



(11) **EP 2 028 148 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.02.2009 Bulletin 2009/09

(51) Int Cl.:
B65H 54/48 (2006.01) B65H 67/08 (2006.01)

(21) Application number: **08012254.2**

(22) Date of filing: **07.07.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(72) Inventor: **Tanigawa, Yasunobu**
Kyoto-shi
Kyoto (JP)

(74) Representative: **Liedl, Christine et al**
c/o Hansmann & Vogeser,
Albert-Rosshaupter-Strasse 65
81369 München (DE)

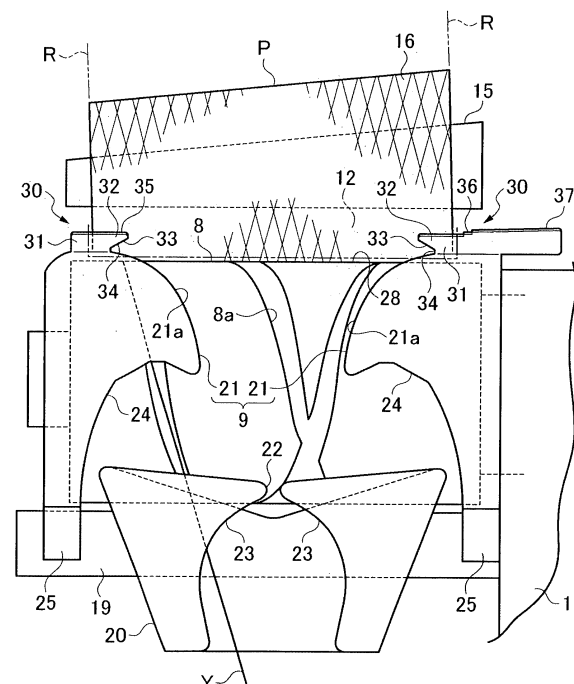
(30) Priority: **21.08.2007 JP 2007215303**

(71) Applicant: **Murata Machinery, Ltd.**
Minami-ku
Kyoto-shi
Kyoto 601-8326 (JP)

(54) **Automatic winder**

(57) An automatic winder includes a rotationally driven traverse drum 8 and a cover member 9 located so as to face a traverse area of the traverse drum 8. The cover member 9 has a yarn catching member 30 including a yarn regulating portion 32 which regulates a cut end of a yarn. The yarn regulating portion 32 is located on at least one side of the traverse area at a position where the yarn regulating portion 32 faces a contact portion 28 between a peripheral surface of the traverse drum 8 and a package P. The yarn regulating portion 32 is formed upright so as to extend away from the peripheral surface of the traverse drum 8. An upright projecting end of the yarn regulating portion 32 is located in proximity to the peripheral surface of the package (Fig. 1).

FIGURE 1



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an automatic winder which, when a yarn is broken, automatically splices and winds the yarn into a package shape.

Description of Related Art

[0002] In an automatic winder of this type, what is called yarn slip-off may occur; that is, when a yarn is broken, a cut end of the yarn sticks out from a side end of a package. The yarn slip-off makes it impossible to catch the cut end of the yarn through a suction mouth. This precludes a splicer from performing automatic yarn splicing. An automatic winder having a structure preventing such a yarn slip-off phenomenon is known from the Examined Japanese Patent Application Publication (Tokko-Hei) No. 2-36502. In the Examined Japanese Patent Application Publication (Tokko-Hei) No. 2-36502, the yarn slip-off preventing structure is composed of a rectangular guide plate located at one end or both ends of a traverse area of a traverse drum. The cut end of the yarn is caught by the guide plate to prevent the cut end of the yarn from sticking out from the side end of the package. The entire plate surface of the guide plate is curved along a drum surface of the traverse drum.

BRIEF SUMMARY OF THE INVENTION

[0003] According to the above-described yarn slip-off preventing structure, where the cut end of the yarn is wound along a guide groove or a drum surface of the traverse drum toward the package side, the cut end of the yarn can be reliably caught by the guide plate. However, a fixed tension always acts on the yarn being wound, so that when the yarn is broken, the cut end does not always behave in a fixed manner. Moreover, the yarn wound into the package after the breakage may float away from a surface of the package. This prevents the cut end of the yarn from being caught by the guide plate. For example, where the tension causes the cut end of the yarn to jump out or rotation of the package swings around the cut end of the yarn, the cut end of the yarn may climb onto a top surface of the guide plate. In this case, the guide plate fails to catch the cut end of the yarn and thus to inhibit the cut end from slipping onto the side end of the package or a side end of the traverse drum.

[0004] An object of the present invention is to provide an automatic winder which, when the yarn is broken, can reliably catch the cut end of the yarn and allow automatic yarn splicing to be smoothly performed after the breakage, thus effectively achieving package processing. An object of the present invention is to provide an automatic winder which, even if the cut end of the yarn jumps out,

can reliably catch the cut end of the broken yarn to prevent the yarn slip-off, thus achieving package processing more effectively than conventional devices.

[0005] An automatic winder according to the present invention comprises a rotationally driven traverse drum and a cover member located so as to cover at least a part of a traverse area defined in a direction parallel to a direction of a rotating shaft of the traverse drum. The cover member has a yarn catching member located therein and comprising a yarn regulating portion which regulates a cut end of a yarn. The yarn regulating portion is located on at least one side of the traverse area at a position where the yarn regulating portion faces a contact portion between a peripheral surface of the traverse drum and a package. The yarn regulating portion is formed upright so as to extend away from the peripheral surface of the traverse drum. Moreover, an upright projecting end of the yarn regulating portion is located in proximity to the peripheral surface of the package. The traverse area according to the present invention means a part of the peripheral surface of the traverse drum which corresponds to a side on which the yarn is operatively reciprocated in a lateral direction by the traverse drum.

[0006] The yarn catching member comprises a catching wall extending upright away from the peripheral surface of the traversing drum. The yarn regulating portion comprises a pawl-like portion formed at an inner side end of the catching wall which faces a center of the traverse drum in a width direction there. An inner corner portion is formed at a base end of the yarn regulating portion to hold the yarn.

[0007] A yarn winding start point of the yarn is wound and installed at one side end of a winding core comprising the package. A positioning structure transferring and guiding the continuous yarn to the winding start point is provided at the projecting end of the yarn catching member positioned on the winding start point side.

[0008] A yarn support portion preventing yarn slip-off during yarn splicing is formed continuously with an outer side end of the catching wall so as to project laterally out from the outer side end.

[0009] The positioning structure and the yarn support portion are integrated with the catching wall forming the yarn catching member.

[0010] In the present invention, the yarn catching member comprising the yarn regulating portion regulating the cut end of the yarn is located in the cover member located so as to cover at least a part of the traverse area. The yarn regulating portion is located on the at least one side of the traverse area at the position where the yarn regulating portion faces the contact portion between the peripheral surface of the traverse drum and the package. The yarn regulating portion is formed upright so as to extend away from the peripheral surface of the traverse drum. Furthermore, the upright projecting end of the yarn regulating portion is located in proximity to the peripheral surface of the package. Where the yarn regulating portion is thus formed upright, the yarn regulating portion and

the yarn catching member can receive and hold the yarn the cut end of which jumps onto a surface of the cover member and which then shifts toward a side end of the package. This makes it possible to reliably prevent the cut end of the yarn from slipping off. Therefore, with the automatic winder according to the present invention, when the yarn is broken, the yarn regulating member and the yarn catching member can reliably catch the cut end of the yarn and allow automatic yarn splicing to be smoothly performed after the yarn breakage, thus achieving package processing more effectively than conventional devices of this kind.

[0011] When the yarn catching member is formed by the catching wall extending upright away from the peripheral surface of the traverse drum, the pawl-like portion formed at the inner side end of the catching wall comprises the yarn regulating portion, and the inner corner portion is formed at the base end of the yarn regulating portion to hold the yarn, the yarn can be reliably held by the inner corner portion at the base end of the yarn regulating portion having received the yarn. That is, since the horizontally recessed inner corner portion holds the yarn, the yarn regulating portion can regulate the caught yarn gaining momentum to climb over the catching wall. This makes it possible to more reliably prevent the cut end from slipping off.

[0012] Where the positioning structure is provided at the projecting end of the yarn catching member positioned at the winding start point of the yarn, then when the winding start point of the yarn is wound around the winding core, the yarn can be transferred and guided by the positioning structure along a position suitable for the winding. Thus, the yarn winding operation can be reliably and quickly performed.

[0013] Where formed continuously with the outer side end of the catching wall so as to project laterally out from the outer side end, the yarn support portion can receive the yarn starting to climb over the catching wall to inhibit the yarn from climbing over the catching wall. In particular, during yarn splicing, the yarn can be reliably prevented from slipping onto the side end of the traverse drum.

[0014] Where the positioning structure and the yarn support portion are integrated with one of the catching walls, the configuration can be simplified compared with that in which the positioning structure and the yarn support portion are configured as members separated from the catching wall. This configuration also has the advantage of involving no deviation of the positional relationship between the positioning structure and the yarn support portion and the yarn regulating portion.

[0015] Other features, elements, processes, steps, characteristics and advantages of the present invention will become more apparent from the following detailed description of preferred embodiments of the present invention with reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

- 5 Figure 1 is a front view showing the structure of a traverse drum and a peripheral portion.
 Figure 2 is a front view of a winding unit.
 Figure 3 is a side view showing the structure of the traverse drum and the peripheral portion.
 10 Figure 4 is a side view showing the operation of devices during yarn splicing.
 Figure 5 is a perspective view of an essential part of an automatic winder showing how a yarn catching member catches a yarn.
 15 Figure 6 is a perspective view of an essential part of the automatic winder showing how the yarn has slipped off.
 Figure 7 is a perspective view of an essential part of the automatic winder showing how the slipped-off yarn is caught.
 20

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

- 25 **[0017]** An embodiment of an automatic winder according to the present invention will be described with reference to Figure 1 to Figure 5. The automatic winder is composed of a group of winding units arranged in a row. In Figure 2, the winding unit is constructed using, as a base, a main body frame 1 shaped like a vertically long box and fixed so as to extend upright. A balloon breaker 2, a tension device 3, a yarn splicing device 4, a slab catcher 5, and the like are arranged on one side of the main body frame 1 from the bottom to top of the frame
 30 in this order. A traverse drum 8, a cover member 9, a cradle 10, and the like are arranged at the top of the main body frame 1; the traverse drum 8 operatively displaces (traverses) a yarn Y within a given width range, the cover member 9 is located so as to face a traverse area defined in a direction parallel to a rotating shaft of the traverse drum 8, and the cradle 10 supports a package P such that the package P is rotatable. Besides these devices,
 35 a relay pipe 11 and a suction mouth 12 are provided in a middle portion of the column of the devices so as to be swingable in a vertical direction; the relay pipe 11 and the suction mouth 12 sucks, catches, and passes the cut yarn to the yarn splicing device 4.
 40

- [0018]** The package P is composed of a winding core 15 and a yarn winding layer 16 wound around the periphery of the winding core 15 (see Figure 1). The package P of this kind is classified into a cone type and a cheese type depending on the external shape of the yarn winding layer 16. The package P in the present embodiment is of the cone type. As shown in Figure 2, a spinning bobbin B is supported below the balloon breaker 2 in an upright position. While passing through the devices 2 to 5, the yarn Y delivered from the spinning bobbin B is checked for a yarn defect. When a yarn defect is found,
 45
 50
 55

the yarn is cut by a cutter provided in the slab catcher 5 and a cutter provided in the tension device 3. The defective portion is then sucked and removed.

[0019] As shown in Figure 1, the traverse drum 8 is composed of a drum having a traverse groove 8a formed in a peripheral surface. The traverse drum 8 is supported like a cantilever by the main body frame 1, described above, and is rotationally driven by a motor (not shown in the drawings). An assist table 19 is located below the traverse drum 8. A base end of the assist table 19 is fixed to the main body frame 19. A yarn end control member 20 is fixed to a front surface of the assist table 19 that guides the yarn Y having passed through the devices 2 to 5, toward the traverse drum 8. The cover member 9 is composed of a lateral pair of drum covers 21, 21 arranged along the peripheral surface of the traverse drum 8 to prevent the yarn Y from jumping out of the traverse groove 8a.

[0020] The yarn end control member 20 comprises a flat, hollow frame member formed using a metal plate material as a raw material and shaped like an inverted trapezoid. The yarn end control member 20 has a yarn passing port 22 and a guide edge 23 formed in a front wall portion; the guide edge 23 is formed continuously with the yarn passing port 22 so as to flare. The right and left drum covers 21 are made up of press moldings shaped like the inverse of the letter J as viewed from the front, using a metal plate material as a raw material. The entire cover is curved along the peripheral surface of the traverse drum 8. The right and left drum covers 21 are arranged at opposite side ends of the traverse drum 8 so that contour lines of the drum covers 21 are laterally symmetrical. A guide edge 24 formed on a lower half side of each of the opposite edges of the drum covers 21 to guide the yarn Y toward a central portion of the traverse area. The drum cover 21 has an installation seat 25 provided at a lower end thereof and shaped like the inverse of the letter L as viewed from the side. The installation seat 25 is fixed to the assist table 19.

[0021] In the automatic winder configured as described above, when a sensed yarn defect portion is cut by the cutter or all of the yarn Y has been delivered from the bobbin B, driving of the traverse drum 8 is stopped. However, the traverse drum 8 and the package P do not stop immediately owing to a kinetic inertia force but stops after rotating by a predetermined amount. The present invention is characterized in that the yarn catching member 30 and the yarn regulating portion 32, described below, are provided to prevent a side of the yarn Y which is wound into the package P from slipping off in the above-described situation.

[0022] As shown in Figure 1 and Figure 3, in the present embodiment, the yarn catching member 30 is located on both the right and left sides of the traverse area faced by a contact portion 28 between the traverse drum 8 and the package P so that the yarn Y can be prevented from slipping off on each of the opposite ends of the package P. Utilizing the drum cover 21, the yarn

catching member 30 is integrated with the drum cover 21. Specifically, the yarn catching member 30 is composed of a right catching wall 31 and a left catching wall 31 each of which is horizontally long and crosses a virtual plane (virtual surface) R passing through a corresponding side end surface of the package, the catching wall 31 extending upright away from the peripheral surface of the traverse drum 8. A yarn regulating portion 32 is formed at each of the opposite ends of the right and left catching walls 31, that is, the inner side end of each catching wall 31 which faces the center of the traverse drum 8 in a width direction thereof. Moreover, a guide edge 33 is formed at a lower edge of the yarn regulating portion 32 so as to incline upward from an upright base end toward the projecting end of the catching wall 31. An inner corner portion 34 is provided at a lower end of the guide edge 33 to hold the yarn Y. An upright projecting end 35, that is, the projecting end portion of the catching wall 31, is formed parallel to a central axis of the traverse drum 8 and as close to the peripheral surface of the package P as possible. This arrangement is to prevent the cut end of the yarn Y from slipping through between the projecting end of the catching wall 31 and the peripheral surface of the package P. In the present embodiment, the gap between the projecting end of the catching wall 31 and the peripheral surface of the package P is 2 mm.

[0023] The right and left yarn catching members 30 are the same in that both comprise the catching wall 31, the yarn regulating portion 32, the guide edge 33, and the inner corner portion 34 and in that the pawl-like portion is formed at the inner side end of the catching wall 31. However, the yarn catching member 30 located at that end of the traverse drum 8 which is adjacent to the main body frame 1 side (the yarn catching member located in the right of Figure 1) is different from the other yarn catching member 30 in that the former yarn catching member 30 integrally comprises a positioning structure 36 and a yarn support portion 37 in addition to the above-described members 31 to 33. That end of the winding core 15 constituting the package P which is closer to the main body frame 1 corresponds to a winding start point for the yarn Y. The step-like positioning structure 36 is formed at an upper edge of the catching wall 31 to transfer and guide the continuous yarn Y to the winding start point. Furthermore, the yarn support portion 37 is projectingly formed continuously with that end of the catching wall 31 which is adjacent to the main body frame 1, that is, the outer side end of the catching wall 31. Thus, the added yarn support portion 37 can receive the yarn Y floating away from the original yarn path during yarn splicing to prevent the yarn Y from slipping onto a support base end-side shaft portion of the traverse drum 8.

[0024] In the present embodiment, the right and left yarn catching members 30 are formed by folding the material integrally with the right and left drum covers 21, respectively. Mounting structures for the yarn catching members 30 are omitted.

[0025] Furthermore, the inner corner portion 34 formed

at the lower edge of the yarn regulating portion 32 is continuous with an externally projecting curved edge 21a formed on an upper half side of the drum cover 21. This allows the yarn Y having climbed onto an outer surface of the drum cover 21 to be guided to the inner corner portion 34, where the yarn Y is caught.

[0026] With the winding unit configured as described above, when the yarn Y is broken, the cut end of the yarn Y can be reliably caught by one of the right and left pairs each of the yarn regulating portion 32 and the yarn catching member 30.

[0027] Consequently, after the yarn breakage, automatic yarn splicing can be smoothly achieved. For example, even if the cut end of the yarn Y jumps onto the outer surface of the drum cover 21 and shifts toward the right or left side end of the package P, the cut end of the yarn Y is prevented from slipping onto the side end. This is because the catching wall 31, extending upright away from the traverse drum 8, is formed at the upper end portion of the drum cover 21, so that the cut end of the yarn Y shifting toward the side end is caught in the inner corner portion 34 of the yarn regulating portion 32 and thus inhibited from moving to the side end of the drum as shown in Figure 5. The conventional yarn catching member is curved along the surface of the traverse drum. Thus, when the cut end of the yarn Y jumps onto the outer surface of the drum cover 21, the yarn cannot be inhibited from shifting laterally.

[0028] Furthermore, with the winding unit according to the present invention, even if the cut end of the yarn Y climbs over the catching wall 31 and falls from the side end of the yarn winding layer 16, the yarn regulating portion 32 and the catching wall 31 catch a floating portion of the yarn located on the peripheral surface of the package P; the floating portion is close to the cut end of the yarn Y. The cut end of the yarn Y having slipped off can be returned to the surface of the package P. As previously described, where the yarn defect portion is cut by the cutter or all of the yarn Y has been delivered from the bobbin B, the driving of the traverse drum 8 is stopped, but the traverse drum 8 and the package P rotate by a predetermined amount owing to the kinetic inertia force. In this case, the tension generated when the yarn is broken is released from the cut end of the yarn Y, which is swung around by the inertia rotation of the package P, and thus jumps and shifts on the peripheral surface of the package P. At this time, as shown in Figure 6, the cut end of the shifting yarn Y and a floating portion 40 of the yarn Y are present on the peripheral surface of the package P; the floating portion 40 unwound like a loop results from slight unwinding of a part of the yarn which is close to the cut end. Thus, the cut end of the yarn Y runs uncontrollably while behaving violently. The cut end may climb over the catching wall 31 and fall from the side end of the yarn winding layer 16.

[0029] Even in the above-described situation, provided that the upright projecting end 35 of the yarn regulating portion 32 and the projecting end portion of the catching

wall 31 are arranged as close to the peripheral surface of the package P as possible, the upright projecting end 35 of the yarn regulating portion 32 can catch the floating portion 40 unwound like a loop as shown in Figure 7. Moreover, the caught floating portion 40 is continuous with the cut end of the yarn Y. By lifting the slipped-off yarn Y as the package P rotates, it is possible to return the cut end onto the peripheral surface of the package P as shown in Figure 5.

[0030] Since the yarn catching member 30 is formed upright so as to cross the virtual plane R passing through the side end surface of the package P, the yarn regulating portion 32 can hold the cut end of the yarn Y inside the opposite side ends of the package P. This means that the cut end of the yarn Y can be held within the range of the opening width of a suction port of the suction mouth 12 in the lateral direction. Consequently, the cut end of the yarn Y can be reliably sucked through the suction mouth 12.

[0031] With the yarn Y appropriately wound into the package P, the suction mouth 12 stands by at a position shown in Figure 2. When the yarn is broken, the suction mouth 12 is operatively turned from the lower standby position to an upper suction position shown by an alternate long and two short dashes line in Figure 4. The posture of the suction mouth 12 is thus switched such that the suction mouth 12 faces a triangular space sandwiched between a peripheral surface of the traverse drum 8 and the peripheral surface of the package P. In this condition, the traverse drum 8 is reversely driven to deliver the yarn Y wound into the package P. Furthermore, since the cut end of the yarn Y is held by one of the right and left yarn catching members 30, the cut end of the yarn Y can be reliably sucked and caught in the suction mouth 12. The suction mouth 12, having caught the cut end of the yarn Y, is operatively turned from the upper suction position to the lower standby position to pass the caught yarn Y to the yarn splicing device 4.

[0032] When the suction mouth 12 operates, the relay pipe 11 operates synchronously. The yarn splicing device 4 splices the yarn Y passed by the suction mouth 12 to the yarn Y passed by the relay pipe 11 so that the yarns Y are continuous with each other.

[0033] To perform yarn splicing, the traverse drum 8 is reversely driven to deliver a part of the yarn Y wound into the package P as previously described. Where the delivery position of the yarn Y is located at a larger diameter end of the package P, a middle portion of the yarn Y crosses the catching wall 31. The middle portion of the yarn Y may then shift toward and slip onto the side end. However, when formed continuously with the catching wall 31, the yarn support portion 37 can receive the yarn Y shifting toward the side end. The yarn Y can thus be prevented from slipping onto the side end of the traverse drum 8. The delivery position of the yarn Y moves toward the central portion of the package P as the yarn splicing operation progresses. Thus, the yarn Y can return to the regular yarn path.

[0034] The full package P is removed from the cradle 10, and a new winding core 15 is installed in the cradle 10. At this time, the winding start point of the yarn Y having traveled through the traverse groove 8a in the traverse drum 8 is inserted into an inner cylindrical surface of the winding core 15 and fixedly nipped by a chuck holding the winding core 15. In this condition, the middle portion of the yarn Y is applied to the upper step position of the positioning structure 36, and the winding core 15 is operatively rotated several times. Moreover, the middle portion of the yarn Y is applied to the lower step position of the positioning structure 36, and the winding core 15 is similarly operatively rotated several times. Thus, the yarn Y can be reliably wound outside that area of the winding core 15 around which the yarn winding layer 16 of the package P is wound. This winding structure provides the package P with a reduced unwinding resistance. Subsequently, the yarn Y is slid along the yarn regulating portion 32 and engaged with the traverse groove 8a in the traverse drum 8. An actuation switch is then turned on to start winding the yarn Y. At this time, since the positioning structure 36 is formed like steps, the yarn Y can be smoothly moved in the lateral direction. This configuration can easily deal with a winding core 15 with a different winding start point position. The start point of the yarn Y is wound laterally outside the yarn winding layer 16 and close to the side end of the winding core 15. Thus, the positioning structure 36 is positioned so as to stick laterally out from the virtual plane R (see Figure 1).

[0035] In the present embodiment, the yarn catching member 30 is integrated with the drum cover 21. However, this arrangement is not necessarily provided. The yarn catching member 30 can be configured as an independent component. For example, the yarn catching member 30 formed like a pin can be fixed to the drum cover 21. Furthermore, the yarn catching member 30 need not be a press molding. The yarn catching member 30 can be formed by folding a metal bar material. The yarn catching member 30 can be provided on at least one side of the traverse area, for example, only on a smaller diameter side of the package P. The cover member 9 need not be composed of the yarn end control member 20 and the drum cover 21. The yarn catching member 30 according to the present invention is located so as to cross the virtual surface R passing through the side end surface of the package P. However, the virtual surface R may be either the two-dimensional plane shown in the embodiment or a three-dimensional plane (curved surface).

[0036] While the present invention has been described with respect to preferred embodiments thereof, it will be apparent to those skilled in the art that the disclosed invention may be modified in numerous ways and may assume many embodiments other than those specifically set out and described above. Accordingly, it is intended by the appended claims to cover all modifications of the present invention that fall within the true spirit and scope of the invention.

Claims

1. An automatic winder **characterized by** comprising a rotationally driven traverse drum (8) and a cover member (9) located so as to cover at least a part of a traverse area defined in a direction parallel to a direction of a rotating shaft of the traverse drum (8), the cover member (9) having a yarn catching member (30) located therein and comprising a yarn regulating portion (32) which regulates a cut end of a yarn, the yarn regulating portion (32) being located on at least one side of the traverse area at a position where the yarn regulating portion (32) faces a contact portion (28) between a peripheral surface of the traverse drum (8) and a package (P), the yarn regulating portion (32) being formed upright so as to extend away from the peripheral surface of the traverse drum (8), an upright projecting end of the yarn regulating portion (32) being located in proximity to the peripheral surface of the package (P).
2. An automatic winder according to Claim 1, **characterized in that** the yarn catching member (30) comprises a catching wall (31) extending upright away from the peripheral surface of the traversing drum (8), the yarn regulating portion (32) comprises a pawl-like portion formed at an inner side end of the catching wall (31) which faces a center of the traverse drum (8) in a width direction thereof, and an inner corner portion (34) is formed at a base end of the yarn regulating portion (32) to hold the yarn.
3. An automatic winder according to Claim 1 or Claim 2, **characterized in that** a yarn winding start point of the yarn is wound and installed at one side end of a winding core (15) comprising the package (P), and a positioning structure (36) transferring and guiding the continuous yarn to the winding start point is provided at the projecting end of the yarn catching member (30) positioned on the winding start point side.
4. An automatic winder according to Claim 2 or Claim 3, **characterized in that** a yarn support portion (37) preventing yarn slip-off during yarn splicing is formed continuously with an outer side end of the catching wall (31) so as to project laterally out from the outer side end.
5. An automatic winder according to Claim 4, **characterized in that** the positioning structure (36) and the yarn support portion (37) are integrated with the catching wall (31) forming one of the yarn catching members (30).

FIGURE 1

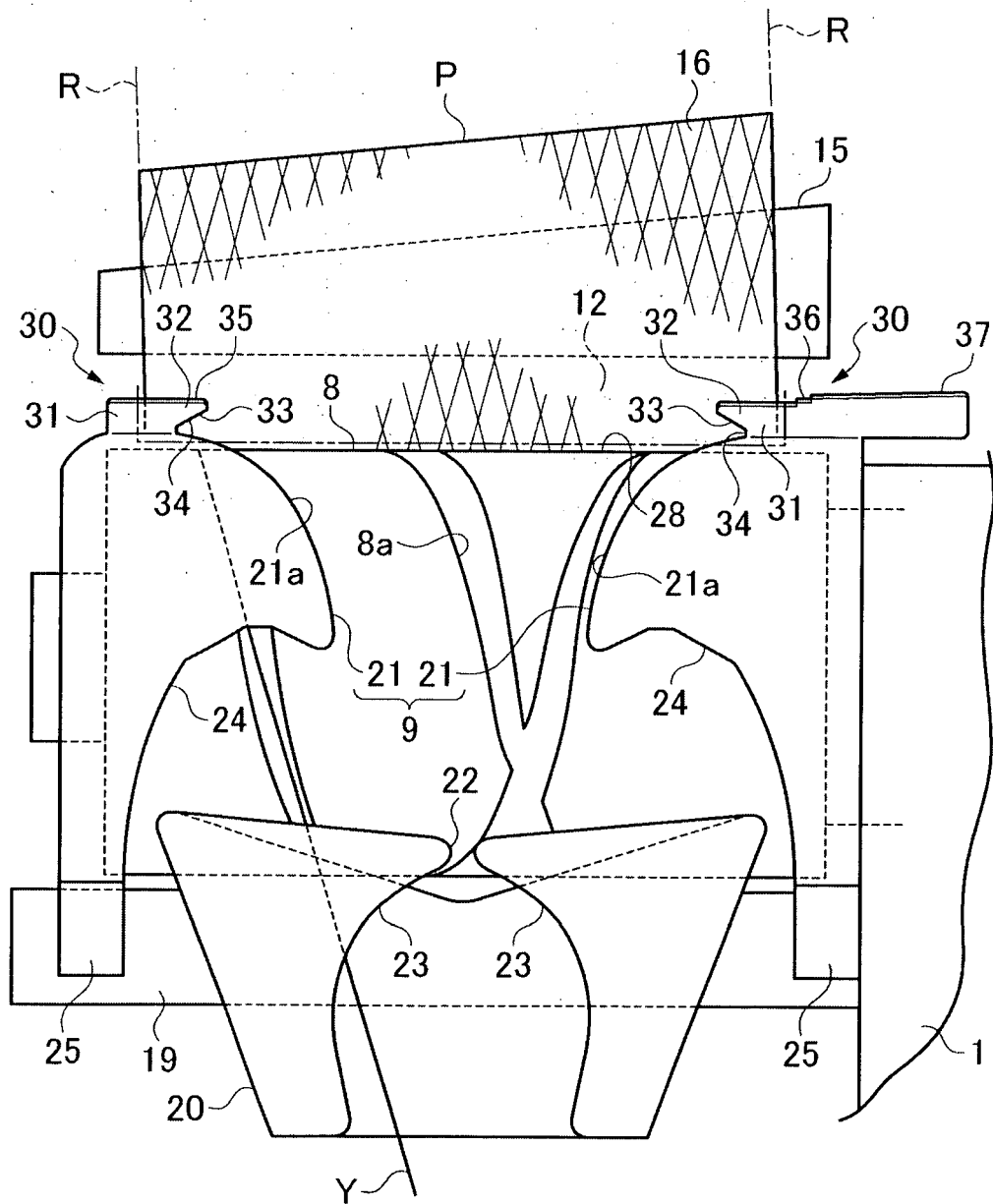


FIGURE 2

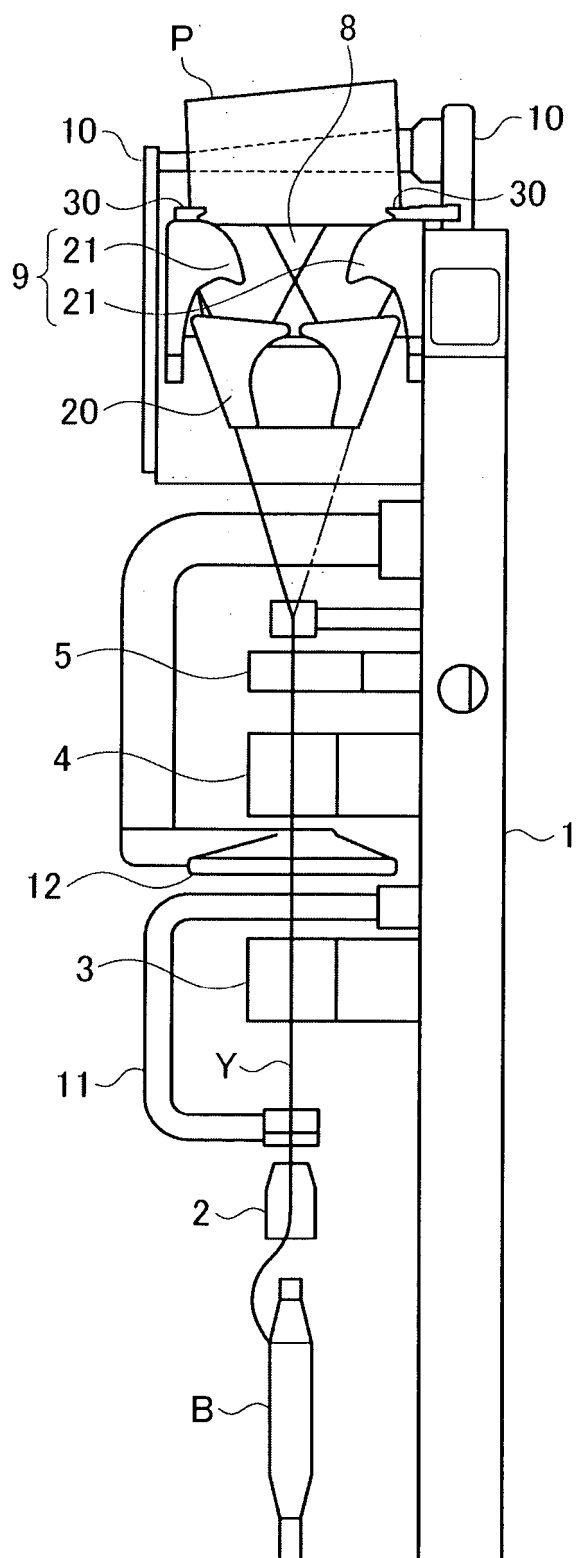


FIGURE 3

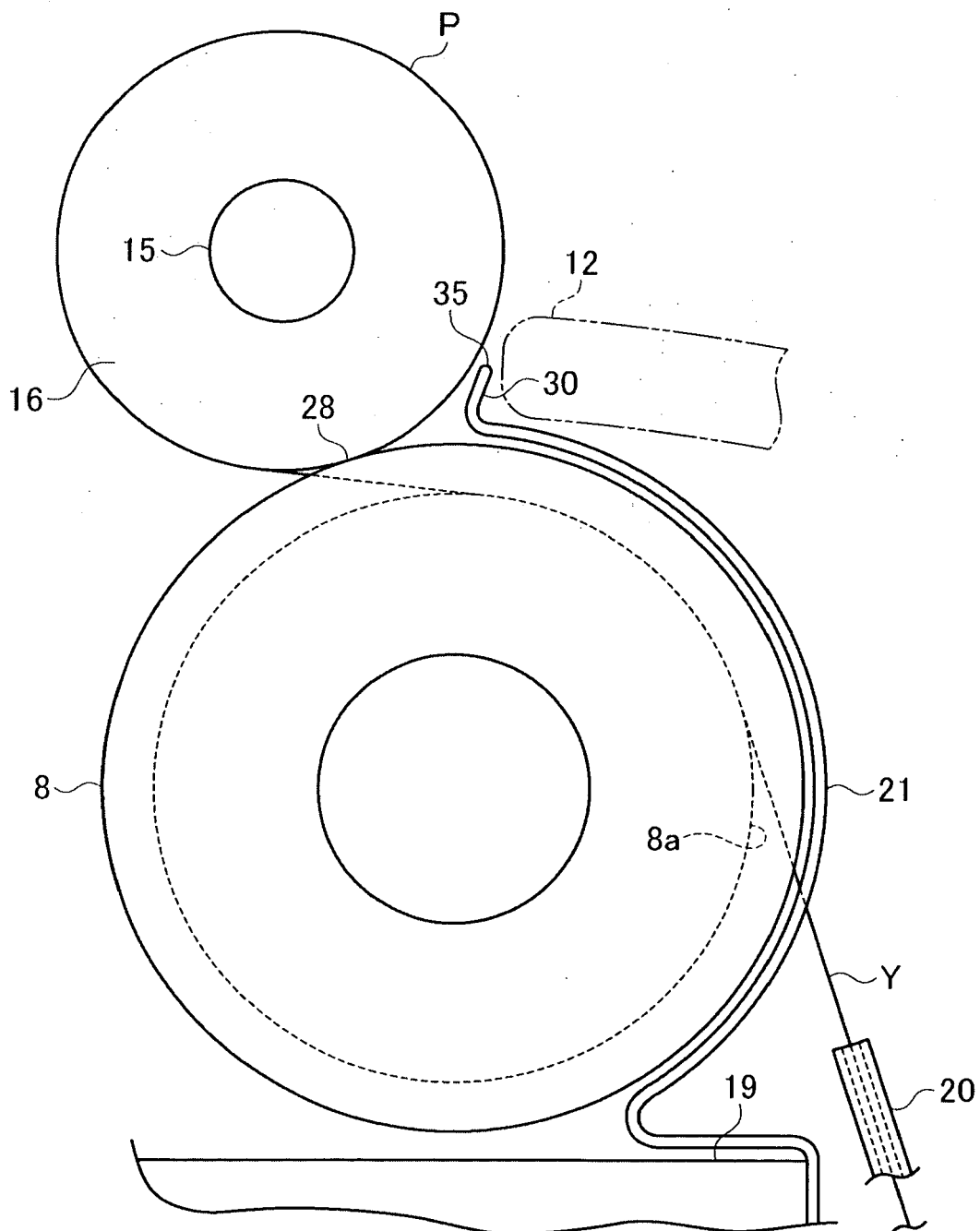


FIGURE 4

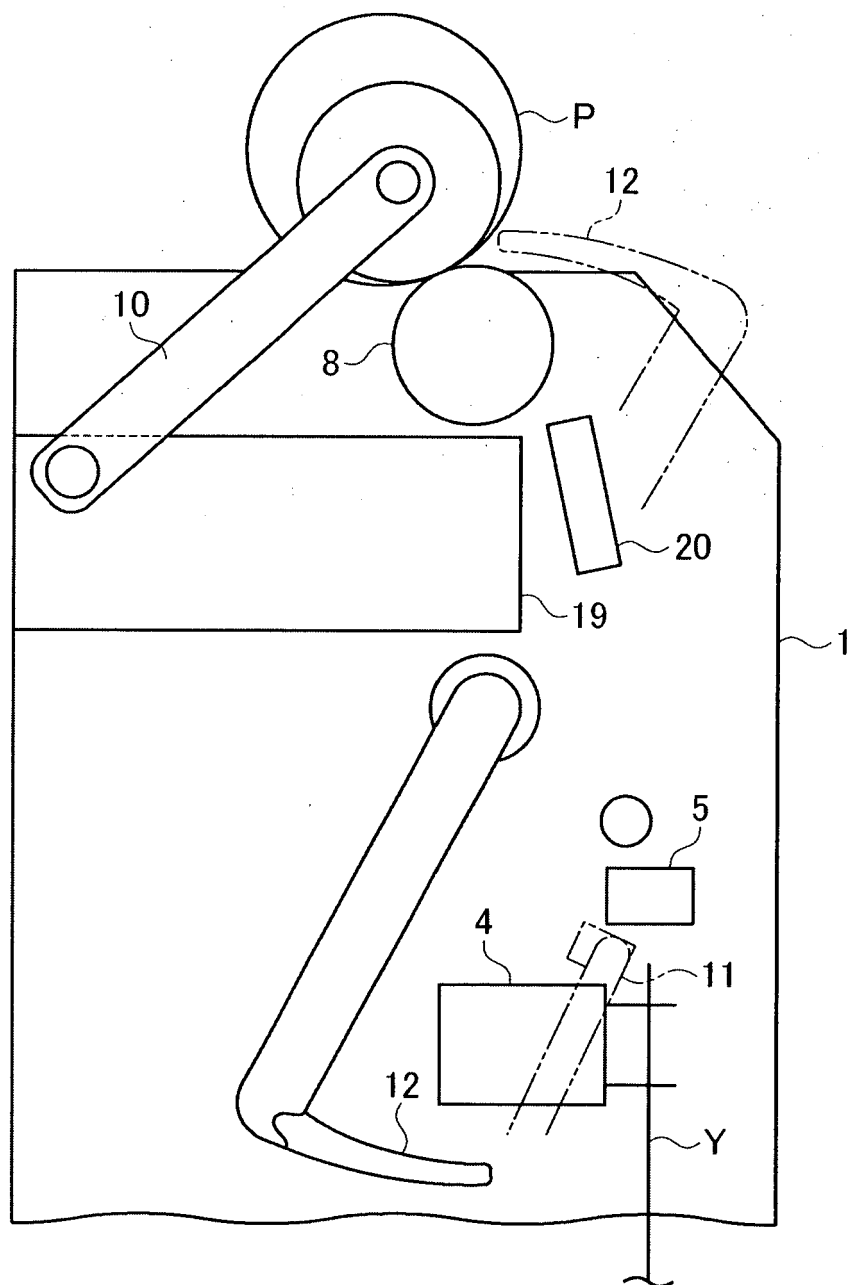


FIGURE 5

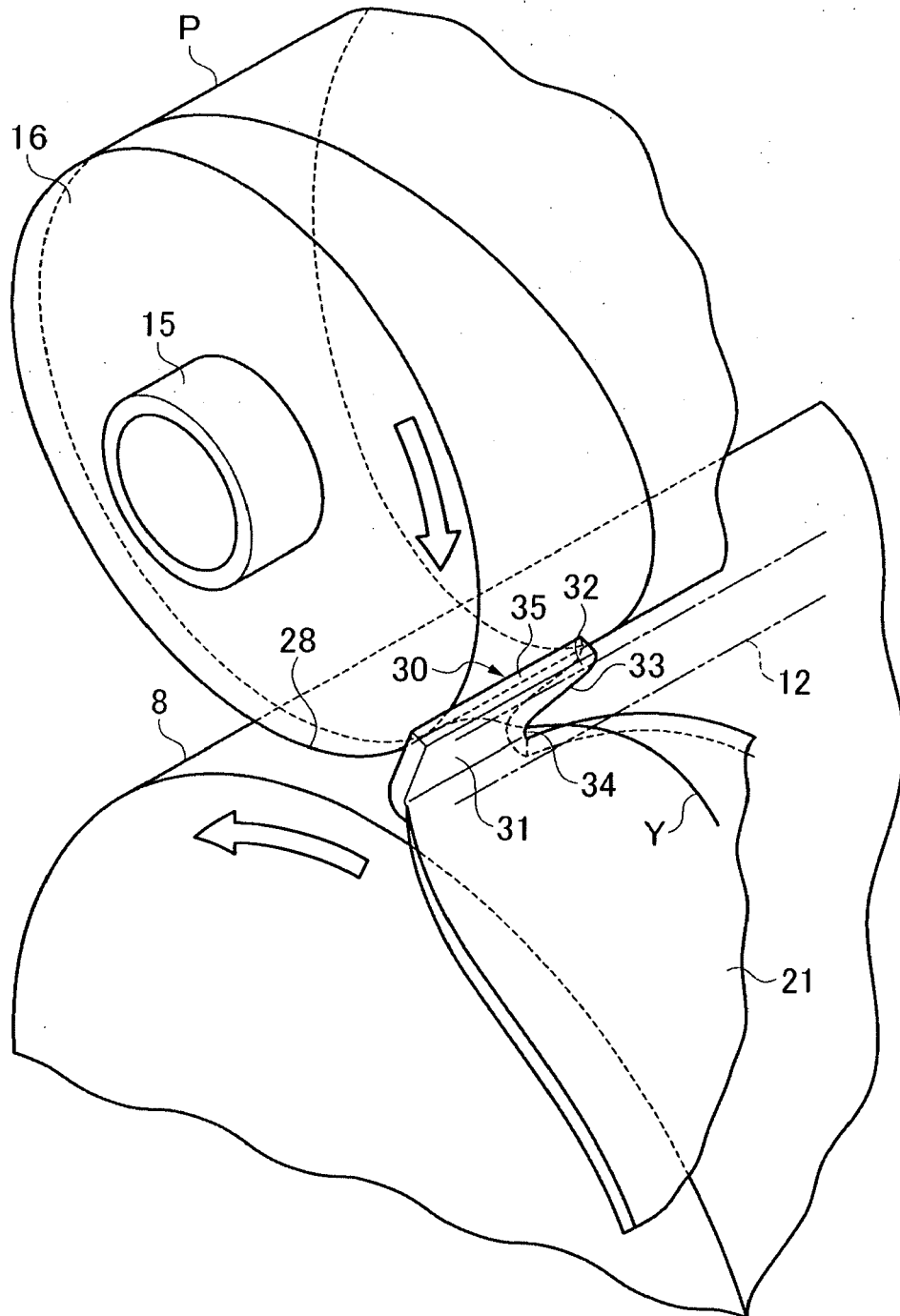


FIGURE 6

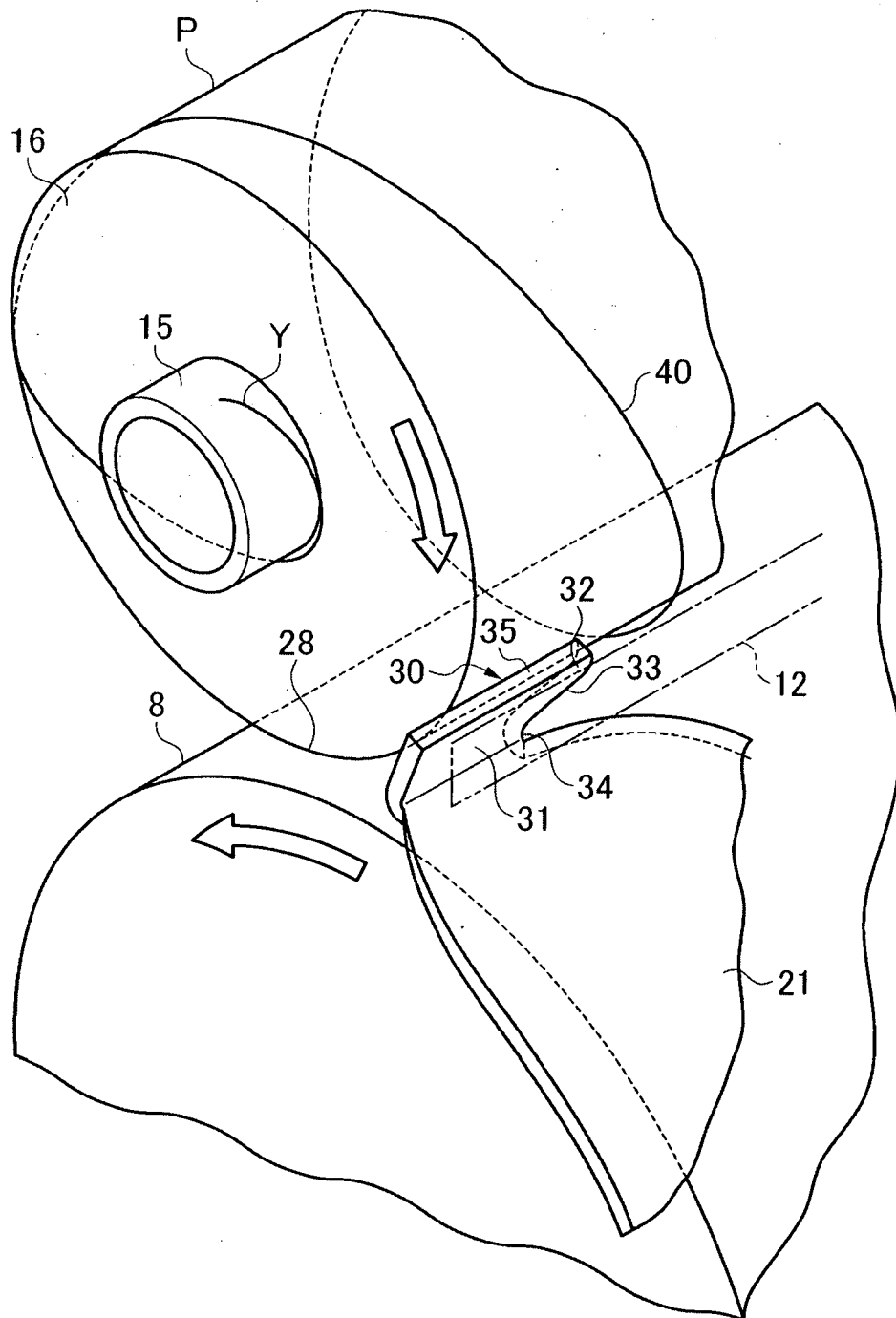
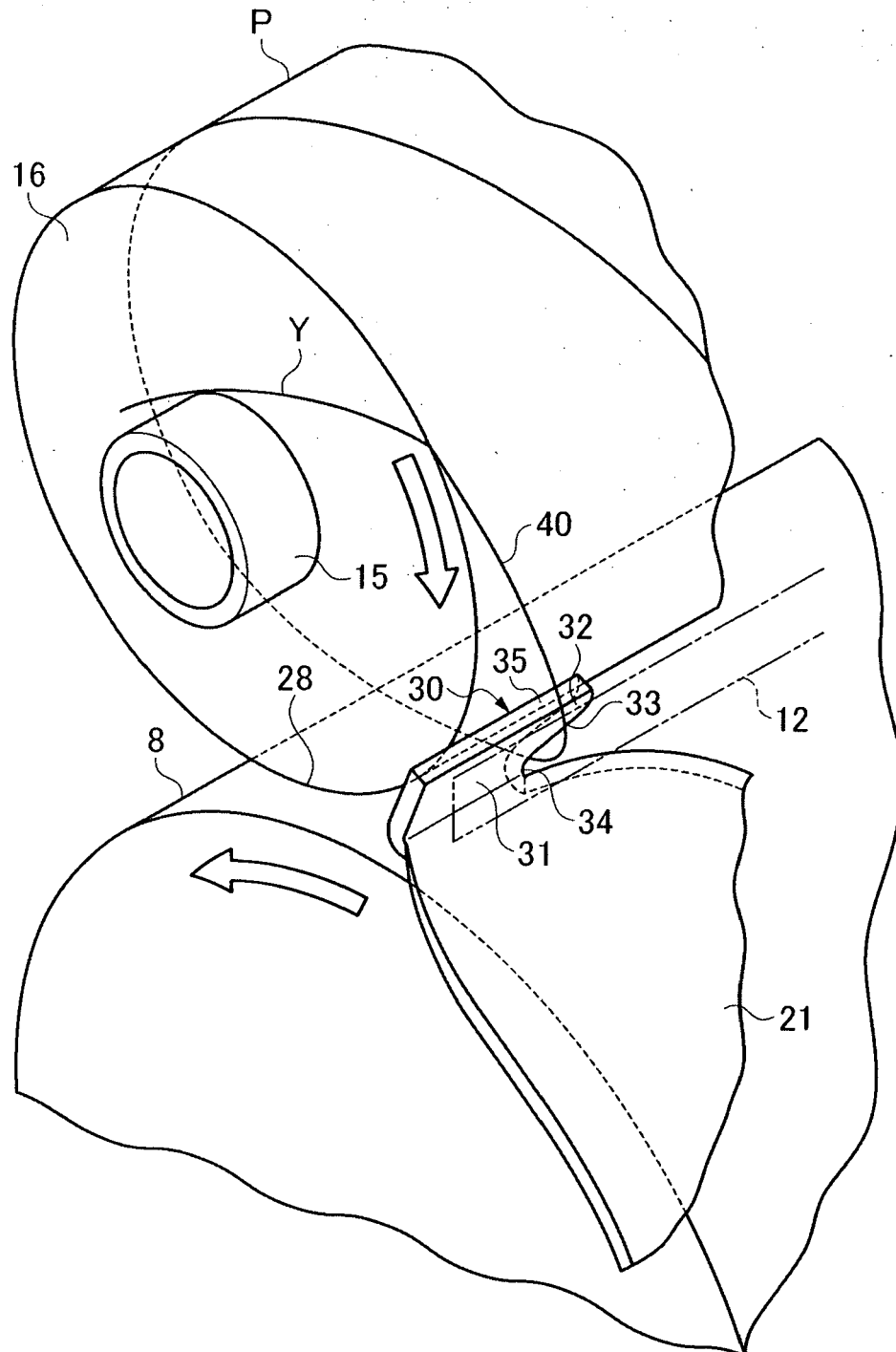


FIGURE 7



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2036502 A [0002] [0002]