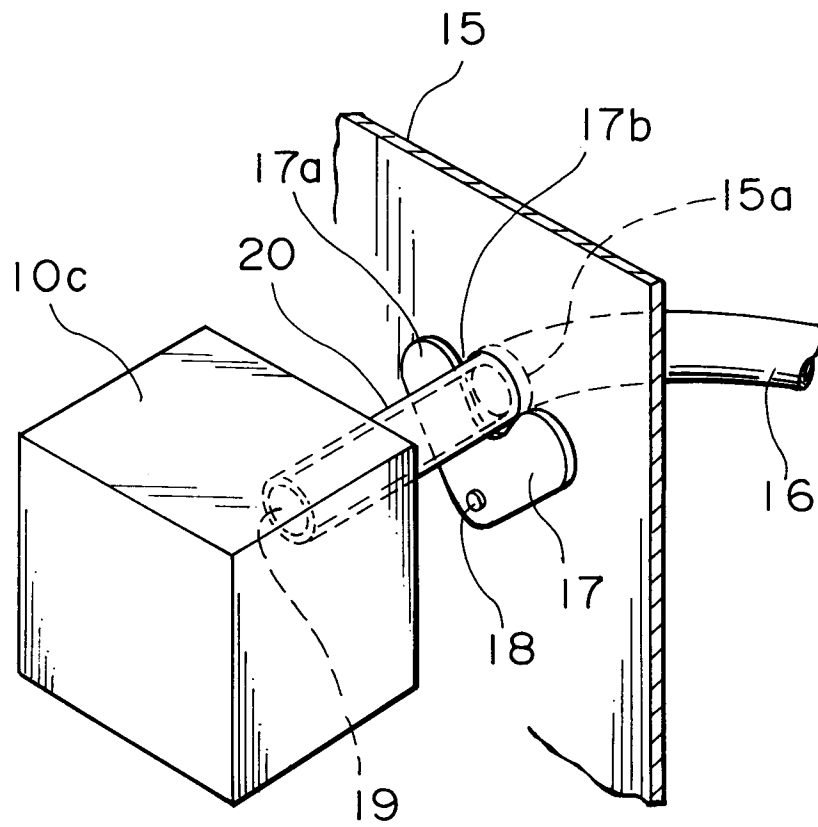


FIG. 6A

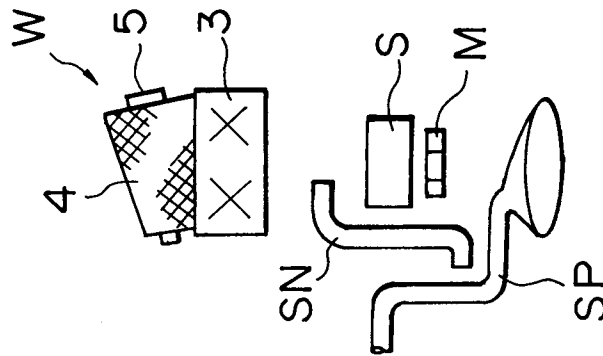


FIG. 6B

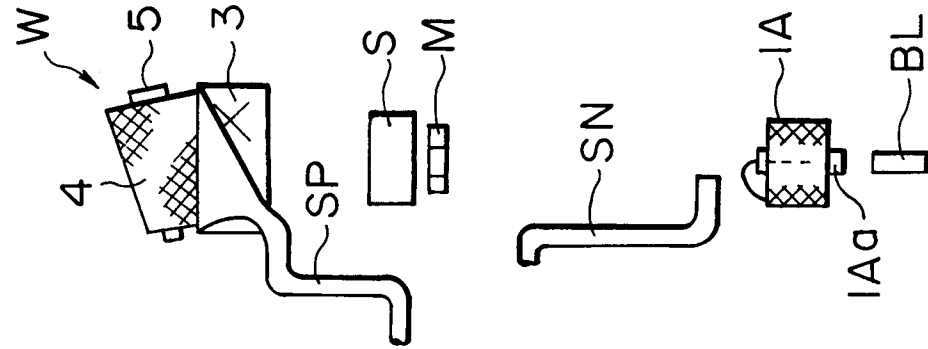


FIG. 6C

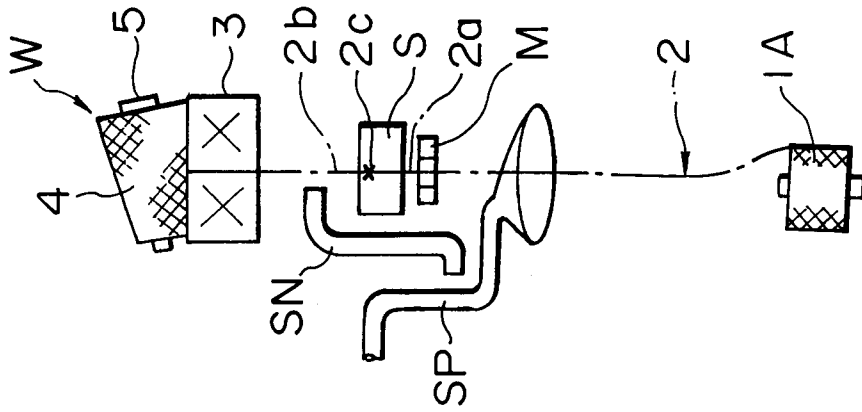


FIG. 6D

