United States Patent

Waters

[15] **3,691,750**

[45] **Sept. 19, 1972**

[54] **TEXTURED CORE YARNS**

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[22] Filed: **March 18, 1971**

[21] Appl. No.: **125,683**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 805,598, March 10, 1969, Pat. No. 3,557,873.

[52] **U.S. Cl.**..............**57/144,** 57/34 AT, 57/140 BY, 57/157 F, 57/160

[51] **Int. Cl.**..........**D02g 3/38,** D02g 3/04, D02g 3/28

[58] **Field of Search**.....57/34 R, 34 HS, 34 AT, 77.3, 57/77.37, 139, 140 R, 140 BY, 144, 152, 157 R, 157 TS, 157 MS, 157 F, 160

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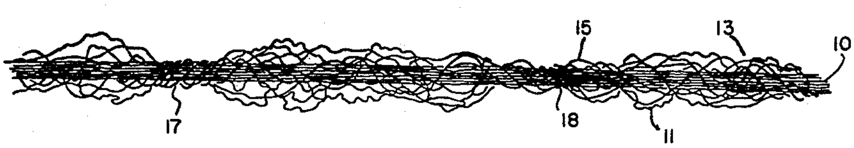
[57] **ABSTRACT**

False twist textured yarns are described which are composed of a plurality of continuous filaments forming a false twist textured core portion and a plurality of wrapper false twist textured continuous filaments, said wrapper filaments being of a higher bulk than the core filaments, said filaments periodically wrapping around the core filaments and forming reversing helices at intervals along the yarn.

11 Claims, 11 Drawing Figures



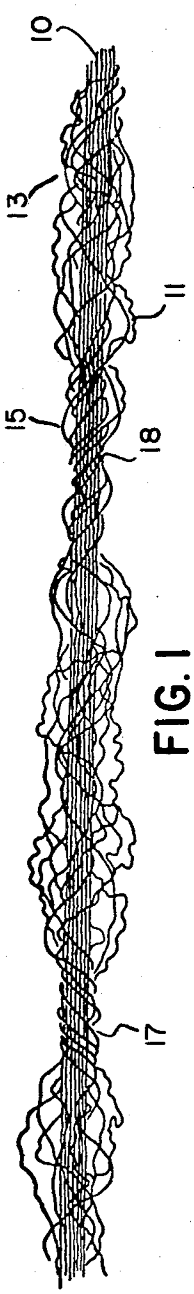


FIG. 1

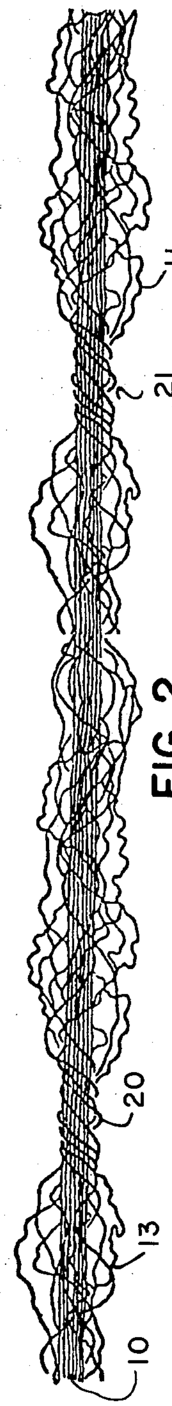


FIG. 2

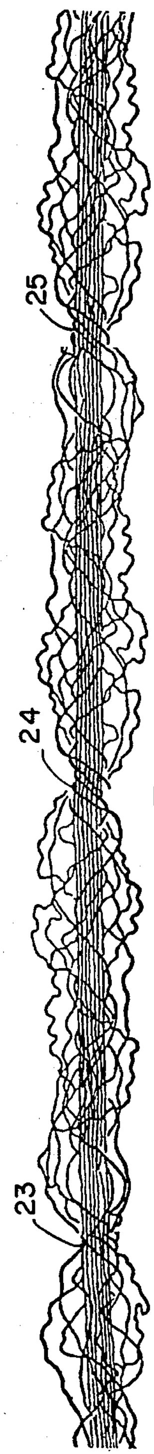


FIG. 3

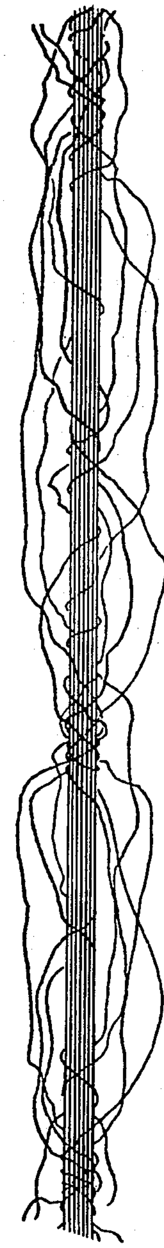


FIG. 4

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FIG. 5

FIG. 6

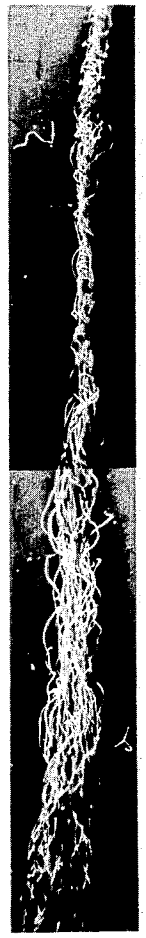

FIG. 7

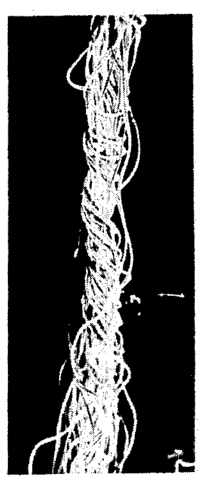

FIG. 8

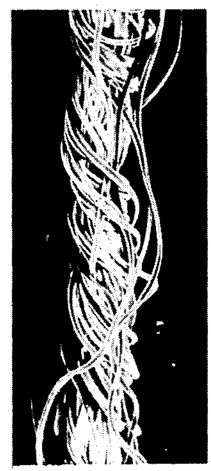

FIG. 9

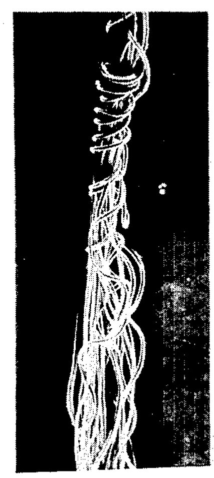

FIG. 10

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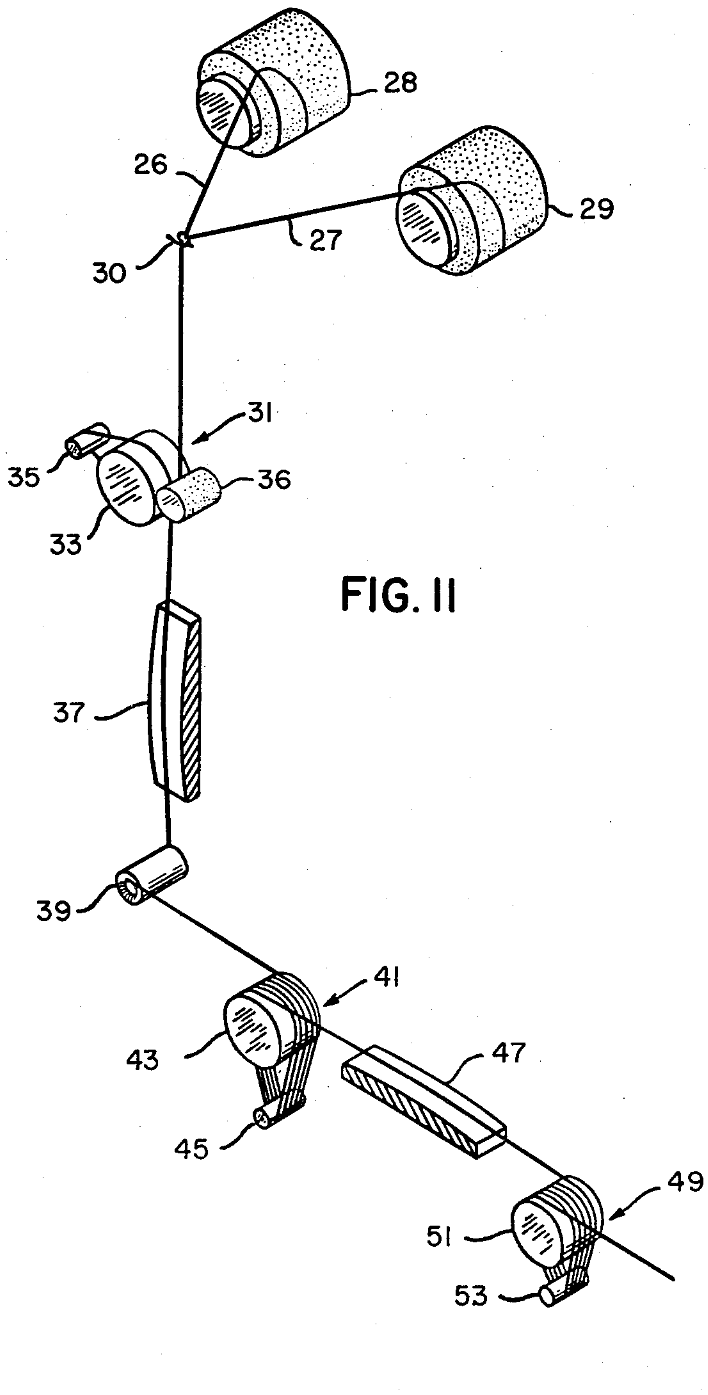

FIG. 11

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TEXTURED CORE YARNS

INTRODUCTION

This is a continuation-in-part of Ser. No. 805,598, filed Mar. 10, 1969, now U.S. Pat. No. 3,557,873.

The invention concerns novel core yarns.

BACKGROUND

Core yarns may be produced in several ways, the main ones of which are that of core-spinning, in which a core component is introduced into a wrapping component during the drafting or spinning process, and core-texturing, in which the two (or more) components are fed together but under different tensions and/or rates to a texturing device, such as an air jet.

Core yarns provide the possibility of achieving surface effects in fabrics equivalent to those of the wrapping component, while the extension characteristics of the yarn during and after fabrication are determined by those of the core component. In this way, bulky or nubby surface effects can be achieved with yarns which are more tension stable (i.e. withstanding the tensions inherent in fabrication, e.g., by weaving, and in wear, when the fabric is utilized in clothing) than would be the case were the entire yarn to be made as the wrapping component is made.

Another way in which interesting surface effects can be produced in fabrics is by fancy doubling, where two or more yarns are plied together with twist, e.g., on an uptwister. This process is, however, an expensive one; and one of the objects of this invention is the production of a novel core yarn which simulates the more expensive fancy doubled type of yarn.

THE INVENTION

In accordance with the invention, a continuous filament textured core yarn is produced comprising a false twist textured core of a plurality of continuous filaments and a wrapper portion of at least one continuous false twist textured filament of a higher crimp amplitude than said core filaments, said wrapper portion periodically wrapping around said core filaments to provide an integrated yarn of variable bulk along its length, said wrapper filament forming reversing helices at intervals along its length and periodically looping into said core filaments.

DETAILS OF THE INVENTION

The invention is more clearly described by reference to the drawings in which:

FIG. 1 is a schematic representation of a low order core yarn of the present invention wherein the wrapper filaments periodically wrap about the core in alternating S and Z wrappings;

FIG. 2 is another schematic representation of a low order core yarn of the present invention wherein the wrapper filaments periodically wrap about the core wherein all such wrappings are either in the S or Z direction;

FIG. 3 is another schematic representation of a low order core yarn of the present invention wherein only a couple wrapper filaments periodically wrap about the core;

FIG. 4 is a schematic representation of a lower order core yarn of the present invention wherein the order is lower than the yarns of FIGS. 1–3;

FIG. 5 is a composite microphotograph of a yarn of the present invention illustrating a tightly wrapped section wherein all the wrapper filaments wrap about the core and bulked, looser wrapped sections at a magnification of 40 power;

FIG. 6 is another composite microphotograph at 40 power magnification of a lower order yarn than that of FIG. 5 illustrating a wrapped section wherein not all of the wrapper filaments are wrapping the core followed by a section of yarn wherein the wrapper filaments separate from the core filaments and are then rejoined and loosely wrapped about the core filaments;

FIG. 7 is a composite electronmicroscope photo at 18 power magnification illustrating another yarn of the present invention with tightly wrapped sections and loosely wrapped sections;

FIG. 8 is an electronmicroscope photo at 45 power magnification showing the tightly wrapped section of FIG. 7 which more particularly illustrates wrapper filaments which intermingle and loop along the yarn bundle as they wrap about the core filaments;

FIG. 9 is another electronmicroscope photo at 90 power magnification showing a further enlargement of FIG. 8 wherein reversing helices are more clearly evident as well as two wrapper filaments in a twisted condition about each other as can be noted at the dust speck in the center of the photograph;

FIG. 10 is another electronmicroscope photo at 45 power magnification which particularly illustrates reversing helices and looping of a filament; and

FIG. 11 is a schematic representation of one embodiment of the process of the invention.

The wrapping component of reversing helices may be continuously wrapped around the core component as more particularly described in the noted parent patent. Such yarns have been designated as core yarns of high order.

The wrapping component of reversing helices may be only intermittently wrapped around the core component. These are the yarns to which the present application is more particularly directed and these yarns have been designated as core yarns of low order.

The nature and thickness of the synthetic filaments of the wrapping component or components are such as to cause the helices of that component(s) to stand out proud of the core component, and to provide the surface texture which, after fabrication, simulates that of a fancy doubled yarn, despite the presence of the reversals of helix direction to be contrasted with the unidirectional helix of a doubled yarn. Indeed, the uniformity of the surface texture with our core yarns of low order is dependent on the reversals of helix direction occurring at frequent intervals along the yarn.

The low order core yarns are fluffier than the high order ones, and, despite the intermittency of the wrapping, they are a well-integrated filamentary body which holds together well through textile processing such as weaving and knitting.

Core yarns referred to in this specification can be controlled so that the wrapping component wraps in alternating direction helices around the yarn or with all the wrapper components wrapping in the S or Z twist direction. As will be exemplified hereinafter, the degree of order is controlled in several manners particularly by selection of denier differences between the core and wrapper, draw ratio differences which are produced by the different spun birefringence, shrinkage, intrinsic viscosities and the like as described herein. Briefly stated, as the wrapper denier per filament decreases with respect to the core denier per filament, the degree or order changes to lower order. In the same manner, this type change results in the wrapping yarn wrapping in the same direction, while the higher denier per filament wrapper yarns tend to produce wraps which alternate between S and Z. Additionally, the order of the core yarn can be controlled by differences as noted above with greater differences in draw ratios giving lower order yarns. As can be readily noted, by selection of the various alternatives and combination thereof, the particularly desired type of core yarn is readily produced.

Again, in the low order yarn, there will be likely to be some filaments of the wrapping component, especially as there are a relatively large number of filaments in that component, which will stand proud of the main body of the component.

The core yarn of the invention can be homogeneous in the sense of the core and wrapping components being made of filaments of the same synthetic fibers, as for instance, polyhexamethylene adipamide (nylon 66) or polyethylene terephthalate. However, this is not essential; and dye variations and other effects may be better obtained if the components or filaments differ in respect of chemical character, or at least the wrapping components differ when there are more than one of them. Filaments may be all of circular cross-section; or some, for instance in the wrapping component(s), may be of non-circular cross-section, e.g., tri-lobal.

Although possessing a set false twisted, and hence extensible, core component, the core yarn of the invention exhibits no sharply defined yield point under load at a constant rate of extension and can be regarded as being sufficiently tension-stable for weaving into woven fabric in which the textured effect of the helical wrapping component or components is adequately maintained.

For instance, a core yarn comprising a core component of 30 denier/10 filament nylon 66 wrapped with a wrapping component of 20 denier/2 filament nylon 66 **maintains approximately similar helical spacing of the wrapping component on the core at loads between** 0.1 gram/denier and 1.0 gram/denier. In fact, the textured effect appears to be slightly enhanced by tensioning within this range.

The core yarn of the invention, owing to its false-twisted components, possesses torque; and hence it may be desirable for two such yarns of opposite torque to be doubled to balance the torques, or for a single such yarn to be submitted to a subsequent heat treatment to cause the decay of the torque, in order that the yarn may be readily usable for knitting or weaving.

In furtherance of the invention a process for making the core yarn comprising supplying at least two synthetic continuous filamentary components in sequence to a feed means, a heating zone and a false twisting element and withdrawing said filamentary components from said sequence under a higher tension than that under which the said components were supplied to said sequence such that the filaments are drawn 1.5 to 6.0 times their feed length, the filamentary components differing as to their extensibility under the stresses on entering the yarn section of increasing twist gradient. The draw ration is more preferably between 2.0 and 3.5 for most yarns, but can vary within the noted larger range depending on the particular core yarn being produced.

Feed means include a positive feed system such as a nip roll or feed roll assembly and a free feed system such as a tensioning device. The filamentary components may be supplied to separate feed means.

Preferably the false twisting is combined with drawing, in order that the difference between the extensibilities of the filamentary components may be large.

When a feed yarn composed of two undrawn filamentary components having differing values of extension under a given stress is submitted to a combined drawing and false twist crimping process, then, in the false twisting zone, that is, upstream of the twisting element, the component of greater extensibility forms a unidirectional helix of substantially constant radius around the other component which is a twisted yarn in which filament migration occurs. Downstream of the twisting element, the wrapping is of alternating helix direction.

Most practically, such method involves the employment of undrawn filaments having differing natural draw ratios or differing birefringence values, e.g. differing by $3\text{–}5 \times 10^{-3}$ units as measured, for instance, by a Berek compensator with a polarized microscope. Details of a method for so measuring birefringence are given in our British Pat. No. 762.190.

"Natural draw ratio" is defined as the ratio of the cross-sectional areas of the yarn immediately on opposite sides of the "neck" (or localized draw point) at which the yarn draws, "Natural draw ratio" is thus a characteristic of the yarn, not of the machine to which the mechanical draw ratio is applied, such latter ratio being the ratio of the linear speeds at which the yarn is supplied to and withdrawn from the zone in which drawing occurs.

It is possible to prepare the undrawn filamentary components with differing natural draw ratios or differing drawing tensions or differing spun birefringences either by spinning them from differing polymer feed stocks, or by using a common polymer feed stock and varying spinning parameters such as the wind-up speed on the spinning machine or the size of holes in the spinnerets or the temperature thereof.

It is also within the scope of the invention that certain of the filaments shall themselves be of the conjugate type, say those of two constituents, in sheath-and-core or side-by-side arrangement, in which one constituent may be of a material having a higher extensibility than the other under a given stress.

According to this invention, it is possible to have a feed yarn in which the filaments are of but two different types having differing values of extension under the drawing stress. Equally, however, it is possible to employ a feed yarn having filaments of more than two such types, whereby a wider spectrum of effects may be obtained.

Such varying extensibility of filaments can be usefully achieved by varying the spun birefringence of the filaments that are combined to form the feed yarn, such filaments being of homogeneous polymeric feed-stock. For instance, polymeric material for extrusion into filaments by melt-spinning can be split into two or more fractions prior to extrusion, and the required differential potential can be provided for by treating the fractions differently in regard to their extrusion conditions. One such method involves the injection of a degradent for the polymer into one or more of the stream fractions within the spinning pack. Another method involves variable quenching of the filaments through the use of water or other fluids.

Alternatively, the variability can be achieved by employing filaments of different material which differ in regard to this characteristic.

Core yarns according to the invention may be processed from such heterogeneous filament bundles concurrently with their production, or as a separate step following on after the preparation of the heterogeneous filament bundles and their supply in the form, for instance, of wound packages of undrawn filaments.

In yet another method by which the said core yarns may be made, we employ undrawn filamentary components of the same or differing birefringence values, and positively feed them at the same or differing speeds to a false twisting device and withdraw them therefrom under a tension, such that drawing has occurred in the yarn section of increasing twist gradient and the several components are submitted to differing heat treatments prior to drawing taking place. Such differing heat treatments can be imparted by contacting the filamentary components with a heated surface or surfaces having portions at different temperatures, as for instance with a heated feed roll having portions of its peripheral surface heated from internally, e.g. by electric resistance heaters, at different temperatures.

This method of making the said core yarns is especially adapted to the invention when to be carried out with filamentary components of polyester material, as for instance polyethylene terephthalate filaments. In this latter method, the temperature of portions of a heated feed roll, or of a plurality of heated feed rolls, can differ in the range between, say 80° and 95° C.

When a core yarn according to the invention is made by a method wherein false twisting and drawing are combined, the synthetic filaments of the wrapping components may, or may not, be completely drawn, although it is preferred that they should be. The filaments of the core component will, however, be at least substantially fully drawn.

It is possible, however to produce useful core yarns from filamentary components wherein at least some of the filaments are already in a drawn state, or in a partially drawn state, provided that they nevertheless differ as to their extensibility under the stress to which they will be submitted in the false twisting process.

It is within the scope of this invention to provide for other differences between the filaments than that of extension under a given stress. Thus, the filaments may also be of different deniers, having been extruded through spinneret holes of different sizes in one or more groups of the spinneret.

Preferably, owing mainly to the higher throughput which it allows, the false twist crimping machine has twisting elements of the friction type, by which the false twist is inserted by the direct action of rotating annular friction means on the yarn. Alternatively a spindle false twisting machine may be used with correspondingly good results.

It is usually to be preferred to decay the torque of the composite, core yarns, either before or after wind-up after drawing. One reason for this is that, when a final denier yarn of say, only **70** denier is the one desired for the particular fabrics in mind, the desired bulky effect in the core yarn is better achieved with only two components, i.e. one component as core and one component as wrapping, rather than by using an initial four (smaller) components in two core yarns which are then plied in a manner to neutralize each other's torques. With but two components, however, it is, as stated above, usually desired to decay the torque necessarily induced in the false twisting process; and such may be achieved by imparting a limited degree of heating to the composite, core yarn on the way to the wind-up, or after having been wound on the wind-up package. The decaying of the torque under tension contributes to the lesser bulk of the core components compared to the wrapper component.

Such limited degree of heating "on the run" may be provided by contact with a heated surface, e.g. a roll or a curved plate. In certain circumstances, if desired, the draw roll may be heated to serve for this purpose. Alternatively, the limited degree of heating "on the run" may be provided by passage of the composite, core yarn through a heated fluid, such as steam in a steaming tube or a jet.

Heating on the wind-up package may likewise be in steam, in a dry heat atmosphere or in a heated dyebath.

In either case of limited heating, the composite, core yarn may be heat treated while under a controlled tension and temperature depending on the nature of the bulkiness desired.

Referring to FIGS. **1–4**, there are shown core yarns of low order having a core component **10** and a wrapping component **13** composed of individual filaments **15** formed in helices and intermittently wrapped around said core component. Reversals of helix direction of individual filaments are shown at point **11**. FIG. **1** further illustrates alternating S–Z twist wrappings at **17** and **18** respectively. FIG. **2** illustrates all S wrappings such as at **20** and **21**. FIG. **3** further illustrates single wrappings at **23, 24** and **25**.

Referring to the process illustrated in FIG. **11**, undrawn yarns **26** and **27**, of differing birefringence values, are withdrawn from supply packages **28** and **29** by feed roll assembly **31**, comprising a feed roll **33**, a separator roll **35**, and a nip roll **36**, the undrawn yarns having been brought together at thread guide **30**. From the feed roll assembly the yarns pass to a false twisting and drawing stage comprising a heated plate **37**, a friction twisting element **39** and a draw roll assembly **41** comprising a draw roll **43** and a separator roll **45**. On leaving the feed roll assembly **31**, the yarns enter a section of increasing twist gradient due to the insertion of twist into the yarns by friction twisting element **39**. The twist gradient reaches a maximum value on the heater plate **37**. The draw roll is rotated at a given higher speed compared with the feed roll and drawing takes place on the heater plate **37**. The yarns are subjected to stresses on entering the yarn section of increasing twist gradient due to the higher speed of the draw roll **43** compared with the feed roll **33** and the insertion of twist by friction twisting element **39**. Since the yarns have differing birefringence values they differ as to their extensibilities under the stresses on entering the yarn section of increasing twist gradient. In this section, that is upstream of twisting element **39**, the component of greater extensibility forms a unidirectional helix of substantially constant radius around the other component which is a twisted yarn in which filament migration occurs. Downstream of twist element **39**, the core yarn produced has a set false twisted core and a wrapping component of alternating helix direction. From the draw roll assembly the core yarn passes to a heater plate **47** and thence to a relax roll assembly **49** comprising a relax roll **51** and a separator roll **53**.

The extent of relaxation achieved is governed by the temperature of heater plate **47** and the speed at which relax roll **51** is operated compared with draw roll **43**. Increasing overfeed across the relax heater plate **47**, that is decreasing the speed of relax roll **51** compared with the speed of draw roll **43**, increases the order of the core yarn produced. Increasing the temperature of heater plate **47**, decreases the order of the core yarn produced. From the relax roll assembly **49**, the core yarn is passed to a conventional wind-up assembly (not shown) for orderly collection.

The following examples illustrate but do not limit our invention.

Example 1

The core component comprised 84 denier/10 filament undrawn poly(hexamethylene adipamide) yarn of natural draw ration 2.8 and the wrapping component comprised 75 denier/2 filament undrawn poly(hexamethylene adipamide) yarn of natural draw ration 3.8.

The two undrawn yarn components were fed together by the feed roll of a positive-feed friction false twisting machine, the take-out (draw) roll of which was rotated at a given higher speed compared with the feed roll such as to draw the yarn components together while they were being false twisted, drawing occurring an inch or two along the length of a 2 foot long heater plate, maintained at 220° C and positioned between the feed roll and the annular false twisting device.

The linear speed of the composite yarn at the draw roll was 1,000 feet/minute and the draw ratio 2.57.

The ratio of twisting device r.p.m. to throughput speed in feet/minute of the composite cored yarn was 9.

The tension of the yarn within the yarn length of increasing twist gradient was 30g. The tension of the yarn on withdrawing from the false twisting device was 46g.

The core yarn so produced was of a high order. The wrapping component was formed in helices around the core component, the direction of which helices reversed at intervals along the yarn. At least 95 percent and 50 % by number of the intervals between helix reversals along the yarn were of length less than 0.7 cm. and 0.3 cm. respectively.

EXAMPLE 2

An example of a low-ordered core yarn according to the invention comprises a polyamide yarn of heterogeneous filaments processed according to the following conditions:

The undrawn yarn was 210 denier/20 filaments melt-spun from a spinneret containing two groups of 10 holes each. Through one such group standard filaments of polyhexamethylene adipamide were extruded such that the 10 filaments had a total denier of 90 and a natural draw ratio of 3. Through the other such group modified filaments of polyhexamethylene adipamide were extruded such that the 10 filaments had a total denier of 120 and a natural draw ratio of 4, the modification consisting in that the polymer was of a kind which had been nucleated with calcium fluoride (of an average particle size of less than 0.5 microns diameter) in such a manner that the mean maximum nucleant separation distance was given by the expression

$$s \leq 2\int_{0}^{XC} G dt$$

where G is the linear rate of crystallization at a temperature T,

S is the mean maximum nucleant separation distance and XC is the distance of the solidification point from the spinneret for un-nucleated polymer when spun into filaments.

The yarn, in undrawn state, was used as the supply for a drawing and false twisting machine in which yarn was positively forwarded by a feed roll into a combined drawing and false twisting zone consisting in sequence of a heater, a friction false twisting device and a draw roll. The conditions of drawing and false twisting according to this example were

Linear speed of yarn at draw roll	- 1,500 feet/minute
Heater length	- 2 feet
Heater temperature	- 220°C
Draw ratio	- 2.71
S/V ratio	- 11

(where S is the r.p.m. of the twisting device and V is the speed of the yarn in feet/minute).

The tension of the yarn within the yarn length of increasing twist gradient was 40g. The tension of the yarn on withdrawing from the false twisting device was 70g.

EXAMPLE 3

The core component comprised 96 denier/10 filament undrawn poly(ethylene terephthalate) yarn of spun birefringence value 8×10^{-3}; and the wrapping component comprised 96 denier/2 filament undrawn poly(ethylene terephthalate) yarn of spun birefringence value 5×10^{-3}.

The two component undrawn yarns were fed together by the feed roll of a positive-feed friction false twisting machine, the take-out (draw) roll of which was rotated at a given higher speed compared with the feed roll such as to draw the component yarns together while they were being false twisted, drawing occurring an inch or two along the length of a 2 foot long heater plate, positioned between the feed roll and the annular false twisting device, which plate was maintained at 187°C.

The linear speed of the composite yarn at the draw roll was 1,000 feet/minute and the draw ratio 3.00.

The ratio of twisting device r.p.m. to throughput speed in feet/minute of the composite, cored yarn (S/V) was 9.

The bulked, cored yarn so produced was of a high order.

EXAMPLE 4

The core component comprised **96** denier/**10** filament undrawn poly(ethylene terephthalate) yarn of spun birefringence value 8 × 10^{-3} and the wrapping component comprised 96 denier/10 filament undrawn poly(ethylene terephthalate) yarn of spun birefringence value 5 × 10^{-3}.

The two undrawn yarn components were fed together by the feed roll of a positive-feed friction false twisting machine, the draw roll of which was rotated at a given higher speed compared with the feed roll such as to draw the yarn components together while they were being false twisted, drawing occuring an inch or two along the length of an 18 inch long heater plate, maintained at 210°C and positioned between the feed roll and the annular false twisting element.

The linear speed of the composite yarn at the draw roll was 1,500 feet/minute and the draw ratio 2.80.

The ratio of twisting element r.p.m. to throughput speed at the draw roll in feet/minute of the core yarn was 9.5.

The yarn was then fed along an 18 inch long heater plate, maintained at 240°C, to a relax roll, the ratio of the draw roll speed: the relax roll speed being 1.0435 : 1.

The yarn so produced was a core yarn of low order.

The above example was repeated except that the ratio of the draw roll speed : the relax roll speed was 1.135 : 1.

The yarn so produced was a core yarn of higher order than that produced previously.

EXAMPLE 5

Both a single wrapping and the core components of the yarn were of filaments of polyhexamethylene adipamide and each was of 84 denier (undrawn)/10 filaments.

The two component yarns, when still in undrawn state, were fed together by the feed roll of a positive-feed friction false twisting machine, the take-out (draw) roll of which was rotated at a given higher speed compared with the feed roll such as to draw the component yarns together while they were being false twisted, drawing occurring an inch or two along the length of a 2 foot long heater plate positioned between the feed foll and the annular false twisting device, which plate was maintained at 210°C.

The feed roll was of stepped form, providing peripheral surfaces of differing diameter and hence capable of forwarding the respective components at different speeds. In this case the wrapping component was fed by the higher diameter portion at a feed speed **18%** greater than the core component.

The throughput speed, at the draw roll, was 1,000 feet/minute; and the ratio of twisting device r.p.m. to throughput speed (S/V) was 9. The draw ratio was 2.85.

The core yarn so produced was of low order.

EXAMPLE 6

The core component comprised 105 denier/24 filament undrawn poly(ethylene terephthalate) yarn of a spun birefringence 12 × 10^{-3} and the wrapping component comprised 105 denier/24 filament undrawn poly(ethylene terephthalate) yarn of spun birefringence value 5 × 10^{-3}.

The two undrawn yarn components were fed together by the feed roll of a positive feed friction false twisting machine and the draw roll of which was rotated at a given higher speed such as to draw the yarn components together while they were being false twisted. Drawing occurred an inch or two along the length of an 18 inch long heater plate maintained at 210°C and positioned between the feed roll and the annular false twisting element as shown in FIG. **11**.

The linear speed of the composite yarn at the draw roll was 1,500 feet per minute and the draw ratio, 2.63.

The ratio of twisting element r.p.m. to throughput speed at the draw roll in feet per minute of the core yarn was 10.9.

The yarn so produced was a core yarn of low order similar to FIGS. **5–10**.

EXAMPLE 7

The core component comprised 105 denier/24 filament undrawn poly(ethylene terephthalate) yarn of spun shrinkage equal to 57 percent as measured on a yarn skein in 100°C steam. The wrapping component comprised 105 denier/24 filament undrawn poly(ethylene terephthalate) yarn of spun shrinkage equalled to 48 percent in 100°C steam. The difference in shrinkage was obtained by controlling the quench conditions in spinning as is known in the art.

Two undrawn yarn components were fed together in the manner of Example 6 at the same linear speed and draw ratio. The ratio of the twisting element r.p.m. to throughput speed as also maintained at the same ratio as Example 6.

The yarn so produced is a core yarn of low order similar to FIGS. **5–10**.

EXAMPLE 8

A low order core yarn was produced from a core component comprised of 100/24 undrawn poly(ethylene terephthalate) yarn having an intrinsic viscosity of 0.95 as measured in 100 percent orthochlorophenol at 25°C using 8 grams of polymer per 100 ml. of solvent and a wrapping component comprised of 100/24 undrawn poly(ethylene terephthalate) yarn having an intrinsic viscosity of 0.47 as measured above.

The two undrawn yarn components were fed together by positive feed and drawn in a false friction machine as in Example 6 at a linear speed of the composite yarn at the draw roll of 1,500 feet/minute and a draw ratio of 2.5.

The resulting 80/48 yarn was a core yarn of low order similar to FIGS. **5–10**.

EXAMPLE 9

A core yarn was produced from a core component of 210/48 undrawn poly(ethylene terephthalate) having a spun birefringence value of 12 × 10^{-3} and a wrapping component of 210/48 undrawn poly(ethylene terephthalate) yarn of spun birefringence value of 5 × 10^{-3}.

The two undrawn yarn components were fed together by a feed roll to a spindle false twisting machine, the draw roll of which was operated at a higher speed than the feed roll such that drawing of the component filaments occurred while the filaments were false twisted. Drawing occurred along a point on a 1 meter heater plate set at a temperature of 110°C while the yarn was in the twisted condition. The draw roll speed was operated at 600 feet per minute at a draw ratio of 2.9. The spindle twister was operated at about 432,000 r.p.m.'s to produce a 60 twist per inch false twisted yarn.

The resulting yarn was a 175/96 core yarn of low order similar to FIGS. **5–10**.

What is claimed is:

1. A continuous filament textured core yarn comprising a false twist textured core of a plurality of continuous filaments and a wrapper portion of at least one continuous false-twist textured filament of higher crimp amplitude than said core filaments, said wrapper portion periodically wrapping around said core filaments to provide an integrated yarn of variable bulk along its length, said wrapper filament forming reversing helices at intervals along its length and periodically looping into said core filaments.

2. The core yarn of claim **1** wherein the wrapper portion comprises a plurality of filaments.

3. The core yarn of claim **2** wherein the wrapper filaments individually periodically wrap about the core filaments.

4. The core yarn of claim **2** wherein the wrapper filaments periodically wrap about the core yarn together as a group.

5. The core yarn of claim **2** wherein the wrapper filaments wrap about the core in alternating S and Z directions.

6. The core yarn of claim **2** wherein the core filaments are of a different denier per filament than the wrapper filaments.

7. The core yarn of claim **2** wherein the denier per filament of the core filaments and the wrapper filaments is about the same.

8. The core yarn of claim **2** wherein the wrapper filaments all wrap about the core in the same twist direction.

9. The core yarn of claim **1** wherein the torque liveliness of the yarn has been at least partially decayed.

10. The core yarn of claim **1** wherein the core filaments are the primarily load bearing filaments and have a substantially constant rate of extension.

11. The core yarn of claim **1** wherein the false-twist texture in the core filaments has been at least partially drawn out to reduce its crimp amplitude.

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