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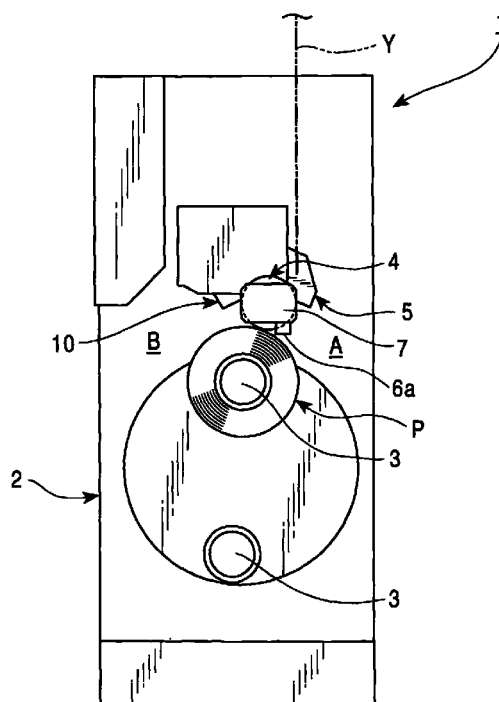
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(54) **Take-up winding device**

(57) To reliably detect yarn that is wound around a contact roller a take-up winding device for winding up a yarn Y that contacts a contact roller 4 onto a bobbin holder 3 is provided with a light projector 6a and a light receiver 6b that form part of an optical detecting device 6. A yarn detection light beam L passes through the vicinity of the outer circumferential surface 4a of the contact roller 4. The light projector 6a and the light receiver 6b are provided on a side A, which constitutes an open area. The light projector 6a and the light receiver 6b are located in areas where accompanying air flow generated due to the rotation of the contact roller passes through. A lap feeler 10 comprising a detecting member 11 that arranges its tip 11a close to the contact roller's outer circumferential surface 4a is provided.

FIG. 1



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Description

Field of the Invention

[0001] The present invention relates to improvements of a detecting device for detecting a yarn that is wound around a contact roller in a winding device for winding a filament yarn traveling from a spinning device while contacting the yarn to the contact roller.

Background of the Invention

[0002] The prior art includes a winding device which is designed such that when a yarn is wound around a contact roller due to a yarn breakage caused on the downstream side from the contact roller, the wound yarn is detected by a lap feeler used as a contact-type detecting device, and the yarn is cut by means of a cutter provided on the upstream side from the contact roller. The lap feeler is intended to approach the tip of a detecting plate that swings to the outer circumferential surface of the contact roller, and the lap feeler is designed to detect, through a switch or the like, swinging motions in the detecting plate caused when the yarn wound around the contact roller comes into contact with the tip of the detecting plate.

[0003] The lap feeler needs to provide a gap (for example, 0.5 to 1.0 mm) between the outer circumferential surface of the contact roller and the tip of the detecting plate to prevent the contact between the outer circumferential surface and the tip of the detecting plate. Therefore, some yarns wound around the contact roller pass through this gap and are not detected by the lap feeler. In particular, a yarn weakly wound around the contact roller with low tension or a floating yarn is not detected, and therefore easily passes through this gap.

[0004] When a condition in which the yarn is wound around the contact roller cannot be detected, the yarn weakly wound around the contact roller or the yarn floated from the contact roller is caught by a blade or a guide constituting the yarn guide section of a traverse device, and this frequently leads to accidents, such as the traverse device breakage, which require much work and considerable time for repair.

[0005] Therefore, synthetic fiber manufacturers treating a take-up winding device require certain detection of the yarn wound around the contact roller and the yarn certainly cut in the upstream from the contact roller.

[0006] In view of the foregoing, it is an object of the present invention to provide a take-up winding device capable of reliably detecting yarn that is wound around the contact roller so as to meet the above requirement.

Summary of the Invention

[0007] The means adopted by the present invention to reliably detect yarn that is wound around a contact roller is directed to a take-up winding device for winding up a

filament yarn contacting the contact roller onto a bobbin holder, and the winding device comprises paired optical detecting devices provided at the outside right and left of the contact roller, wherein a light beam for detecting yarn winding passes through the vicinity of the outer circumferential surface of the contact roller.

[0008] According to the present invention, when the yarn is wound around the contact roller, the light beam, for detecting the yarn wound around the contact roller, passing through the vicinity of the outer circumferential surface of the contact roller is interrupted by the yarn protruding from the outer circumferential surface of the rotating contact roller, thus making it possible to detect the yarn winding conditions by means of the optical detecting device.

[0009] The means adopted by the present invention to facilitate control, maintenance and inspection is directed to a take-up winding device provided with the optical detecting devices at directly visible locations.

[0010] According to the present invention, the optical detecting devices are easily visible, thus making it possible to control the distance between the outer circumferential surface of the contact roller and the light beam, and to facilitate maintenance and inspection.

[0011] The means adopted by the present invention to ensure stable detection even under a condition in which an oil agent such as an oil mist is generated from a bearing section of the contact roller is directed to a take-up winding device wherein the optical detecting devices are provided in locations where an air flow is generated due to the rotation of the contact roller. According to the present invention, the optical detecting devices are automatically cleaned by the accompanying air flow to prevent the adherence of oil mist or the like.

[0012] The means adopted by the present invention to ensure more certain detection is directed to a take-up winding device comprising a contact-type detecting device provided with a detecting member arranged in close proximity to the outer circumferential surface of the contact roller.

[0013] According to the present invention, the optical detecting device and the contact-type detecting device are provided. Therefore, what cannot be detected by one detecting device is detected by the other detecting device, and thus the functions of these detecting devices complement each other.

Brief Description of the Drawing

[0014]

Figure 1 shows a left side view of a take-up winding device showing a preferred embodiment of the winding device according to the present invention. Figure 2 shows a front view of the take-up winding device in the preferred embodiment. Figure 3 shows a side view showing enlarged essential parts of the preferred embodiment.

Detailed Description of the Preferred Embodiments

[0015] Hereinafter, a take-up winding device according to the present invention will be described with reference to the preferred embodiment shown in Figures 1 to 3. Figure 1 is a left side view of a take-up winding device, Figure 2 is a front view of the take-up winding device, and Figure 3 is a left side view showing enlarged essential parts of the winding device.

[0016] A take-up winding device 1 comprises a main frame 2, a bobbin holder 3 supported on the main frame in a cantilever manner, a contact roller 4 for pushing a filament yarn Y to the outer circumferential surface of a package P to be wound onto the bobbin holder 3, and a traverse device 5 provided on the upstream side of the contact roller 4. As an improvement to the take-up winding device 1, a light projector 6a and a light receiver 6b of an optical detecting device 6 are provided at the outside right and left of the contact roller 4, so that a yarn detection light beam L, for detecting the yarn wound around the contact roller such as a laser beam, emitted from the light projector 6a to the light receiver 6b passes through the vicinity of the outer circumferential surface 4a of the contact roller 4.

[0017] The light projector 6a and the light receiver 6b of the optical detecting device 6 are mounted on such as left and right bearing sections 7 and 8 of the contact roller 4. The optical detecting device 6 is provided with adjusting tools (not shown in the drawings) between the light projector 6a and the bearing section 7, and between the light receiver 6b and the bearing section 8 so that the distance between the outer circumference surface 4a of the contact roller 4 and the yarn detection light beam (yarn breakage detection light beam) L can be adjusted. The light projector 6a and the light receiver 6b of the optical detecting device 6 are disposed at a directly visible position, i.e., on a side where the yarn is introduced into the contact roller 4 that is an open area side A, and the light projector 6a and the light receiver 6b are easily visible from the open area side A so that the above adjustment, the maintenance and the inspection can be easily performed.

[0018] The light projector 6a and the light receiver 6b of the optical detecting device 6 are mounted so that the light projecting surface of the light projector 6a and the light receiving surface of the light receiver 6b are located in an area where accompanying air flow, which is generated on the outer circumferential surface 4a and the outer side surface 4b of the contact roller 4 during high speed rotation (for example, 18,000 to 40,000 rotations per minute), passes through, that is, the area on the introduction side of the yarn into the package P, the area near the contact point between the package P and the contact roller 4, and the area where a wedge section is formed by the package P and the contact roller 4. The oil mist generated from the bearings 7 and 8 passes through the light projector 6a and the light receiver 6b while the oil mist is guided by the accompanying air flow,

and is discharged to the outside of the contact roller 4. Thus, the oil mist never adheres to the light projecting surface of the light projector 6a and the light receiving surface of the light receiver 6b. Consequently, the optical detecting device 6 can ensure stable detection even when the oil mist is generated from the bearings 7 and 8 of the contact roller 4. Preferably, the optical detecting device 6 also has a function for detecting dirt on the light projecting surface and the light receiving surface.

[0019] In the take-up winding device 1, when the yarn Y is wound around the contact roller 4, a yarn Ya (see Figure 3) protruded from the outer circumferential surface 4a of the rotating contact roller 4 interrupts the yarn detection light beam L that passes horizontally (in a parallel with the rotary shaft of the contact roller 4) through the vicinity of the outer circumferential surface 4a of the contact roller 4, therefore, the state that the yarn is wound around the contact roller is detected by means of the optical detecting device 6. The take-up winding device 1 actuates a cutter (not shown in the drawings) provided on upstream side from the contact roller 4 based on a detection signal of the optical detecting device 6 and cuts the yarn Y, and prevents the yarn Y from winding around the outer circumferential surface 4a of the contact roller 4.

[0020] The above optical detecting device 6 is not limited to the embodiment just described, wherein the paired light projector 6a and light receiver 6b are disposed opposite to each other on both the right and left sides so as to send the yarn breakage detection light beam in one direction. Although it is not shown, it is possible to select the following reflection-type detecting device. In the detecting device of such type, the light projector 6a and the light receiver 6b are arranged at either the right or the left side of the contact roller 4, and a reflection mirror is arranged on the other side. Then, the yarn breakage detection light beam L generated from the light projector 6a and passing through the vicinity of the outer circumferential surface 4a of the contact roller 4 in horizontal direction is reflected by the mirror. The reflected yarn breakage detection light beam L passes through the vicinity of the outer circumferential surface 4a of the contact roller 4 again, and is received by the light receiver 6b. As in the previous embodiment, it is preferable to dispose the light projector 6a and the light receiver 6b opposite to each other in order to increase the precision of detection.

[0021] The take-up winding device 1 is provided with a lap feeler 10 on a device side B, opposite to the open area A where the light projector 6a and the light receiver 6b are provided. The lap feeler 10 is designed to arrange the tip 11a of a swinging movement detecting member 11 close to the outer circumferential surface 4a of the contact roller 4, and further the lap feeler 10 is designed to detect swinging motion in the detecting member 11 caused when the yarn wound around the contact roller 4 comes into contact with the tip 11a of the detecting member 11 by means of a detector 12 such as

a limit switch. The take-up winding device 1 is provided with the optical detecting device 6 and the mechanical detecting device that includes the lap feeler 10, thereby enabling speedy detection by means of the optical detecting device 6 and certain detection by means of the contact detecting device 10. The detection functions of these detecting devices complement each other, thereby making it possible to enable more certain detection.

[0022] The device provided by the present invention is capable of detecting the condition that the yarn is wound around the contact roller by means of a non-contact-type detecting device, thus making it possible to speedily detect the yarn wound around the contact roller. In addition, the yarn floated from the contact roller can also be detected. Further, the yarn detection light beam pass horizontally through the vicinity of the outer circumferential surface of the contact roller, thus making it possible to even detect whether yarn is wound anywhere on the contact roller.

[0023] The device provided by the present invention facilitates control of the distance between the outer circumferential surface of the contact roller and the yarn detection light beam, and also facilitates maintenance and inspection of the optical detecting device, thus enabling maintenance of an optimal condition and reliable detection by the optical detecting device.

[0024] The present invention can ensure stable detection because the optical detecting device is automatically cleaned by the accompanying air flow generated on the outer circumferential surface of the contact roller.

[0025] The present invention can ensure more certain detection by making detection functions of the optical and contact-type detecting devices complement each other.

Claims

1. A take-up winding device that winds up a yarn contacting a contact roller onto a bobbin holder, said winding device comprising paired optical detecting devices provided to the outside right and left of said contact roller such that yarn detection light beam passes through the vicinity of the outer circumferential surface of the contact roller.
2. A take-up winding device as in claim 1, characterized in that said optical detecting devices are provided at directly visible locations.
3. A take-up winding device as in claim 1 or claim 2, characterized in that said optical detecting devices are provided at locations where accompanying air flow generated by the rotation of said contact roller passes through.
4. A take-up winding device as in any one of claims 1, 2, and 3, characterized in that said winding device

is provided with a contact-type detecting device having a detecting member that arranges close to the outer circumferential surface of said contact roller.

FIG. 1

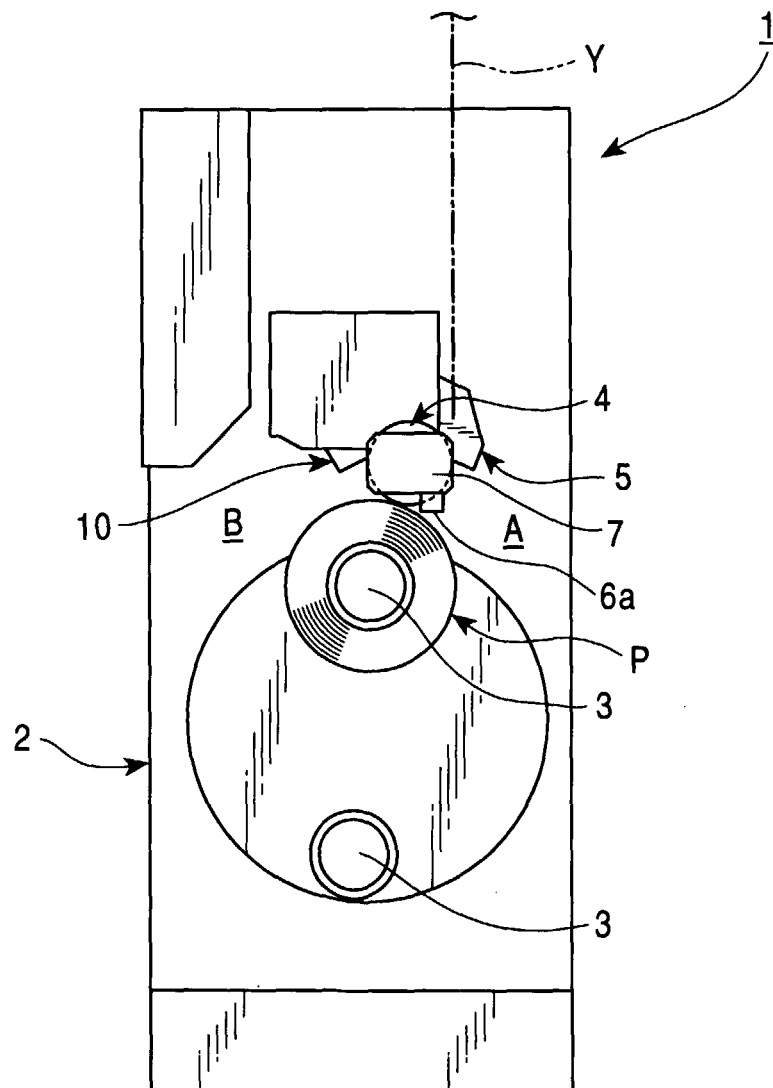


FIG. 2

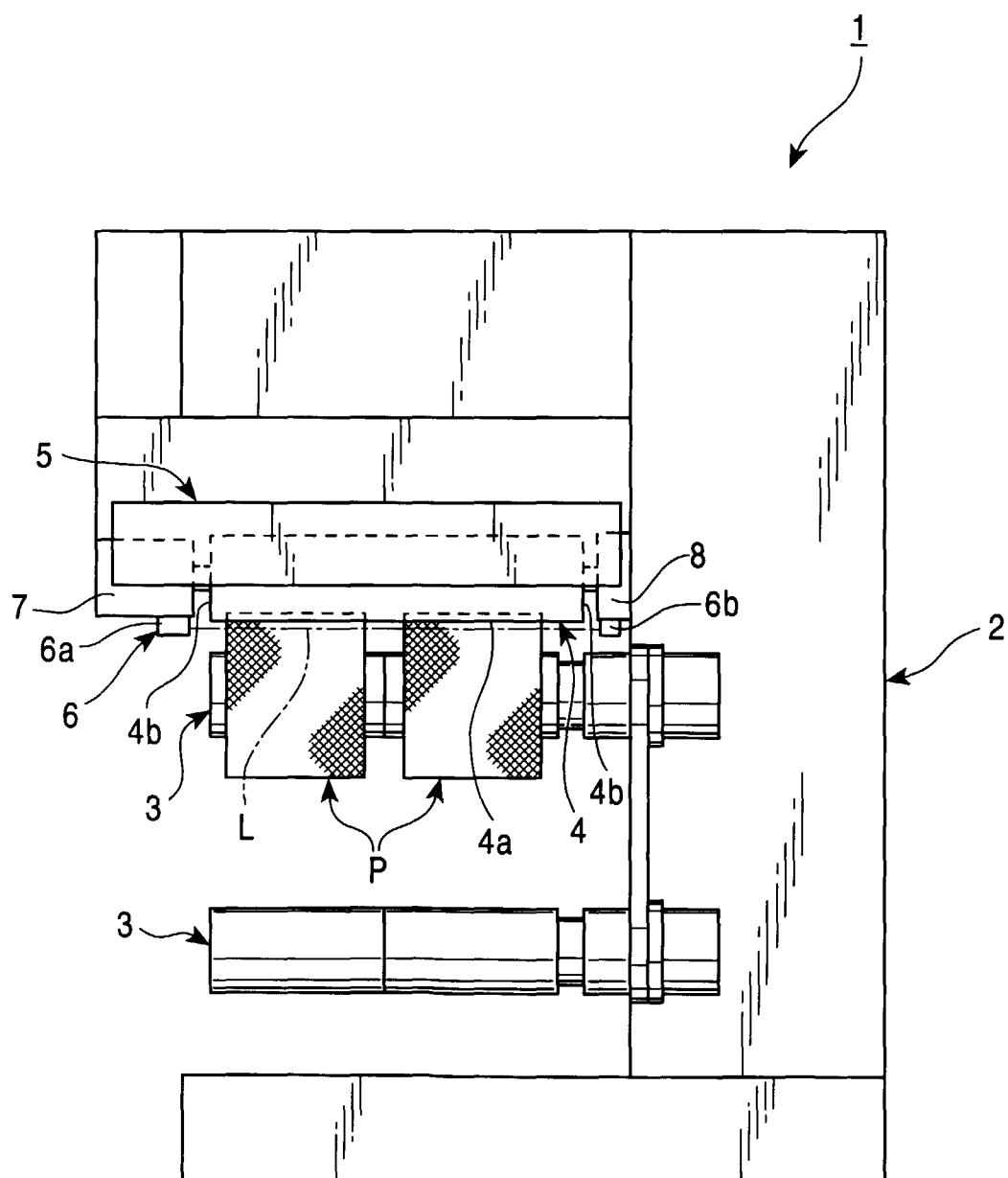


FIG. 3

