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COVERED STRETCH YARN AND METHOD FOR PRODUCING

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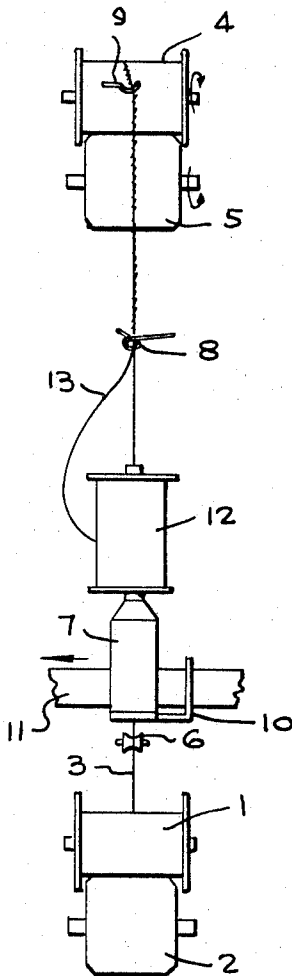


Fig-1

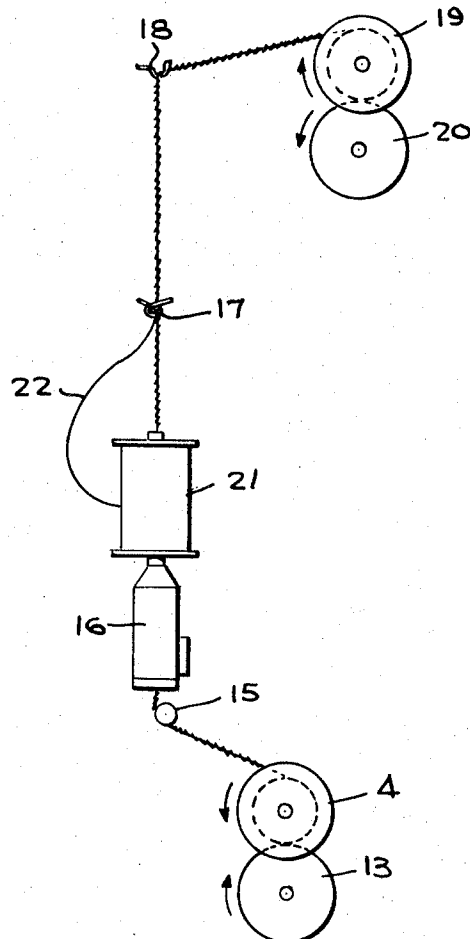


Fig-2

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COVERED STRETCH YARN AND METHOD FOR PRODUCING

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ABSTRACT OF THE DISCLOSURE

A method of producing a covered stretch yarn and the stretch yarn produced, by drawing a spandex yarn and wrapping it with a nylon multifilament yarn while drawn, drawing the single wrap composite yarn and wrapping with a second nylon multifilament yarn while drawn. The yarn is set by steaming, either after the first and second wrapping stages, or only after the second wrapping stage.

Background of the invention

This invention relates to improved methods of making wrapped stretch yarns, particularly to making yarns of this nature having a core yarn which is highly elastic, and to yarns produced thereby.

It has been common practice to produce stretch yarns having high elastic characteristics and retractive power by using a natural material core (such as rubber), or a synthetic material core (such as polyurethane), known as spandex, of which Lycra is an example, covered with a single wrap, or a double wrap, of a yarn to provide a proper finish both in appearance and in hand, or feel. Such composite yarns are relatively heavy and bulky, and when made into some fabrics, particularly when knit into support stockings, result in a product which is too coarse and heavy to fully meet the demands of the purchasing public. There is an urgent need for a support stocking which is much sheerer than the one presently being offered.

Summary of the invention

The general object of the present invention is to provide a method of making a wrapped core yarn which will produce a stretch yarn of much finer denier, while retaining full stretch and retractive power characteristics.

A more specific object is to provide such a method wherein the core yarn is double wrapped, and the wrapping is performed in separate stages, one for each wrap.

Another object is the provision of a method including two-stage wrapping, with the two stages being performed with the core yarn being drawn under different ratios.

A further object of the invention is to provide a method of making a wrapped core yarn in which the yarn is set after wrapping and winding in a package.

Yet another object is to provide such a method wherein the yarn is set after each stage of wrapping.

A still further object is to provide an improved, double-wrap core yarn of relatively fine denier, having good stretch characteristics.

Other objects of the invention will become apparent from the following description of practical embodiments thereof, when taken in conjunction with the drawings which accompany, and form part of, this specification.

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Brief description of the drawing

FIGURE 1 is a schematic view of the apparatus, and procedure, for providing a core yarn with a first cover wrap; and

FIGURE 2 is a similar view illustrating a single wrap core yarn receiving a second cover wrap.

Description of the preferred embodiments

In general, the invention consists of a method for producing a wrapped core yarn having high stretch, wherein the core is drawn, wrapped, re-drawn, wrapped and set, or wherein the yarn is set after each wrapping operation, and in the yarn produced by such a method.

Referring to the drawings in detail, FIGURE 1 shows diagrammatically a core yarn package 1 positioned on a face drive roll 2. Roll 2 will be rotated in conventional manner to control the rotational speed of the package 1, and consequently, the rate of feed of the core yarn from the package. The core yarn 3 is a high stretch yarn capable of elongation to several times its relaxed length. Any of the spandex (polyurethane) yarns, such as Lycra, will be suitable. The yarn is wound onto a take-up bobbin 4, which is rotated by drive roll 5. The differential between the speeds of drive rolls 2 and 5 determine the amount of draft given the core yarn during the wrapping stage. This ratio may vary between 3 to 1 and 4.5 to 1, but good results have been obtained with a ratio of 3.8 to 1. In its passage from the package 1 to the bobbin 4, core yarn 3 passes over a guide roller 6, through a hollow spindle 7, through a pigtail guide 8 and a traverse guide 9 adjacent bobbin 4.

Spindle 7 is mounted on the usual spindle rail 10, and is driven by belt 11. The spindle carries a bobbin 12 containing a cover yarn 13. This yarn should have some stretch, and can be a multifilament, torque, textured nylon yarn. It is immaterial whether the first cover yarn be of S or Z twist. Rotation of the spindle will cause the cover yarn to wrap about the core yarn in the usual fashion. It has been found that approximately thirty turns of cover yarn per inch of core yarn will give the best results. This provides the composite yarn which will be wrapped on the bobbin 4 under the tension provided by the drive differential ratio.

The full bobbin 4 will be removed, and the composite yarn may be set at this stage by subjecting it to steaming at from 180° F. to 220° F. for a period of from one hour to one and one-half hours. Excellent results have been obtained by steaming at 200° F. for one and one-quarter hours. The yarn, after steaming, will have good stretch qualities, and a relaxed denier which is less than the combined deniers of the original unstretched core yarn and the cover yarn.

It has been found that for some uses the setting step after the first wrapping operation may be eliminated. In any event, whether the composite yarn bobbin has been subjected to steaming or not, the bobbin 4 is placed on the drive roller 14 of a second twister. The yarn will be led over guide roller 15, through hollow spindle 16, through pigtail guide 17, through traverse guide 18 and onto takeup bobbin 19 on drive roller 20. For the second wrapping operation, the ratio between bobbin 4 and the takeup bobbin 19 may be from 1.05 to 1 to 1.10 to 1, although a ratio of 1.07 to 1 has given excellent results. A bobbin 21 of torque yarn 22 is mounted on spindle 16 to form the second wrap. The cover yarn 22 will usually be the same material as that used for the first

cover, but of opposite twist, and the number of wraps per inch will usually be the same. Whether or not the composite yarn is set after the first wrap, a steaming operation as described above is given the composite yarn after the second wrapping operation is completed.

Yarn made according to the above method is considerably finer than previously known covered yarns, yet has ample stretch. The second drawing, after the first wrap has been applied, is not sufficient to greatly separate the convolutions of the first wrap and materially lessen its covering effect, but does result in a further decrease in denier of the core yarn and a consequent reduction in denier of the composite finished yarn.

The following charts show examples of denier reductions and residual stretch at various stages of the process, and provide comparative results when the same materials are used in the method and set after each drawing and wrapping stage, and when a single setting is given after the second wrapping.

CHART NO. 1.—DRAW-WRAP, SET; DRAW-WRAP, SET

Denier	40 denier spandex covered with 1 end 15 denier 3 filament stretch nylon	70 denier spandex covered with 1 end 20 denier 7 filament stretch nylon	140 denier spandex covered with 1 end 70 denier 34 filament stretch nylon
Spandex relaxed denier after 1st drawing, wrapping and steaming	17.07	34.15	65.64
Composite stretch after 1st drawing, wrapping and steaming, percent	137.0	158.0	143.3
Composite denier after 1st drawing, wrapping and steaming:			
Relaxed denier	37.99	71.71	196.34
Stretch denier	26.14	40.42	115.88
Spandex relaxed denier after 2nd drawing, wrapping and steaming	13.66	27.32	60.61
Composite stretch after 2nd drawing, wrapping, and steaming, percent	89.0	123.3	131.3
Composite denier after 2nd drawing, wrapping and steaming:			
Relaxed denier	54.63	93.90	294.5
Stretch denier	44.18	60.58	195.28

CHART NO. 2.—DRAW-WRAP; DRAW-WRAP-SET

Denier	40 denier spandex covered with 1 end 15 denier 3 filament stretch nylon	70 denier spandex covered with 1 end 20 denier 7 filament stretch nylon	140 denier spandex covered with 1 end 70 denier 34 filament stretch nylon
Spandex relaxed denier after 1st drawing and wrapping	23.90	51.22	112.41
Composite stretch after 1st drawing and wrapping, percent	302.0	310.0	290.0
Composite denier after 1st drawing and wrapping:			
Relaxed denier	72.16	123.0	338.05
Stretch denier	27.77	41.85	114.72
Spandex relaxed denier after 2nd drawing, wrapping and steaming	14.51	29.02	64.88
Composite stretch after 2nd drawing, wrapping and steaming, percent	93.0	127.7	136.6
Composite denier after 2nd drawing, wrapping and steaming:			
Relaxed denier	56.34	111.0	307.3
Stretch denier	45.79	60.72	192.89

It will be seen from the charts that in each instance the composite relaxed denier of the composite yarn is less than the combined deniers of the core and wrap materials. It is also to be noted that although the relaxed denier of the core and the composite yarn, and the stretch of the composite yarn are greater after the first wrap when no setting is given at this stage, there is little appreciable difference in these factors at the end of the process, whether or not the yarn is set after the first wrapping stage.

Stocking knit from yarn processed in accordance with the present invention are much sheerer than those knit with covered yarns made from similar base materials and wrapped in accordance with conventional wrapping pro-

cedures. Nevertheless, they have ample stretch, and comparable compressive force.

While in the above practical embodiments of the present invention have been disclosed, it will be understood that the precise structural details and procedural steps are merely by way of illustration, and the invention may take other forms within the scope of the appended claims.

We claim:

1. A method of making a covered stretch yarn comprising, elongating a core yarn of stretchable material, wrapping the core yarn while elongated with a first cover yarn, elongating the single wrap composite yarn, wrapping a second cover yarn about the single wrap composite yarn while elongated, and setting the double wrap yarn while under tension.

2. A method of making a covered stretch yarn as claimed in claim 1 wherein, the elongation of the single wrap composite yarn is of lesser extent than the original elongation of the core yarn.

3. A method of making a covered stretch yarn as claimed in claim 1 wherein the single wrap composite yarn is set while under tension.

4. A method of making a covered stretch yarn as claimed in claim 1 wherein, the core yarn is elongated in the range of from 3 to 1 to 4.5 to 1, and the elongation of the single wrap composite yarn is in the range of from 1.05 to 1 to 1.10 to 1.

5. A method of making a covered stretch yarn as claimed in claim 1, wherein, the elongation of the core yarn is at the rate of 3.8 to 1, and the elongation of the single wrap composite yarn is at the rate of 1.07 to 1.

6. A method of making a covered stretch yarn as claimed in claim 5 wherein the core yarn is a spandex

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yarn, and the cover yarns are nylon multifilament yarns.

7. A method of making a covered stretch yarn as claimed in claim 1 wherein, the setting of the composite yarn is done by steaming at approximately 200° F. for one and one-quarter hours.

8. A method of making a covered stretch yarn as claimed in claim 1 wherein, both the first and second cover yarns are wrapped approximately thirty turns per inch.

9. A covered stretch yarn product according to the method set out in claim 1.

10. A covered stretch yarn produced according to the method set out in claim 3.

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