

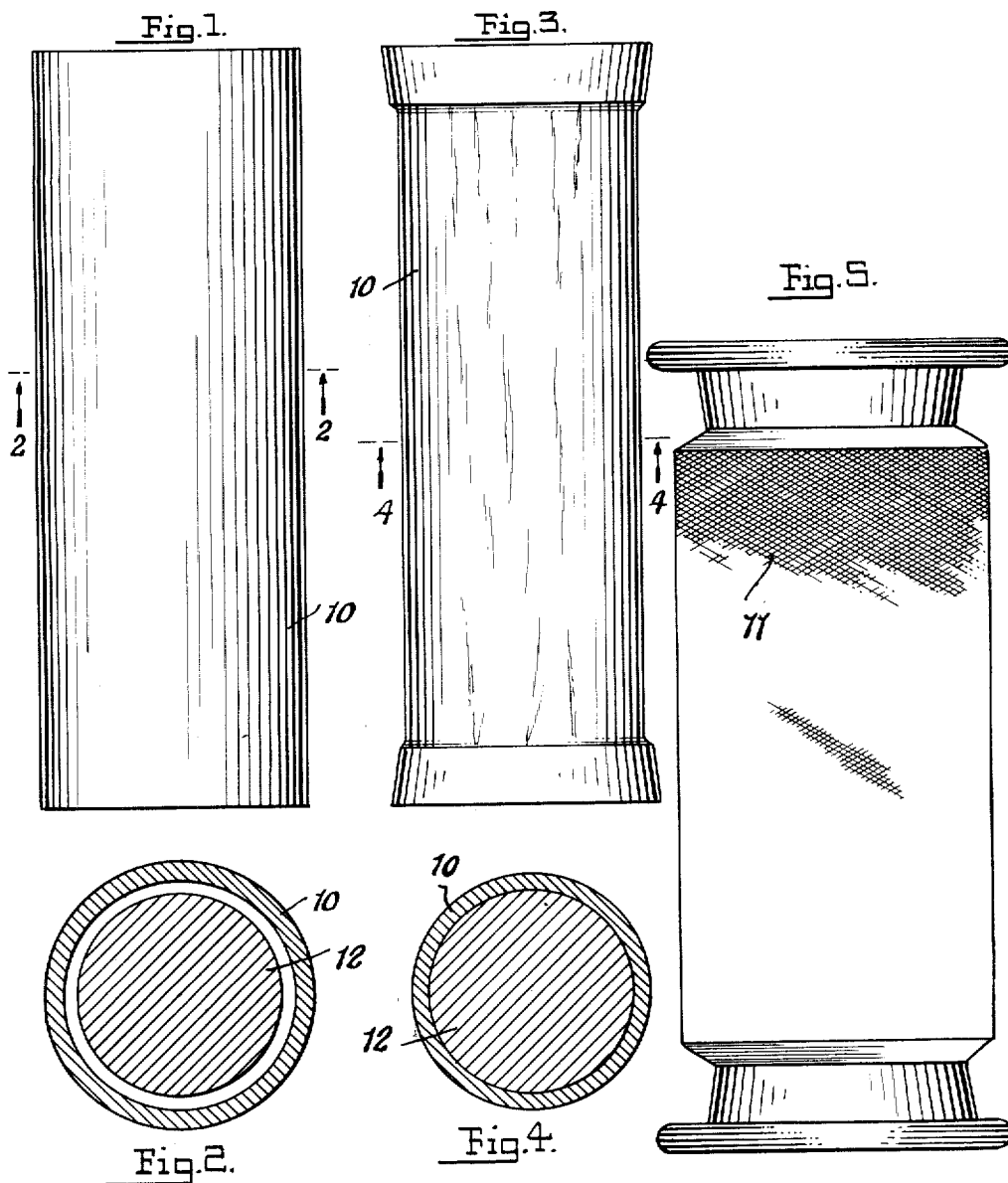
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METHOD OF TREATING SYNTHETIC YARN

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METHOD OF TREATING SYNTHETIC YARN

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The present invention is directed to a method of treating synthetic fibers such as nylon, for the purpose of producing a crimp or crepe therein.

Several methods for twisting nylon yarn into crepe have heretofore been known. Experience has shown that as a result of such methods there was a tendency to produce a flat, smooth crepe fabric which tended during the treatment of dyeing and finishing to form creases and cracks in the fabric due to the lack of creping power. It has also been proposed to produce a crepe effect of nylon either by combining it with other synthetic or natural fibers or by combining a plurality of nylon threads which had been differently treated to form a single thread before the twisting operation was conducted. None of these methods produce a natural crepe such as is known in the trade and which has a sufficient shrinking power to produce a well pronounced creping pebble in the subsequent treatments, such as boiloff and dyeing.

It is among the objects of the present invention to provide a process for crimping nylon yarn which has a sufficient uniformity of creping power and an evenness of crepe fabrics of a rich pebble.

It is also among the objects of the present invention to provide a process of treating nylon so as to obtain a uniformity of creping power and an evenness of crepe pebble.

It is further among the objects of the present invention to provide a process which is simple, is capable of producing uniform effects and which does not require the use of highly skilled operators.

In the accompanying drawing, Fig. 1 is an elevational view of the tube upon which the twisted and set yarn is wound; Fig. 2 is a sectional view through the tube and the insert or core placed therein, the view being taken substantially on the line 2—2 of Fig. 1, looking in the direction of the arrows; Fig. 3 is an elevational view of the tube, showing the same in its shrunken condition; Fig. 4 is a sectional view on the line 4—4 of Fig. 3, looking in the direction of the arrows, and Fig. 5 shows the yarn traverse-wound on the shrunken tube.

In practicing the present invention the nylon yarn is first sized and then twisted and set by steam. The twisting operation is one which gives a very high twist and it may be conducted in two separate steps with intermediate steam setting.

There is provided a small diameter tube 10, usually of paper or other material capable of being softened by the action of steam. A preferable diameter is about two inches. The twisted and set yarn is wound on the tube as shown at 11 at a relatively large angle after which it is steamed in order to shrink the yarn. The pressure created on the tube gives a crimp effect to the yarn. The tube having been softened by the action of the steam itself tends to shrink with the pressure caused by the shrinking yarn. The shrunken tube is shown in Fig. 3. To limit and control the amount of shrinkage, a rigid cylindrical core 12, usually of wood, is inserted into the

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tube, the diameter of the core being somewhat less than the inner diameter of the tube as clearly seen in Fig. 2. Thereby the amount of shrinkage of tube and yarn is controlled.

The following is a specific example of the operation of the present invention:

The raw nylon yarn, or yarn of other synthetic materials, which exhibits thermoplastic properties, is first sized in the conventional manner on the usual thread sizing machines. It is run over the size roll onto a relatively large diameter sizing tube and through a solution of size. The usual sizes are applied, such as polyvinyl alcohol, on the market under various trade names. The size may also include boric acid and sometimes a coning oil is added, such as a mixture of petroleum oil and glyceride oil. The sizing operation is conducted so as to cause a pick-up of size of about 1% to 3%, depending upon the desired stiffness of the sized yarn.

After the sizing operation is complete, the yarn is slowly dried at room temperature over a period of about 24 hours. Thereafter it is wound on spinner bobbins for left and right crepe twisting.

The twisting operation may be conducted as a single step or in two successive steps. Preferably a very high twist is obtained, as for example, a 40 denier 13 filament yarn is given 95 turns per inch and a 70 denier 34 filament yarn is given 80 turns per inch.

The yarn is first twisted with about 50% of the desired twist onto a spinner bobbin, after which it is steamed at 150° to 160° F. for one hour in a steam box to set the initial twist for subsequent operations. Then the twisted and steamed yarn is rewound onto a spinner bobbin to add the other 50% on a conventional spinning machine. The twisting operation being complete, the yarn on the take-up bobbin is steamed in a steam box at 180° to 190° F. for one hour to set the twist. Between the two twisting operations a drying period of about one day is provided. After the second twisting and steaming operation there is a further drying period of about one day.

The thus treated yarn is processed by re-winding it onto a paper tube such as shown at 10, said tube having a diameter of about two inches and a length of about six inches. The re-winding is conducted with a very fast traverse winding motion to produce a headless package or cheese as shown at 11. The package is steamed in an autoclave at about 235° F. for one hour to shrink the yarn, whereby the pressure resulting from the shrinking produces a crimp effect from the crossover wind of the yarn at a sharp angle. In the traversing, an angle of at least 60° to a traverse plane is provided, and the angle may be as high as 85°.

In order to produce a predetermined and controlled shrinkage of the yarn, an insert or core 12 is placed in the paper tube 10, said insert or core 12 having a somewhat smaller diameter than the tube itself as seen in Fig. 2. The insert is usually a core of wood and the dimensions may be about 1½ inch diameter by 6 inches. During the steaming operation the paper tube softens and shrinks down to the size of the core, as shown in Figs. 3 and 4, thereby permitting the yarn to shrink accordingly. Then the yarn is cooled down to room temperature, namely about 75° F. at a conditioned humidity of about 50%. The thus treated yarn is then dried and redrawn onto bobbins ready for warping or weaving of nylon crepe fabrics.

Although the invention has been described setting forth but a single specific embodiment thereof, the invention is relatively broad and is not limited to the specific details of said example. For instance, the size used may be of a different composition than that stated herein. The

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steam pressures and temperatures may be varied to a single degree with corresponding changes in the time of treatment. Also the tensions produced during the shrinking may be increased or decreased in order to obtain the desired amount of crimp. The relative diameters of the tube and core may also be changed in order to vary the amount of crimp obtained. The diameter of the tube need not be exactly two inches but may vary one way or the other to some extent.

These and other changes in the details of the invention may be made within the spirit thereof and the invention is, therefore, to be broadly construed and not to be limited except by the character of the claims appended hereto.

I claim:

1. A method of crimping nylon yarn consisting in winding the treated yarn upon a small diameter tube of a material capable of shrinkage, placing within the tube a cylindrical core of considerably less diameter than the interior diameter of the tube and which core is relatively non-shrinkable in the presence of steam, and shrinking the yarn and the tube by steaming the same to an extent permitted by the core.

2. A method of crimping nylon yarn which comprises sizing said yarn, then twisting the yarn and steam-setting said twist, winding said treated yarn on a small-diameter tube having a core that is relatively non-shrinkable in the presence of steam, said tube having a diameter of about two inches and being composed of a material capable of being softened by steam, restricting the shrinkage of the tube by the non-shrinkable core contained within the tube, the traverse of said yarn on the tube being at least 60°, steaming the yarn on the tube to shrink the yarn and tube, the pressure of the windings giving a crimped effect to said yarn.

3. A method of crimping nylon yarn which comprises

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sizing said yarn, then twisting the yarn and steam-setting said twist, winding said treated yarn on a small-diameter tube composed of a material capable of being softened by the action of steam, inserting a loosely-fitting, relatively non-shrinkable core within the tube to restrict the extent of shrinkage of the tube by said core, the traverse of said yarn on said tube being at least 60°, steaming said yarn on said tube to shrink said yarn in an autoclave at a temperature above the boiling point of water, the pressure of the windings giving a crimped effect to said yarn.

4. A method of crimping nylon yarn which comprises sizing said yarn, then twisting the yarn and steam-setting the twist, traverse-winding said treated yarn on a small-diameter tube of a material capable of being softened by the action of steam, and placing a rigid relatively non-shrinkable core within the tube to limit the amount of shrinkage of the tube and the yarn thereon and steaming the yarn while on the tube.

5. The method of crimping nylon yarn which comprises sizing said yarn, then twisting the yarn and steam-setting the twist, traverse-winding said treated yarn on a small-diameter cylindrical tube composed of a material capable of being softened by the action of steam, placing a cylindrical relatively non-shrinkable core within the tube to limit the amount of shrinkage of the tube and the yarn thereon while maintaining the cylindricity of the tube under shrinkage and steaming the yarn while on the tube.

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