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3,098,347

ELASTIC YARN AND METHOD OF MAKING THE SAME

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FIG. 1.

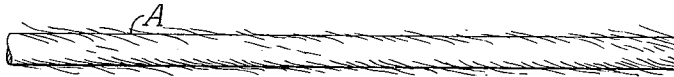


FIG. 2.

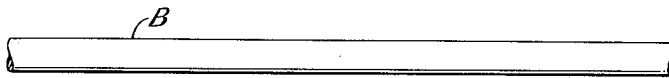


FIG. 3.

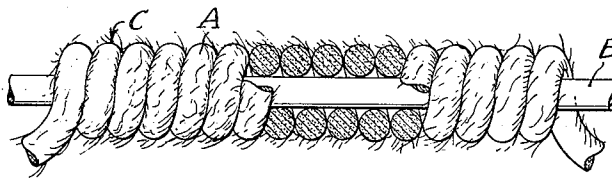
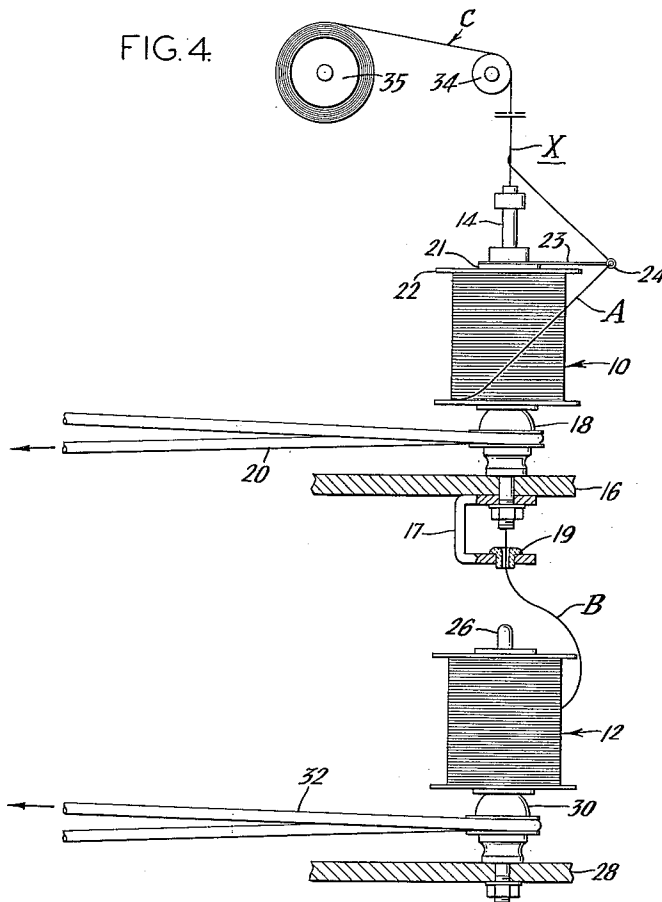


FIG. 4.



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ELASTIC YARN AND METHOD OF MAKING THE SAME

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The present invention relates to a method of making a truly balanced, single cover elastic yarn and the truly balanced elastic yarn produced thereby.

Elastic yarns are usually formed by intertwisting an elastic filament and an inelastic thread of a synthetic material such as rayon, nylon or the like or wrapping the filament with the thread. Prior to the present invention, it was thought that the solution to the problem of making a balanced elastic yarn was to pretwist one or both elements of the elastic yarn prior to intertwisting or wrapping to produce the finished elastic yarn. For example, in accordance with a prior method for forming elastic yarn, the elastic filament is given an initial twist in one direction and the inelastic thread is given an initial twist in a direction opposite the twist of the elastic filament and then the elastic filament and inelastic thread are intertwisted so that the composite yarn is formed of closely axially compacted interlocking alternating convolutions of the filament and thread. In accordance with another prior method for forming elastic yarn, the elastic filament is pretwisted and stretched and while in this condition, a pretwisted inelastic thread is spiralled rather than twisted on to the elastic filament.

The major disadvantage of elastic yarns produced by the above prior methods is that they have a tendency to kink or curl up when in a relaxed condition. Because of this kinking tendency, the elastic yarns are difficult to handle in weaving apparatus or the like and the cloth or fabric produced thereby is of an inferior quality.

Further, pretwisting of the filament and thread induces stress in the finished elastic yarn which may contribute to premature failure of the elastic yarn.

In accordance with the present invention, a new and improved method is provided for making a single cover elastic yarn wherein the yarn produced thereby is a truly balanced yarn. In accordance with the present invention, an inelastic cover thread is helically wound about an elastic core filament while the elastic filament and inelastic thread are maintained in a substantially untwisted, unstressed condition. The convolutions of the cover thread are closely compacted axially of the elastic core filament to provide a well covered elastic yarn. By the present method, pretwisting of the filament and thread are eliminated and I have found that by this method there is produced a truly balanced elastic yarn, one which does not tend to kink or curl up in its relaxed condition. A truly balanced elastic yarn facilitates handling in weaving apparatus or the like and the cloth or fabric produced thereby is of an improved quality. Further since the filament and thread are not stressed by pretwisting, there is less chance of the elastic yarn failing prematurely. The present invention may be employed to make truly balanced, single cover elastic yarns having an elongation falling anywhere in the expanded range of from about 100 percent to 300 percent as desired whereby the elastic yarn of the present invention has a broad range of commercial application.

With the foregoing in mind, an object of the present

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invention is to provide a new and improved, simple and effective method for producing a truly balanced elastic yarn.

Another object of the present invention is to provide a truly balanced elastic yarn which does not tend to kink or curl up and accordingly is much easier to process and wherein cloth or fabric made from the yarn is of improved quality.

A still further object of the present invention is to provide a simple and effective method for producing a truly balanced single cover elastic yarn which is more durable than similar yarns produced by prior methods.

These and other objects of the present invention and the various features and details thereof are set forth more fully hereinafter with reference to the accompanying drawings, wherein:

FIG. 1 shows diagrammatically a piece of inelastic thread in a relaxed, untwisted condition;

FIG. 2 shows a piece of elastic filament in its untwisted relaxed condition;

FIG. 3 shows an elastic yarn produced in accordance with the present invention; and

FIG. 4 illustrates diagrammatically apparatus for carrying out the method of the present invention.

In accordance with the present invention, an untwisted inelastic cover thread A is helically wrapped around an untwisted elastic core filament B to produce a truly balanced, single cover elastic yarn C as shown in FIG. 3. The elastic yarn is characterized by a continuous series of untwisted, engaging convolutions of cover thread which are closely compacted axially of the untwisted core filament to produce a truly balanced, well covered elastic yarn.

There is shown in FIG. 4 an example of apparatus for carrying out the method of the present invention to produce a truly balanced, single cover elastic yarn. As illustrated, the apparatus includes a pair of conventional upper and lower coaxially mounted rotatable spools 10 and 12 having wound thereon the inelastic cover thread A and elastic core filament B respectively. The spool 10 is mounted for rotation about a vertically disposed stationary tubular spindle 14 secured to a rigid support 16. The support 16 mounts a depending C-shaped bracket 17 having a tubular bushing 19 which is axially aligned with and spaced from the lower end of the tubular spindle 14 and which serves to guide the elastic core filament B in its path from the spool 12 through the spindle 14. The spool 10 is rotated by means of a pulley 18 depending from the spool 10 and a belt 20 connecting the pulley with suitable drive means. A central disc 21 rests on the upper flange 22 of the spool 10 and mounts a radially projecting arm 23 which has at its outer end an eye or flyer 24 through which the inelastic cover thread A passes as it is discharged from the spool 10 to a point X where it is wrapped around the core filament B to produce the finished yarn.

The spool 12 is mounted for rotation on a stationary spindle 26 secured to a rigid support 28 and is rotated by suitable drive means similar to that of the spool 10 including a pulley 30 and a belt 32.

It is noted that the cover thread A and the core filament B are initially supplied from a manufacturer on packages in an untwisted condition. Thereafter the cover thread A and the core filament B each is taken off of the package over end and wound onto its respective spool 10 and 12. During the process of transferring the cover

thread A and core filament B from the package to the spools 10 and 12 respectively, a predetermined number of turns are inserted into the core filament and cover thread on their respective spools. The spools 10 and 12 are then positioned on the spindles 14 and 26 respectively so that as the cover thread A and core filament B are taken off over end as shown in FIG. 4, the predetermined number of turns inserted in the cover thread A and core filament B are taken out. Thus as the core filament B is wrapped at the point X with the cover thread A, both the cover thread and the core filament are untwisted.

In setting up the apparatus described to produce a truly balanced elastic yarn, the free end of the core filament B is threaded through the bushing 19 up through the spindle 14, passed over a guide roller 34 and secured to a take up roll 35. The free end of the inelastic cover thread A is then secured to the core filament B in the region X. The spool 12 is then rotated in a direction to unwind the elastic core filament B and the spool 10 is rotated in a direction to unwind the cover thread A. At the point X the core filament B is in substantially unstressed, tensionless condition and is helically wrapped with the cover thread A. The finished elastic yarn C then passes over the guide roller 34 and is wound on to the take up roll 35. The take up roll 35 is rotated by suitable drive means to provide a constant linear feed of the finished yarn. Further, the speed of rotation of the take up roll 35 and core filament feed are correlated in a predetermined manner to maintain the elastic core filament B taut in the region X where it is being wrapped. By this arrangement, an elastic yarn is produced which is characterized by an untwisted core filament B and an untwisted cover thread A and accordingly is a truly balanced, well covered yarn which does not tend to curl up or kink. It is noted that for a given type of cover thread A and core filament B, the take up roll 35 is rotated at a predetermined rate when making a long stretch yarn and at a slightly greater rate when making a short stretch yarn.

In accordance with the present invention, truly balanced, single cover elastic yarns can be produced having an elongation falling anywhere in the expanded range of from about 100 percent to 300 percent as desired. In the present instance, this is accomplished by controlling selectively the relative speeds of rotation of the spools 10 and 12 for a given type of elastic filament and inelastic thread. For example, if it is desired to make a short stretch elastic yarn having a core filament B made of a Spandex yarn such as Lycra, and an inelastic cover thread A such as a 50 single cotton, the bottom spool 12 is rotated at about 4000 r.p.m.'s and the top spool 10 is rotated at 8000 r.p.m.'s. Lycra has about a 600 percent elongation in its substantially relaxed condition on the spool 12 and as it is unwound from the bottom spool 12, it is stretched and permanently set to about a 300 percent elongation by virtue of the air resistance which as shown in FIG. 4, produces a ballooning in the core filament in the region of the upper flange of the spool 12. Thereafter the core filament B is helically wrapped by the cover thread A at the point X while the core filament B is in a substantially unstressed, tensionless condition whereby the speed of the spool 10 effects a predetermined desired number of convolutions of the cover thread on the core filament to produce a truly balanced elastic yarn having about a 100 percent elongation. Employing the same materials to produce a long stretch elastic yarn, the bottom spool 12 is rotated at 7000 r.p.m.'s and the top spool is rotated at about 5500 r.p.m.'s.

It is to be understood that the word "untwisted" as used herein or in the claims in connection with the cover thread A means that no twist is imparted to the cover thread during making of elastic yarn in accordance with the present invention and that it is not twisted in the finished elastic yarn. However, where a cover thread such as a multifilament cotton is used, the fibers comprising

the thread may be intertwisted in the process of making the cotton to hold them together.

Manifestly, other types of elastic materials and inelastic threads may be employed as the core filament and cover thread respectively to produce truly balanced elastic yarns within the teaching of the present invention. Additionally, while the method of the present invention has been illustrated and described herein in connection with a particular apparatus, it is of course to be understood that modifications may be made therein within the scope of the following claims.

I claim:

1. A truly balanced elastic yarn comprising an elastic untwisted core filament and an inelastic untwisted cover thread helically wound about the core filament.

2. An elastic yarn as claimed in claim 1 wherein the convolutions of the cover thread are closely compacted axially of the core filament to provide a truly balanced well covered elastic yarn.

3. A method of making a truly balanced elastic yarn comprising helically winding an untwisted cover thread about an untwisted elastic core filament.

4. A method of making a truly balanced elastic yarn from an elastic core filament and an inelastic cover thread each wound on a spool consisting of the steps of rotating the spools in a direction to unwind the core filament and cover thread from their respective spools in an untwisted condition and helically winding the untwisted inelastic cover thread about the untwisted core filament.

5. A method of making a truly balanced elastic yarn from an inelastic cover thread wound on a first spool rotatably mounted on a tubular spindle and an elastic core filament wound on a second spool consisting of the steps of rotating the spools in a direction to unwind the core filament and cover thread from their respective spools in an untwisted condition, passing the core filament through the tubular spindle and helically winding the untwisted inelastic cover thread about the untwisted core filament after the core filament has passed through the spindle.

6. A method of making a truly balanced elastic yarn from an inelastic cover thread wound on a first spool rotatably mounted on a tubular spindle and an elastic core filament wound on a second spool consisting of the steps of rotating the spools in a direction to unwind the core filament and cover thread from their respective spools in an untwisted condition, passing the core filament through the tubular spindle, helically winding the untwisted inelastic cover thread about the untwisted core filament after the core filament has passed through the spindle and winding the finished elastic yarn on a take up roll.

7. A method of making a truly balanced elastic yarn from an inelastic cover thread wound on a first spool rotatably mounted on a tubular spindle and an elastic core filament wound on a second spool consisting of the steps of rotating the spools in a direction to unwind the core filament and cover thread from their respective spools in an untwisted condition, passing the core filament through the tubular spindle, helically winding the untwisted inelastic cover thread about the untwisted core filament after the core filament has passed through the spindle, rotating a take up roll in a direction to wind the finished elastic yarn thereon and controlling the rotation of the take up roll, core filament and cover thread spool to produce a truly balanced elastic yarn characterized by an untwisted core filament and untwisted cover thread.

8. A method of making a truly balanced elastic yarn consisting of the steps of helically winding an untwisted cover thread about an untwisted elastic core filament and maintaining the core filament in the region where it is wrapped with the cover thread in a substantially unstressed, tensionless condition.

9. A truly balanced elastic yarn as claimed in claim 1 wherein the core filament is a Spandex yarn and said cover thread is cotton.

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10. A truly balanced elastic yarn as claimed in claim 1 wherein the core filament is a Spandex yarn and said cover thread is nylon.

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