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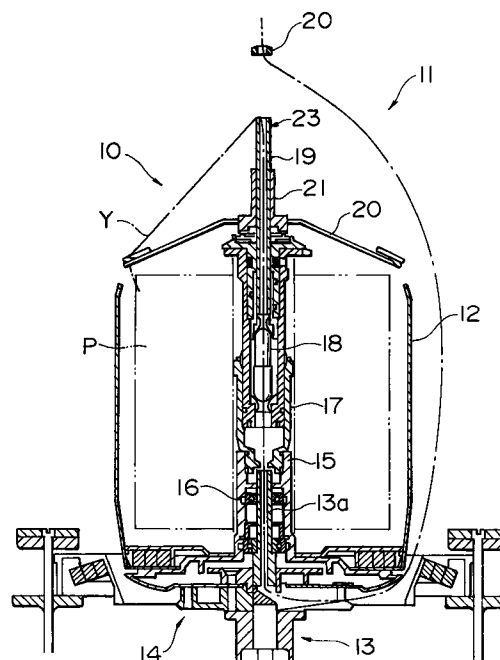
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(54) Twisting tenser

(57) To enable composite yarn, including thick elastic yarn, to be twisted.

The present invention provides a twisting tenser 10 of composite yarn Y, including elastic yarn y_2 , wherein the upper end 23 of a guide pipe 19 that engages the composite yarn Y has a rough surface 24. The rough surface 24 has a surface roughness of 4 μm to 15 μm R_{max} , and is finished by blasting or formed by biscuit-firing.

FIG. 3



Description

Field of the Invention

The present invention relates to a twisting tenser for composite yarn, including elastic yarn.

Background of the Invention

Twisting machines that actually twist yarn, such as double twisting machines, twist yarn by forcing it to be turned and folded back by means of the rotation of a spindle while applying an appropriate tension to the yarn using a tenser, followed by the winding of the yarn around a package. Yarn that is twisted includes not only cotton but also wool, acrylic, rayon, and polyester, which may be supplied as single yarn or combined into composite yarn, as appropriate.

If composite yarn of elastic yarn, such as polyurethane and cotton yarn, is supplied, the yarn is likely to be cut during the twisting process and, in particular, it is impossible to twist elastic yarn of a large yarn number (for example, 70 or 140 denier). This is because due to the fact that, although the upper end 2 of a tenser 1 that guides composite yarn Y to the lower part of the central shaft (a spindle shaft) is formed as a smooth surface (mirror surface finish), little resistance is provided to prevent damage to the composite yarn Y, and elastic yarn y_1 may entwine around and adhere to the surface due to its higher viscosity and be delayed, compared to cotton yarn y_2 , in entering a shaft hole at the upper end 2 while being released (turned), resulting in yarn branching, as shown in Figure 4. Thus, there is a need for a twisting tenser that can smoothly twist the composite yarn Y, including thick elastic yarn y_1 .

Summary of the Invention

To solve these problems, this invention provides a twisting tenser for composite yarn, including elastic yarn, wherein the upper end of the tenser that engages the composite yarn has a rough surface. The rough surface preferably has a surface roughness of $4\text{ }\mu\text{m}$ to $15\text{ }\mu\text{m}$ R_{max} . This configuration prevents elastic yarn from being delayed compared to the other yarn in entering the shaft hole at the upper end of the tenser, thereby preventing the yarn from branching or being cut. The rough surface is preferably finished by blasting (spraying solid metal or mineral or vegetable abrasive material onto a processed surface at a high speed to clean, polish, or harden the surface). Alternatively, the rough surface may be biscuit-fired. This configuration enables a desired rough surface to be formed easily and reliably.

Brief Description of the Drawing

Figure 1 is a side view of the integral part of an embodiment of a twisting tenser according to this inven-

tion.

Figure 2 is a schematic cross-sectional view of the upper end of a guide pipe in Figure 1.

Figure 3 is a side cross-sectional view of the overall double twisting machine in Figure 1.

Figure 4 is a side view showing a conventional twisting tenser.

Detailed Description of the preferred Embodiments

An embodiment of this invention is described with reference to the drawings.

Figures 1 and 3 show a twisting tenser 10 according to this invention provided in a double twisting machine 11. The double twisting machine 11 comprises a stationary cylinder 12 with a bottom for holding and accommodating a package P, spindle 13 provided on the bottom of the stationary cylinder 12, and a rotating disc 14 mounted on the spindle 13. The package P is formed as a package for composite yarn Y consisting of polyurethane yarn y_1 which is elastic and cotton yarn y_2 . A shaft portion 15 of an appropriate height is provided at the bottom of the stationary cylinder 12 and coaxially fitted on an upper shaft 13a of a spindle 13 via a bearing 16, and a holder 17 is mounted at the upper end of the shaft portion to detachably hold the tenser 10 for twisting yarn.

A long narrow guide pipe 19 is provided at the upper part of the tenser 10 to guide the composite yarn Y to an urging member 18. A flyer 20 extending in the radial direction is provided on the guide pipe 19 via a holder section 21 in such a way as to rotate around the shaft. Thus, the composite yarn Y from the package P is guided by the flyer 20, which is turned in response to the release of the yarn Y, to enter the shaft hole 19a in the guide pipe 19, and is then guided to the upper shaft 13a of the spindle 13 while being subjected to an appropriate tension by the urging member 18 below the shaft hole 19a. The composite yarn Y, which has entered the shaft hole 19a in the spindle 13, exits the rotating disc 14 in the radial outward direction and is turned to form a balloon outside the stationary cylinder 12. It then passes through a guide member 22 provided above the twisting tenser 10 and is then wound by a take-up device (not shown in the drawings) into a predetermined shape.

The upper end 23 of the guide pipe 19 that constitutes the upper end of the tenser has a rough surface 24 with an appropriate surface roughness.

According to this embodiment, that section of the upper end 23 of the stainless-steel-plated guide pipe 19 that engages the composite yarn Y and is of a specified length (for example, 3 mm to 5 mm from the upper end) is finished by blasting from its outer circumferential surface through its round upper-end surface to its inner circumferential surface. Concretely, in case the guide pipe 19 has an outer diameter of about 8 mm and an inner diameter about 5 mm, its outer circumferential surface

within about 5 mm from the top and its inner circumferential surface within 3 mm from the top are finished by blasting. Shots formed by crushing, such as a chilled cast-iron ball, are used as blast particles instead of sand. Unlike a rough surface obtained through the use of sandpaper, the rough surface 24 formed in this manner has a cross section in the form of relatively smooth and round waves (continuous circular arc), as shown schematically in Figure 2. Thus, there is little frictional resistance between this surface and the composite yarn Y, the surface is not damaged.

In addition, the surface roughness is greater than that of the conventional spectral finish. According to the JIS B 0601 "Surface Roughness" standard and classification, a normal spectral finish shall have a surface roughness of 3S or less, so the rough surface 24 has a surface roughness exceeding this value. That is, according to the standard, the interval (maximum height R_{max}) between the two lines (25, 26) that sandwich a target portion and are parallel to the average height of the sampled portion having a reference length L (for example, 1 mm) is, for example, 4.0 μm or more, preferably 5.0 μm to 15.0 μm . When the guide pipe 19 is molded and the design standard of the finish surface of the upper end 23 must be indicated, for example, 12.5 S to 25 S (lower limit: 5 μm R_{max} ; upper limit: 25 μm R_{max}), for example, is specified.

To mold the rough surface 24, a biscuit-fired ceramic guide (not shown in the drawings) having a shaft hole may be placed on the upper end of a metallic guide pipe without the use of shot blasting. That is, although in the normal manufacture of ceramics a base is formed into a hard product through two firing processes, the ceramic guide fitted on the upper end is obtained by firing the base into a porous state without final hardening. The surface of this biscuit is also a relatively smooth rough surface 24, as shown in Figure 2.

Since the upper end 23 of the guide pipe 19 is formed as a rough surface 24, for example, even polyurethane yarn y_1 that is thick and viscous and has a fineness of 70 to 140 denier is subjected to reduced frictional resistance when entering the shaft hole 19a, and is prevented from adhering to the upper end 23 and being significantly delayed compared to the cotton yarn y_2 . Consequently, the yarn is prevented from branching or being cut (see Figure 1). That is, this invention enables the composite yarn Y, including elastic yarn y_1 , to be actually twisted in order to extend the applicable range of the yarn type and thickness, thereby improving the general versatility of the twisting tensor 10 and the double twisting machine 11.

In addition, this invention has a very simple configuration and can be easily applied to existing twisting machines and twisting tensors without an excessive increase in manufacturing costs. The shot-blasted or biscuit-fired ceramic guide can be used to easily and reliably form a preferable rough surface 24 with an appropriate surface roughness.

This invention is not limited to the combination of polyurethane yarn y_1 and cotton yarn y_2 as the composite yarn Y, but is useful for composite yarn Y that includes different elastic yarn.

In addition, the twisting tensor according to this invention is not limited to the double twisting machine 11 of the type shown in Figure 3, but is widely applicable to similar twisting apparatuses.

In summary, the inventions prevent the elastic yarn from being delayed compared to the other yarn in entering the shaft hole at the upper end of the tensor, thereby preventing the yarn from branching or being cut and enabling the composite yarn, including the elastic yarn, to be twisted.

The inventions enable the upper end of the tensor to be easily and reliably formed with the desired rough surface.

In combination with the rough surface, the invention provides a smaller contact area than a structure with a separate cap mounted on the guide pipe, thereby preventing the branching or cutting of the yarn caused by its adherence.

This invention can be easily applied to existing twisting machine or twisting tensor.

Claims

1. A twisting tensor comprising a long, narrow guide pipe that guides composite yarn, including elastic yarn, to an urging member, and a flyer that extends in the radial direction and can be rotated above the guide pipe around its axis, the tensor being coaxially fitted onto an upper shaft of a spindle, wherein the upper end of the tensor that engages said composite yarn has a rough surface.
2. A twisting tensor according to claim 1 wherein said rough surface has a surface roughness of 4 to 15 μm R_{max} .
3. A twisting tensor according to claim 1 or 2 wherein said rough surface is finished by blasting.
4. A twisting tensor according to claim 1 or 2 wherein said rough surface is formed by biscuit firing.
5. A twisting tensor according to any one of claims 1 to 3 wherein said rough surface is formed by processing the upper end of said guide pipe.

FIG. 1

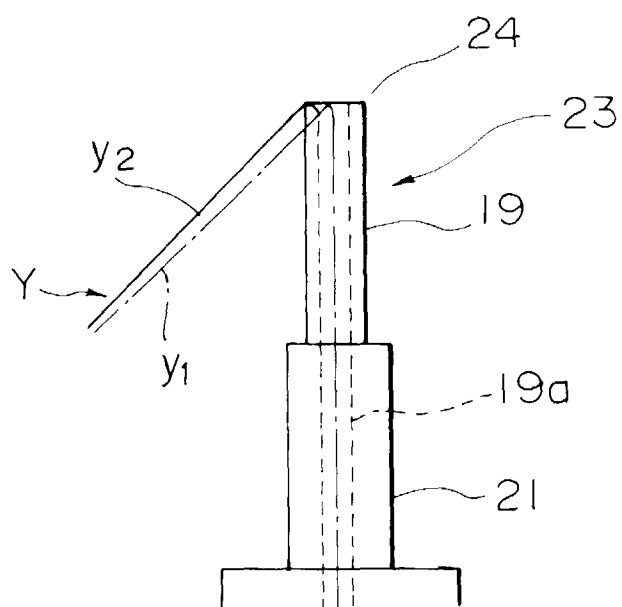


FIG. 2

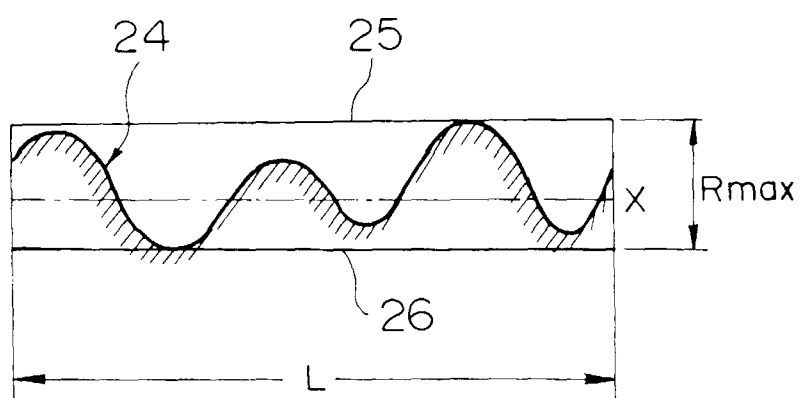


FIG. 3

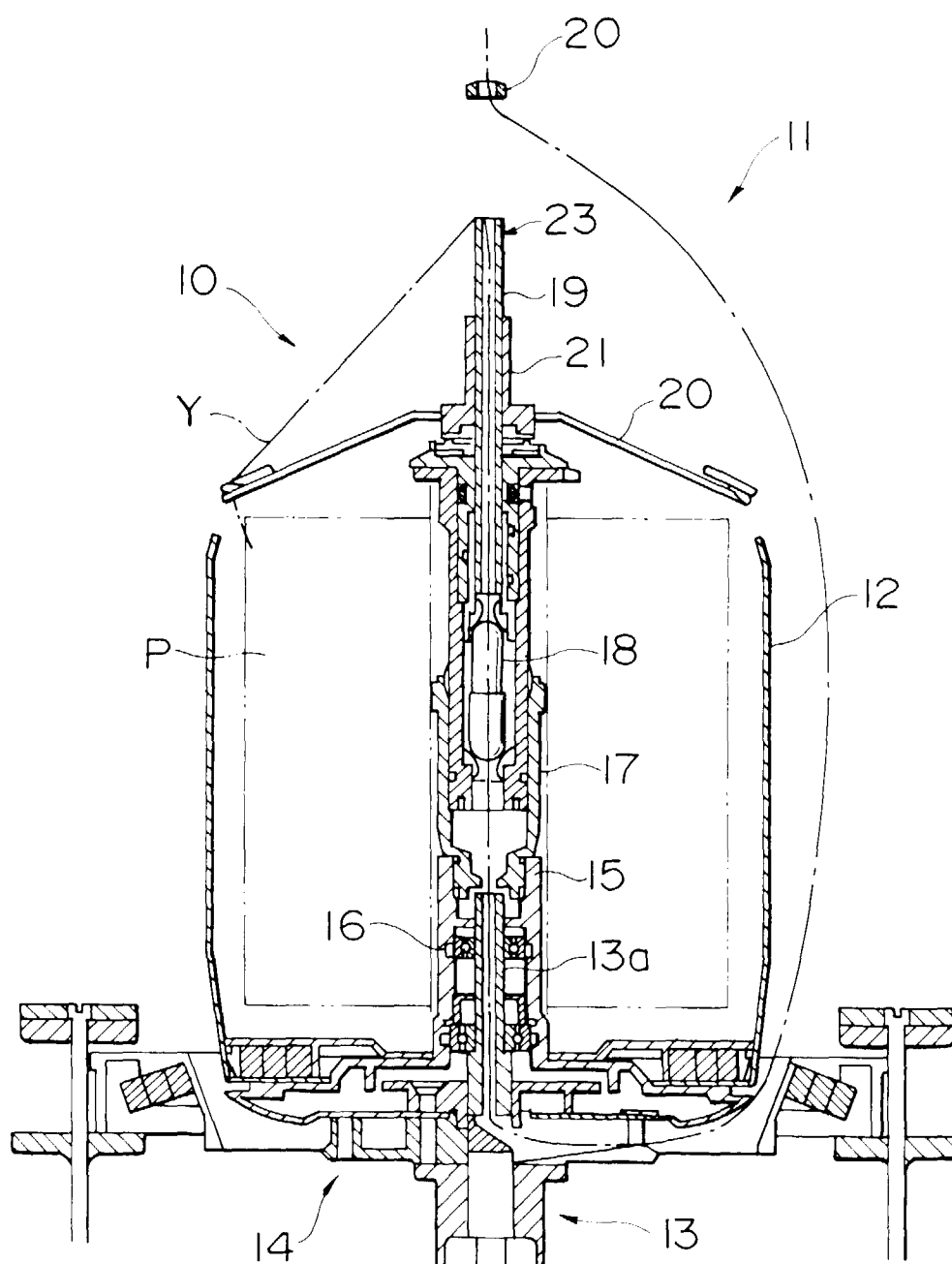


FIG. 4

