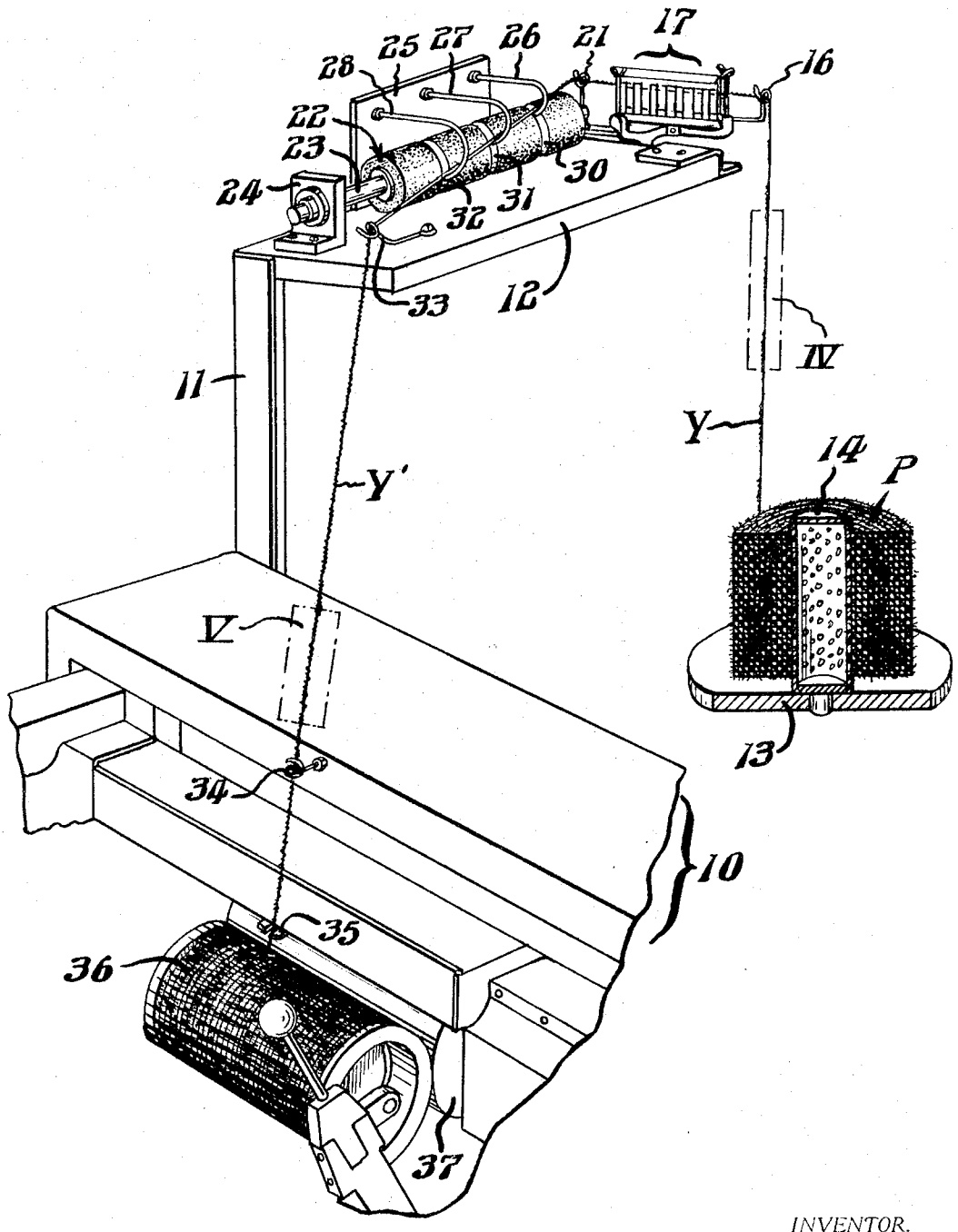
Jan. 10, 1967 W. K. WYATT 3,296,786

APPARATUS FOR PROCESSING A TWISTED BULKY YARN

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FIG. 1



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FIG. 2.

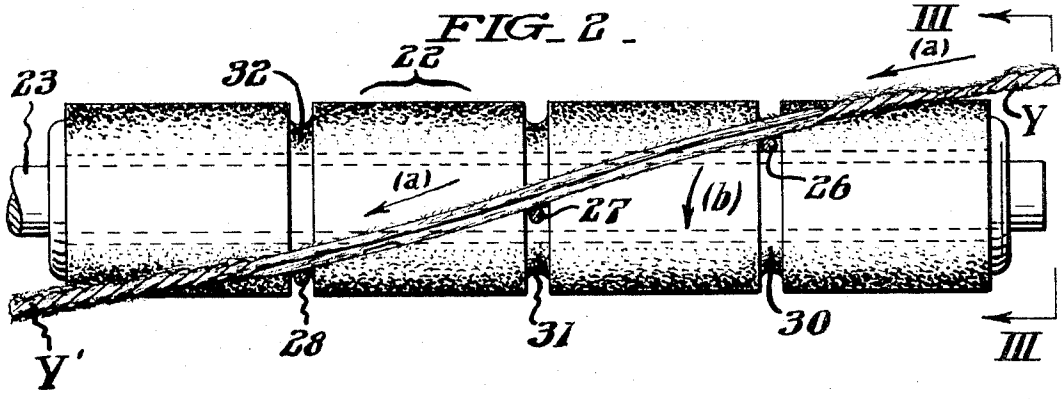


FIG. 3.

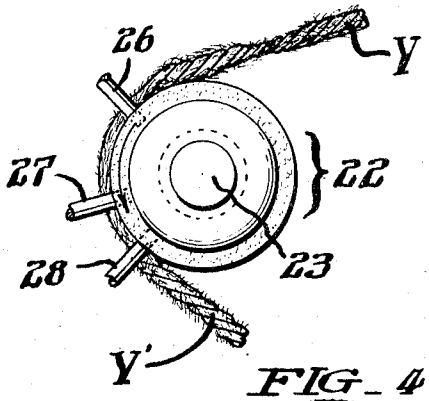
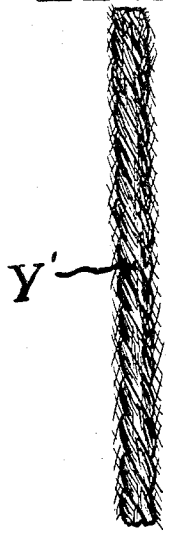


FIG. 4.



FIG. 5.



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APPARATUS FOR PROCESSING A TWISTED BULKY YARN

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4 Claims. (Cl. 57—34)

This invention relates to an apparatus for processing a twisted bulky yarn, and particularly concerns the treatment of twisted bulky yarn which has been heat-set on a package, and which when taken off the package exhibits considerable non-uniformity along its length. One particular form of non-uniformity consists of occasional flattened portions at spaced apart locations along the length of the yarn, which flattened portions have resulted from the heat-treating of the yarn on the package. This type of non-uniformity is produced particularly on bulky yarns which are package dyed, since the heat of the dyeing solution also creates the shrinkage that produces the bulky characteristics of the yarn.

It is an object of this invention to provide a fast, reliable and low cost apparatus and method for eliminating the non-uniform conditions referred to above. Other objects and advantages of this invention will further become apparent hereinafter and in the drawings of which:

FIG. 1 represents a view in perspective showing one specific form of apparatus constructed in accordance with this invention;

FIG. 2 is a plan view, greatly enlarged, of the roll portion of the apparatus appearing in FIG. 1;

FIG. 3 is a sectional view taken as indicated by the lines and arrows III—III which appear in FIG. 2; and

FIGS. 4 and 5 are enlarged views of the yarns shown in the rectangular areas IV and V which appear in FIG. 1.

It will be appreciated that the following description refers to the particular form of the invention as shown in the drawings, and does not limit the scope of the invention as defined in the appended claims.

Turning now to the drawings and particularly to FIG. 1, the apparatus there shown includes a frame **10** having a standard **11** to which is attached to platform **12**. Another platform **13** is mounted in a stationary manner either to the frame **10** or to any other conventient support, and carries a package P carried on a cylinder **14**.

For convenience of illustration, FIG. 1 shows the package P on a cylinder **14** which is of the type usually employed for package dyeing of yarn, wherein the yarn on the cylinder **14** is immersed in a hot dye solution and the dye solution is drawn through the yarn and through the perforations in the cylinder **14**. As stated, such package dyeing has a bulking effect, when the yarn is composed of different fibers some of which shrink more than others under the influence of heat, and all fibers are subjected to the heat of the dye solution. Thus, the dye solution in a package dyeing operation of bulky "Orlon" for example, performs not only a dyeing function but also a bulking function because it causes some fibers to shrink more than others.

As shown, the yarn Y from the package P has the irregularities referred to hereinabove, which irregularities appear in particular detail in FIG. 4.

As shown in FIG. 1, the yarn Y is conducted through a guide **16**, a tension **17**, and through another guide **21**. It is then conducted in accordance with this invention tangentially to and over the surface of a cylindrical roll **22** which is rotatably mounted on a shaft **23** carried on a support **24**. Roll **22** may be a driven roll or an idler roll.

The roll **22** is composed of a material which has capacity to engage frictionally the surface of the yarn Y. Although the cylinder surface may be composed of a variety of materials, rubber is an excellent example.

The number **25** in FIG. 1 designates a vertically extending plate attached to the platform **12**, from which guide fingers **26**, **27** and **28** extend. The roll **22** is provided with a plurality of longitudinally spaced circumferentially arranged grooves **30**, **31**, **32** accommodating respectively the ends of the guide fingers **26**, **27**, **28**.

The ends of the guide fingers **26**, **27**, **28** are arranged substantially in line with one another, such line extending at an angle to the axis of the cylinder **22**. Also, in line with said ends of said fingers **26**, **27**, **28** is another guide **33**. Accordingly, it will be appreciated that the yarn Y passing from the guide **21** is arranged in an arcuate path along the surface of the cylinder **22**, along a substantially helical line defined by the ends of the fingers **26**, **27**, **28** and by the guide **33**, such line being arranged at an angle to the axis of the cylinder **22**.

The number **34** designates another guide, through which the treated yarn Y′ is passed. The yarn Y′, which is a uniform yarn and which is shown in detail in FIG. 5 of the drawings, is then passed through another guide **35** onto a cylinder **36**, or a standard cone or other package.

It will be understood that power may be applied to the cylinders of the winder **36** in the usual manner, but the winding of the yarn may be actuated by drive cylinders **37** or the like, all as is well known to those versed in the art.

FIG. 2 shows the angularly arranged path of the yarn in more particular detail. It also shows the detwisting of the yarn that is achieved by the roll **22**, in accordance with one preferred form of the invention. Actually, such detwisting may be complete or partial. It will be understood that the yarn Y is traveling in the direction indicated by the arrow (*a*) in FIG. 2 and that if it is initially twisted in the direction there shown (clockwise) the roll **22** is rotated as indicated by the arrow (*b*) in FIG. 2. Promptly after the yarn leaves the roll **22**, it reforms into a twisted condition but the new twists and the yarn cross-section are uniform throughout the length of the yarn Y′.

Preferably, according to this invention, the yarn is wrapped at least through an angle of 90° around the roll **22**, such angle being measured in a plane perpendicular to the axis of the roll **22**. For example, as shown in FIG. 3, the angle between the yarn Y which enters and the yarn Y′ which leaves the roll **22** is somewhat more than 90°. Angles much greater than 90°, up to and including even a few complete wraps, will be found entirely satisfactory in certain instances. However, when the angle of wrap is less than substantially 90°, the effectiveness of this invention in detwisting and retwisting the yarn is materially reduced. In some cases, however, even with an angle of wrap as low as 45°, beneficial results can be obtained.

It will be appreciated, accordingly, that there has been provided an apparatus which is particularly useful for processing twisted bulky yarn which deviates from uniformity at spaced apart locations along its length, however such deviations may have been created. While the effectiveness of this invention is particularly apparent in connection with package dyed high-bulk yarns such as high-bulk Orlon or the like, it is applicable to many other yarns as well.

While the roll **22** has been shown divided into four sections separated by circumferentially arranged slots, it will be appreciated that the slots are provided primarily for guidance purposes and that they may be either dispensed with or supplied in greater or lesser numbers, in individual cases. Also, the nature of the surface of the roll **22** can

be varied considerably, depending in part upon the nature of the material of the yarn and of the degree of non-uniformity that is involved.

It will be understood that while specific forms of the invention have been referred to herein, various other forms may be utilized, that equivalent elements may be substituted for those specifically shown or described, that features may be used independently of other features, and that parts may be reversed, all without departing from the spirit and scope of the invention as defined in the appended claims.

The following is claimed:

1. Apparatus for processing a twisted bulky yarn which deviates from uniformity at spaced-apart locations along its length, comprising means for tensioning said yarn, means for continuously moving said tensioned yarn in a predetermined path, means providing an external rotatable arcuate surface arranged to rotate about a predetermined axis which extends at an angle to said yarn path, means continuously urging said yarn against said arcuate surface in a manner to engage frictionally and at least partially to detwist said yarn, and means for continuously moving said yarn away from said arcuate surface thereby retwisting said yarn.

2. The apparatus defined in claim **1** wherein the means providing the arcuate surface is a cylinder.

3. The apparatus defined in claim **2** wherein said cylinder includes a circumferential groove, and wherein a guide means is provided which extends into said groove and is engaged by the yarn.

4. The apparatus defined in claim **1** wherein said yarn is urged against said arcuate surface with at least about a 90° wrap.

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