

[54] **COMPACT MULTI-FILAMENT TEXTILE YARN AND METHOD OF MAKING THE SAME**

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[51] Int. Cl. **D02g 3/26, D02g 3/38**

[58] **Field of Search** 57/3, 6, 7, 13, 14, 57/15, 16-18, 34 R, 36, 139, 140 R, 144, 149, 153, 156, 157 R, 160, 162

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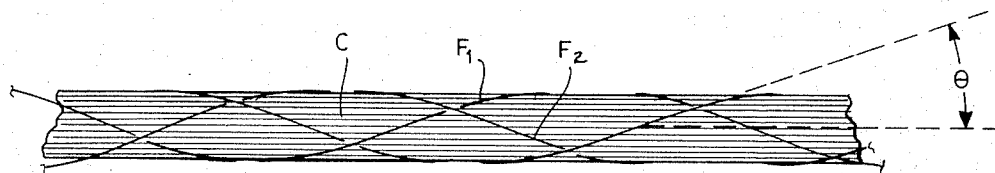
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[57] ABSTRACT

The filaments of multi-filament synthetic textile yarn are rendered and maintained sufficiently coherent and compact for high-speed fabricating purposes such as knitting, winding and weaving by continuously disposing special wrapper filaments in generally helical paths around the core filaments of the yarn, at least one such wrapper filament being disposed in a clockwise manner and another wrapper filament counter-clockwise. The wrapper filaments (drawn or undrawn) are continuously applied from over the ends of supply packages, or at the spinneret or otherwise, and if undrawn may be drawn concurrently with the core filaments.

16 Claims, 9 Drawing Figures



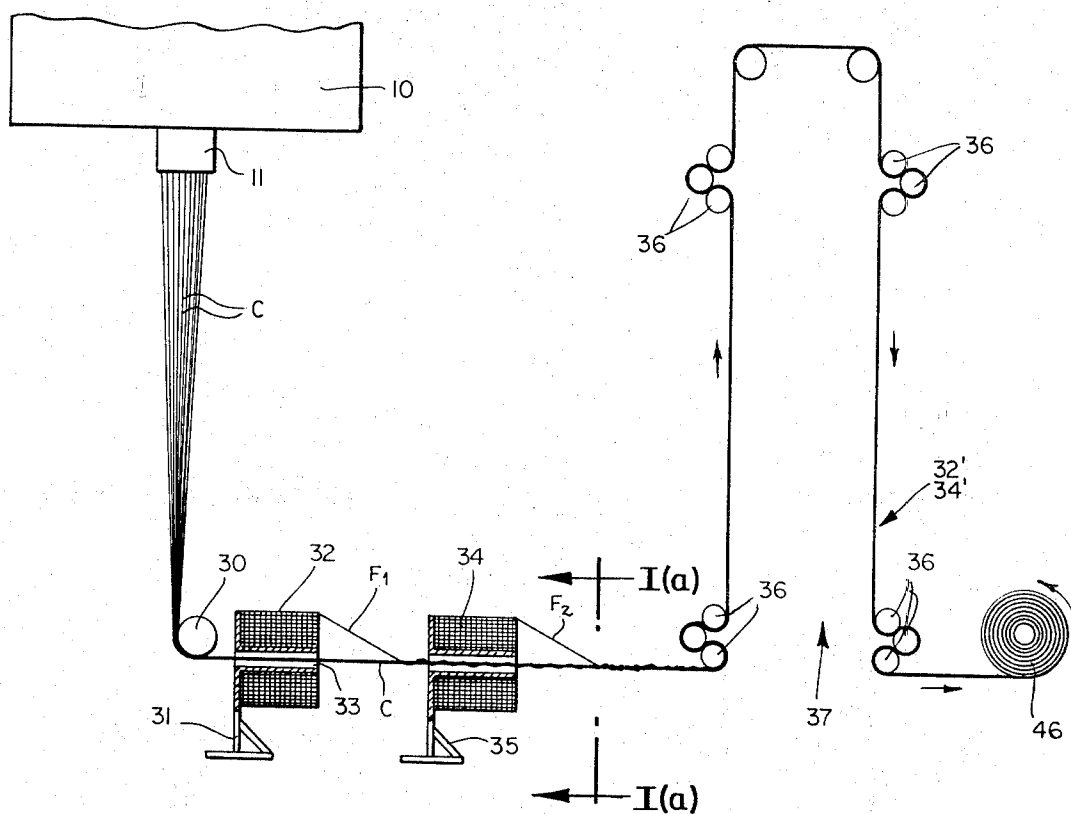


Fig. 1

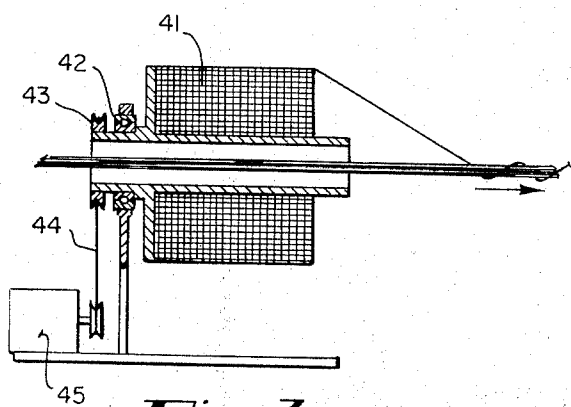


Fig. 3

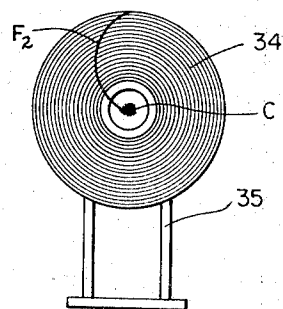


Fig. 1(a)

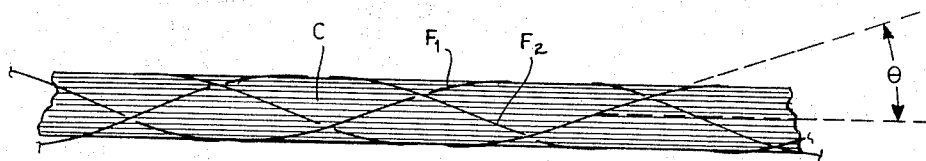
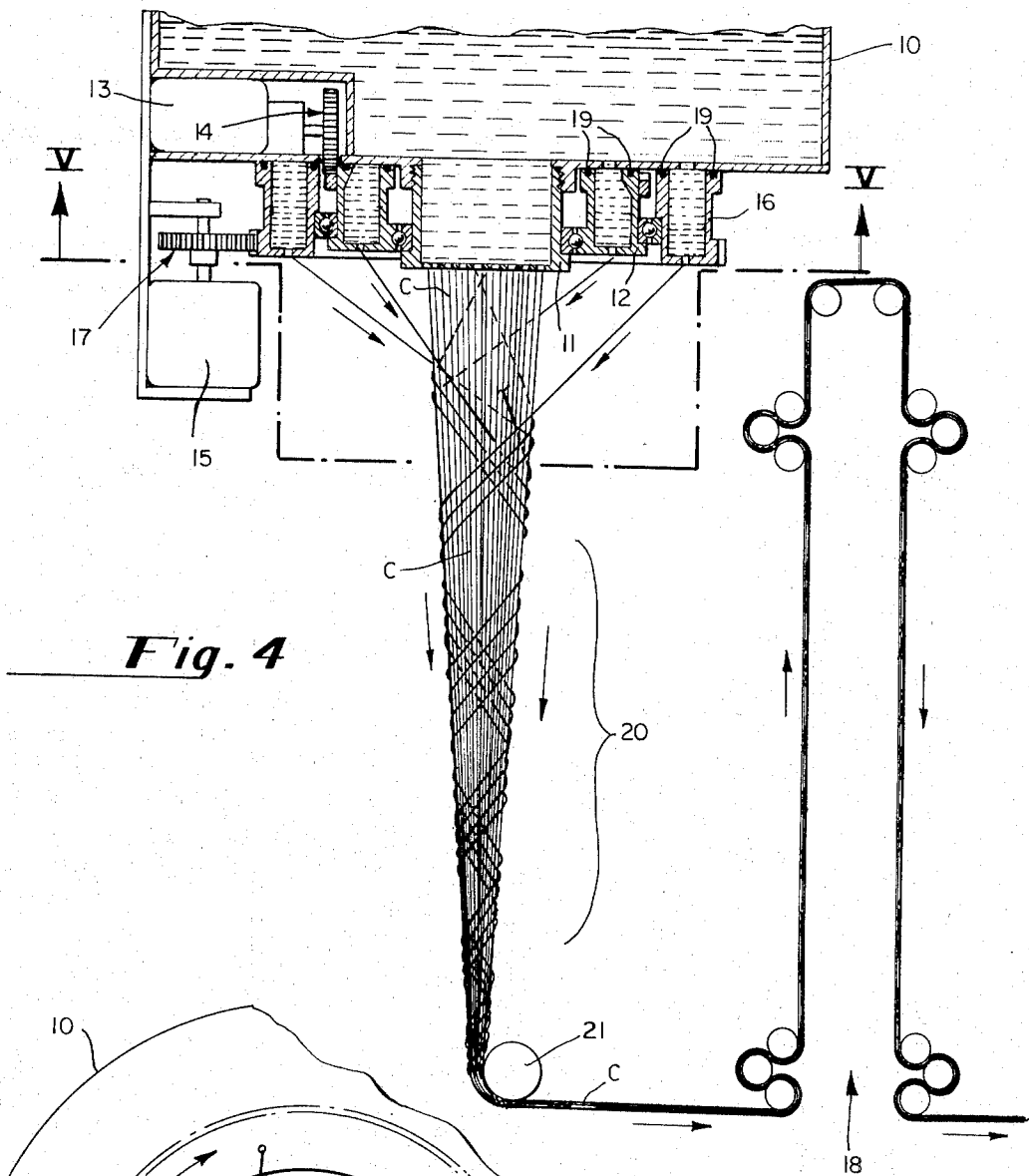
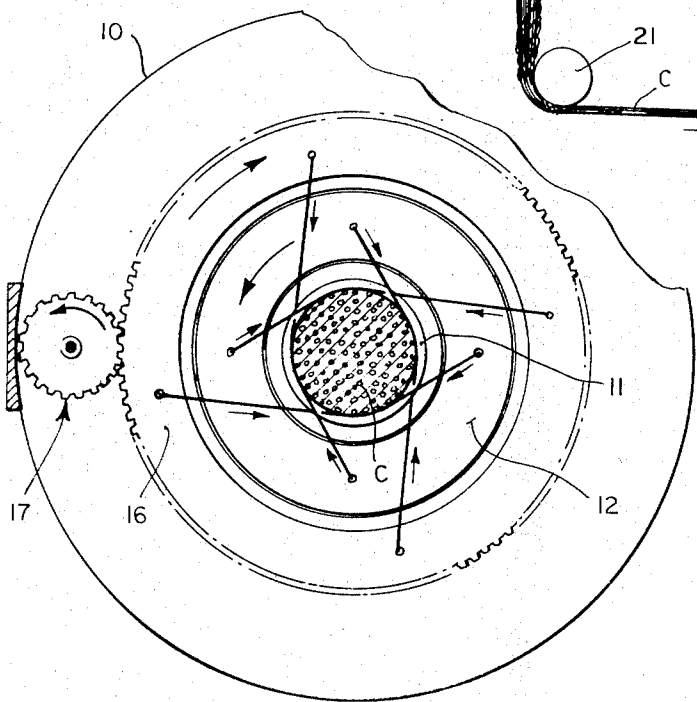
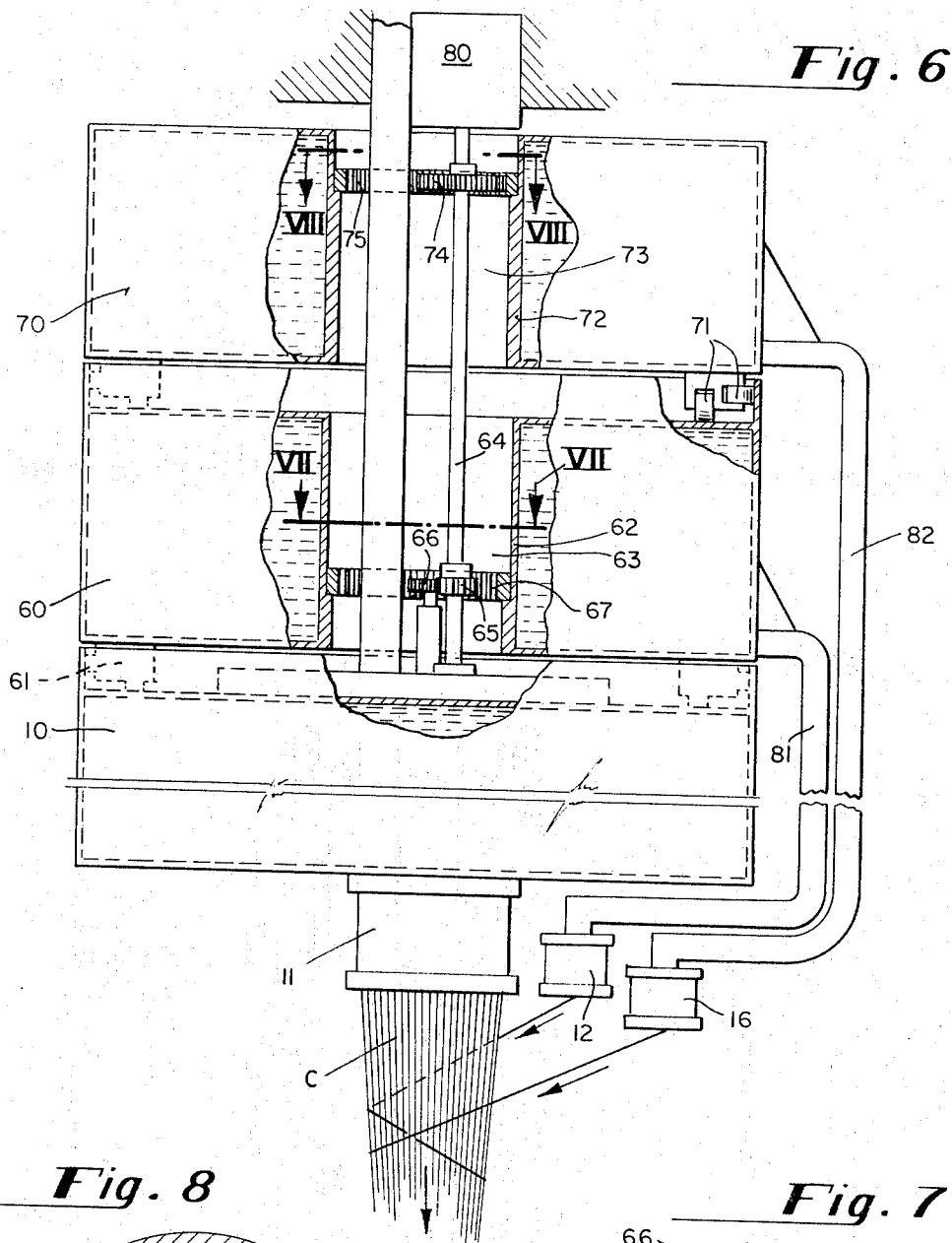
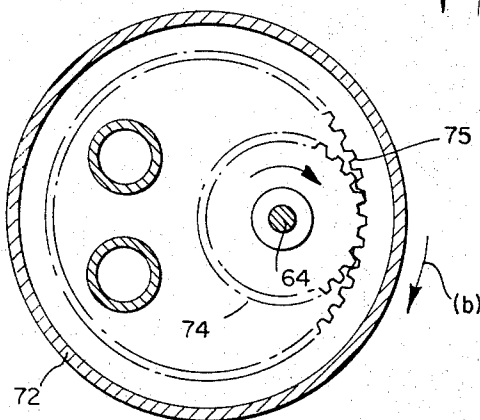
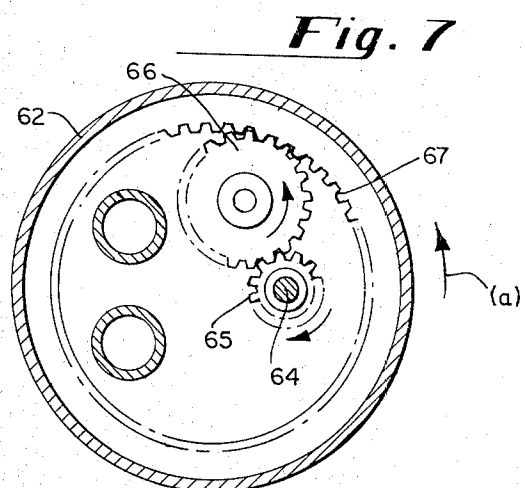


Fig. 2





COMPACT MULTI-FILAMENT TEXTILE YARN AND METHOD OF MAKING THE SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the art of making multiple filament yarn coherent and compact, as distinguished from the bulky or fluffy products that are generally referred to as texturized yarns.

The invention relates particularly to yarn which, even at substantially zero twist, is sufficiently compact for normal high-speed handling in textile fabricating machinery such as machines for winding, knitting, weaving and braiding, for example, but which does not have the high cost of twisted yarns or air-entangled yarns which are currently in use for those purposes. Yarn according to this invention may, however, be subjected to subsequent twisting if this should be desired for any special purpose.

It is well known that synthetic continuous filament yarns, produced in multiple filament form in a spinneret and subsequently drawn, are not often suitable for knitting, weaving or other fabricating uses without having been subjected to some treatment which causes the individual filaments of the yarn to become coherent and compact during the fabricating operation. Otherwise, stray filaments tend to snag and break or contact with fabricating machinery in a manner to form slubs, wraps and the like which are very costly to the fabric producer.

It has, therefore, become conventional in some operations to provide the yarn in the form of a compact filament bundle for high-speed operations by subjecting the yarn to a separate twisting operation. While twisted yarn is in commercial use in large volume today, the extra cost of the separate twisting operation is quite substantial and significantly increases the cost of the fabricated product.

It has also been proposed to make the filaments of zero twist yarn compact by running the yarn through a sizing bath and drying the sized yarn product. The size acts in the manner of an adhesive and maintains the compactness of the filaments in many successful high-speed operations. However, the cost of the sizing material and of the separate sizing operation significantly increases the cost of the fabric product, and it is often necessary for many purposes to subject the resulting fabricated product to an additional washing operation in order to remove the size material from the fabric.

It has also been proposed to subject the filaments of the yarn to a tangling operation so that they retain their compactness during the high-speed fabricating operations. The patent to Bunting et al. U.S. Pat. No. 2,985,995, for example, discloses various forms of air jet devices which are stated to produce a compact yarn composed of filaments at least some of which are randomly interlaced with one another. The continuous use of compressed air, in the quantities that have been found to be necessary for many conventional types of yarn, adds very considerably to the cost of the interlaced yarn product and of the fabrics into which it is made.

The invention also relates to methods of making a compact, coherent zero twist yarn continuously and economically at a high production rate.

It is also known to make a composite yarn by helical wrapping about a core yarn (Kosaka et al. U.S. Pat. No.

3,438,193) and to wrap helically in general (Nalpas et al. U.S. Pat. No. 3,439,484, Cannon U.S. Pat. No. 1,732,593).

With respect to metallic monofilaments, it has also been known to form helical wraps around copper wire, for example, to provide an intervening layer between the copper wire and its insulation. In such cases, however, the copper wire has been a thick, heavy monofilament and there has been no problem with respect to any cohesion of multiple filaments, or any other problem which is analagous to the problems present in connection with this invention.

So far as is known, however, the art has never suggested that such fragile elements as synthetic thermoplastic polymeric filaments could be helically wrapped about a bundle of such filaments without undergoing excessive breakage, or that this would have any benefit. Further, it would be expected normally that the difficulties encountered with tow would be magnified many times if attempts were made to wrap fragile filaments around core filaments to make a yarn.

Accordingly, it is an object of this invention to provide a multi-filament yarn product and a method of making the same, having particular advantage in the textile industry.

SUMMARY OF THE INVENTION

It has been discovered that, when a multi-filament yarn core, which filaments may be arranged at zero twist or twisted, is subjected to wrapping in a generally helical manner with at least a pair of individual filaments one arranged helically in a clockwise manner and the other arranged helically in a counter-clockwise manner, such filaments being applied to the core preferably under low tension, a yarn is created which is sufficiently compact that it can readily be fed into a fabricating machine and knitted, woven or braided, for example, or wound onto a package or bobbin or stored otherwise as a yarn and later withdrawn and used without causing tangling or intermingling of individual filaments. Further, the yarn may be made in such a way that it is sufficiently open that it is particularly receptive to dyeing or to treatment in aqueous or other baths, and may be advantageously and economically dried thereafter.

Yarn according to this invention may be manufactured advantageously of continuous polymeric filaments which can be formed in the undrawn state and then subsequently drawn. For example, the wrapper filaments may be composed of undrawn filaments in the form of a package containing very large numbers of turns arranged around a central opening, as in a bobbin, pirn, beam or the like, so arranged that the core filaments are drawn through the central opening and the wrapper filaments are helically arranged by drawing them endwise off the coil so that the coil configuration causes the natural formation of the helical arrangement about the core filaments.

On the other hand, the core filaments may be spun from a melt spin bath or otherwise, using a conventional spinneret, thus producing a large number of undrawn, parallel core filaments. Undrawn wrapper filaments may then be arranged about the core filaments, by providing rotating spinnerets which surround the stationary spinneret through which the core filaments were created, thus wrapping the wrapper filaments

continuously helically about the core filaments freshly as they are formed.

It is particularly advantageous that undrawn core filaments and undrawn wrapper filaments, having thus been formed into compact undrawn yarn, can be fed directly into a series of draw rolls in such a manner that all of these filaments are drawn together and concurrently as a unitary yarn.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

This invention is directed to a yarn which consists of multiple filaments, wherein the core filaments very substantially outnumber the wrapper filaments. One typical yarn to which this invention has been very advantageously applied has been a nylon yarn of 70 denier in which 30 core filaments are maintained in compact form by four wrapper filaments, two clockwise and two counter-clockwise, wrapped at $\frac{1}{2}$ turn per inch, therefore producing a 70-denier 34-filament product. Other examples include a polyester yarn of about 1,000 denier, 15 denier per filament, composed of 59 core filaments and 18 wrapper filaments (nine and nine). Other yarns for which the invention is ideally suited include nylon multi-filament yarns of denier from about 10 to about 5,000 and even to industrial yarns having deniers of 10,000 and above, and various yarns of all known multi-filament synthetic materials including polyamides, e.g., poly(epsilon caproamide) and poly(hexamethylene adipamide); cellulose esters, e.g. cellulose acetate; polyesters, particularly polyesters of terephthalic acid or isophthalic acid and a lower glycol, e.g., poly(ethylene terephthalate), poly(hexahydro-p-xylylene terephthalate); polyalkylenes, e.g., polyethylene, linear polypropylene, etc.; polyvinyls and polyacrylics, e.g., polyacrylonitrile, as well as copolymers of acrylonitrile and other copolymerizable monomers, and various other synthetic continuous filament materials, regardless of denier per filament and regardless of the cross-section or total denier of the yarn, provided that the core filaments outnumber the wrapper filaments.

The filaments may have a wide variety of cross-sections in addition to the usual circular cross-section, for example elliptical, Y-shape, triangular, heart-shape, square, etc.

Other typical yarns for which this invention is effective appear in the following table:

Yarn Composition	Denier	Filaments	Core Filaments	Wrapper Filaments clockwise/counter clockwise
Polyethylene terephthalate	70	34	32	1/1
"	70	34	30	2/2
"	70	34	26	4/4
"	70	34	20	7/7
Cellulose acetate	150	40	36	2/2
"	150	40	30	5/5 (plied)
"	150	40	24	8/8 (plied)
Cellulose acetate	75	24	20	2/2
"	75	24	18	3/3
"	75	24	16	4/4
"	75	24	14	5/5
Nylon 6-6	70	2/2 34	32	1/1
"	70	34	30	2/2
"	70	34	24	5/5

"	70	34	24	6/4
"	70	34	18	8/8
Nylon 6-6	50	17	15	1/1
"	50	13		2.2
"	50	17	11	3/3 (plied)
Cellulose acetate	300	80	70	5/5
"	300	80	60	10/10
"	300	80	50	15/15

Many other yarns, deniers, and filament arrangements may be used. However it is usually important in accordance with this invention that multiple filaments of the yarn product are arranged in a generally helical manner and of opposite hand about the core filaments. The filaments may be applied singly or, if preferred, doubled.

In applying the wrapper filaments to the core, a controlled amount of tension may be imposed, but it has been discovered that a tight wrap is usually unsatisfactory because of danger of breakage of the wrapper filaments, particularly if they are drawn filaments and even if they are plied. For that reason, substantially zero tension is preferably applied to all filaments when they are in the process of being helically wrapped around the core filaments.

Numerically, the total clockwise and counter-clockwise wrapper filaments may be as low as about 1 percent of the total yarn, up to as high as about 40 percent, preferably in the range of about 1 percent - 20 percent, and even more preferably about 2 percent - 10 percent.

DRAWINGS

FIG. 1 shows schematically an alternate form of apparatus for making continuous filament yarn according to this invention;

FIG. 1(a) is a sectional view taken as indicated by the lines and arrows I(a) — I(a) which appear in FIG. 1;

FIG. 2 is an enlarged view of a length of yarn, shown broken off at the ends, constructed and arranged in accordance with features of this invention, with the ends of some of the wrapping filaments shown broken off at random in order to illustrate the nature of the wrap more clearly;

FIG. 3 shows a modification of a portion of the apparatus appearing in FIG. 1, wherein the filament package may be rotated positively and controllably in a manner to magnify and control the helix angles of the wrapper filaments;

FIG. 4 of the drawings shows schematically a spinning apparatus and method which advantageously causes the formation of a continuous filament yarn embodying features of this invention;

FIG. 5 is a sectional view taken as indicated by the lines and arrows V — V which appear in FIG. 4;

FIG. 6 is an enlarged view, showing a modified spinneret arrangement useful in the practice of this invention; and

FIGS. 7 and 8 are sectional views taken as indicated by the lines and arrows VII — VII and VIII — VIII, respectively, which appear in FIG. 6.

Turning now to FIG. 1, the number 10 designates a conventional melt spin tank and the number 11 designates a conventional spinneret which is connected to the tank in a manner to create a multiplicity of substantially parallel core filaments C. The core filaments C, without any wrapper filaments, are passed about a guide roll 30 for the purpose of assembling them with

clockwise and counterclockwise wrapper filaments. A support 31 is provided carrying a yarn package 32 having a central opening 33 through which the core filaments are conducted. Filaments, preferably undrawn, are wrapped on the package 32 in such a manner that, when the filaments F_1 are taken off the yarn package 32 in an endwise manner as shown in FIG. 3, the wrapper filaments are automatically wrapped in a clockwise direction about the core filaments C. This yarn package 32, as shown, is stationary and contains a very large poundage of fine filaments, such that very great lengths of core filaments can be run through and wrapped in a continuous manner for the yarn package 32.

Another yarn package 34 is provided on a support 35, which is preferably similar to the yarn package 32 but is arranged in such a manner that the filaments F_2 are wrapped in a counterclockwise direction about the core filaments and about the clockwise filaments that have been wrapped about the core filaments in the immediately preceding step. The number 36 designate the rolls of a draw frame 37, in which the core filaments, the counter-clockwise wrapper filaments and the clockwise wrapper filaments are all drawn concurrently and in the same operation. This drawing step may be applied to the compact yarn according to this invention in essentially the same manner in which it is applied to conventional undrawn yarns.

FIG. 1(a) is an end view showing the package of counterclockwise wrapper filaments, with the main bundle of filaments and the counter-clockwise filaments passing through the central opening thereof.

Accordingly, it will be observed that when the filaments are taken off the end of the package 32 they are continuously wrapped helically in a clockwise manner and similarly the filaments taken off the filament package 34 are arranged in a counter-clockwise manner, and this continues automatically so long as the delivery rolls 36 continue to draw upon the compact yarn thus created. There is no practical limit to the number of filament packages that may be utilized, but it is preferred to space the filament packages longitudinally along the length of the core filaments, so that spaces exist between the various filaments in the positions they occupy after they are applied to the core.

A preferred manner of starting up the apparatus of FIG. 1 is to provide substantially equal lengths of filaments on each filament package, 32 and 34, and to start up the spinneret in the usual way, hand-wrapping the wrapper filaments around the freshly made core filaments until sufficient length of wrapped, coherent yarn is provided so that the take-up device 46 takes up not only the core filaments but the spirally wrapped filaments as well. Then, by simply operating the drive of the take-up devices 36, 46, both the core filaments and all of the wrapper filaments are automatically moved as a unit in a longitudinal direction. Suitable contact may be provided at the spinneret in the usual manner.

FIG. 2 shows a length of compact yarn produced in accordance with this invention, showing the relatively large number of core filaments C, together with wrapper filaments F_1 which are arranged generally helically in a clockwise manner and wrapper filaments F_2 which are arranged generally helically in a counter-clockwise manner.

FIG. 3 shows a support 40 for a package 41 of wrapper filaments, mounted on bearings 42 and provided with a pulley 43 driven by a belt 44 powered by a motor

45 in a manner to provide positive rotation to the package of wrapper filaments. Means are provided (such as a conventional rheostat, not shown) for changing and adjusting the speed of the motor 45, thus adjusting and controlling the speed of rotation of the wrapper filaments package 41, thus adjusting the helix angle of wrap (θ , see FIG. 2) of the wrapper filaments.

Normally, it is not necessary to apply special tension to the wrapper filaments and low tension is desirable in order to eliminate breakage. It is, of course, possible to apply special tension devices to the filaments as they pass from the packages to the core, to provide a controlled tension for each wrapper filament. Also, for any specific purpose, it may be possible to apply more tension to one filament than to another filament, and each may be applied at an individual, controlled tension.

Preferably at least two closely adjacent production lines are provided, each using an apparatus of the general type shown in FIG. 1, each including an aligned series of filament bobbins or packages like the packages 32, 34. Change-over is readily effected with such two production lines, the second production line being maintained in a condition ready to operate and provided with fresh packages of counter-clockwise and clockwise filaments whenever the packages on the first production line are about to become depleted. At a given moment, the operator can simply grasp the filament core as it approaches the entrance of one production line and switch it over to the other production line by inserting it into the central opening in the first filament package in the alternate production line. By any convenient means well known in the textile industry, such as a conventional air aspiration tube or stream, for example, the core is forced through the opening at the center of the clock-wise package and then through the opening at the center of the counterclockwise package, the filaments from each are coupled by hand with the core, and operation is continued essentially without interruption.

Referring now to FIG. 4, it will be seen again that a tank 10 of the usual sort is provided for containing the melt spin liquid, which may be any of the well known melt spin baths conventionally used in the manufacture of synthetic filaments such as nylon, polypropylene, polyethylene, cellulose acetate or the like, all of which are in such form that they can be passed through the holes of spinnerets and thus be formed into solid filaments. The melt spin bath is normally maintained under positive pressure by injection of nitrogen gas or by other conventional means. At a suitable location is a stationary spinneret 11 which is provided with a substantial plurality of tiny holes through which the liquid from the melt spin bath may flow, to form a multiplicity of core filaments C.

Arranged concentrically about the stationary spinneret 11 is a ring spinneret 12 which is also arranged to receive liquid under pressure from the melt spin bath in the tank 10, and which is provided with a relatively small number of holes for the formation of wrapper filaments adapted to be arranged clockwise about the core filaments C.

Means are provided for rotating the ring spinneret 12 in a clockwise direction, including a motor 13 and a gear train 14.

Arranged concentrically with and outside of the ring spinneret 12 is another ring spinneret 16 arranged to rotate in a counter-clockwise direction about the sta-

tionary spinneret 11. The ring spinneret 16 is also connected to receive liquid under pressure from the melt spin bath in the tank 10, and is arranged to distribute a small number of wrapper filaments in a counter-clockwise direction around the relatively larger number of filaments in a core C. A motor 15 may be used conveniently to drive the ring spinneret 16 in a counter-clockwise direction, utilizing a gear train 17.

Pressure seals 19 are provided between the melt spin tank 10 and the rotating spinnerets 12 and 16, permitting rotation of the spinnerets without leakage of the pressurized fluid. Although FIG. 4 shows the pressurized seals in perhaps their most simple form, no effort has been made to illustrate the precise details of the rotating seals since various types of such seals, themselves well known in the art, may be used.

Means are provided for solidifying the filaments created in the spinnerets 11, 12 and 16, as by providing an elongated heated air space 20, in a manner well known in the synthetic spinning field. In FIG. 4 a guide roll 21 is shown, around which the solidified and assembled but undrawn yarn is trained, in a manner to conduct the yarn to the draw rolls 18.

FIG. 5 shows that the spinnerets 12 and 16 are arranged concentrically about the stationary spinneret 11 for the purpose of concurrently creating the core filaments, the counter-clockwise wrapper filaments and the clockwise wrapper filaments.

A convenient manner of starting up the apparatus of FIG. 4 is to start up all of the spinnerets 11, 12 and 16 without rotating spinnerets 12 or 16, and to run for a convenient period of time with the "wrapper" filaments parallel to the core filaments, and then to start rotating the inner and outer rotating ring spinnerets 12 and 16. Once operation has been begun, it can be continued without interruption by simply maintaining a proper supply of pressurized liquid in the melt spin bath in the tank 10 and supplying such liquid to the spinnerets 11, 12 and 16.

FIGS. 6 - 8 show a modified form in which the need for slidable pressure seals is eliminated. As heretofore described, a main tank 10 is provided for supplying the pressurized melt spin fluid to the central spinneret 11. However a supplemental melt spin tank 60 is mounted on rollers 61 on top of tank 10. Tank 60 has an inner wall 62 creating an open central space 63 housing a drive shaft 64 and, see particularly FIG. 7, pinion 65, gear 66 and ring gear 67 through which the entire tank 60 is driven in rotation in the direction indicated by the arrows (a) in FIG. 7.

Another supplemental melt spin tank 70 is mounted on rollers 71 on top of tank 60. Tank 70 has an inner wall 72 creating an open central space 73 housing the same drive shaft 64 and, see particularly FIG. 8, pinion 74 and ring gear 75 through which the entire tank 70 is driven in rotation in the direction indicated by the arrow (b) in FIG. 8, opposite to the direction of rotation of tank 60.

Drive shaft 64 is power driven by motor 80.

Connected into tank 60 is a rigidly hung pressure pipe 81 from which the planetary spinneret 12 is hung. Similarly, a rigid pressure pipe 82 is connected to tank 70 and extends at a location spaced outwardly of pipe 81 down to a location below spinneret 12, where planetary spinneret 16 is attached to pipe 82.

It will be apparent that the pipe 81 and attached planetary spinneret 12 are driven continuously in rotation

in a given direction (say clockwise) around the core filaments C, thus applying one or more wrapper filaments continuously in that direction, and that planetary spinneret 16 revolves in the opposite direction, applying one or more wrapper filaments in the opposite direction.

Since the spinnerets 12, 16 are sealed in a fixed manner to pipes 81, 82 and since those pipes are sealed in a fixed manner to their respective tanks, there is no need to use or to maintain or replace any sliding pressure seals of the type shown in FIG. 4 and the apparatus is capable of operating in a continuous manner for a virtually indefinite period of time by merely continuously feeding the melt spin fluid to the main tank 10 through the feed pipes 85, 86 which extend through the inner spaces 63, 73 into the top of the tank 10. Since the capacities of the tanks 60, 70 are virtually unlimited and since the fluid consumption of the wrapper filament spinnerets 12, 16 is very small compared to that of the core filaments spinneret 11, the apparatus may be operated for a virtually indefinite period without needing to refill the rotating tanks 60, 70.

In many cases it is preferable to provide a wrapper filament of the same filament type and denier per filament as the core filaments. However, for other uses, it is not essential to meet this requirement, and using any of the forms of apparatus heretofore described in this specification the wrapper filaments may indeed be composed of other types of filament, and of deniers which differ from the deniers of the core filaments by suitably selecting the chemical composition, shape, etc. of each filament. For example, it is possible to use wrapper filaments which may be of different chemical nature, or of different cross-section from the core filaments or from each other. Indeed, the wrapper filaments may even be of a type that may later be dissolved for the purpose of removing them from the core filaments after the fabric has been formed.

Although this invention may be utilized in conjunction with core filaments which have been drawn, (as by applying the packages 32 and 34 at the location 32', 34' in FIG. 1) or even with wrapper filaments which have been drawn, it is preferred for reasons of strength that the very fine wrapper filaments be applied in the undrawn state. It is also highly preferred that both the core filaments and the wrapper filaments be undrawn at the time the yarn is assembled, and that they subsequently be drawn concurrently. In some cases, straggler filaments are a problem, especially when the wrapper filaments are loosely wrapped, and drawing eliminates all stragglers.

The use of undrawn filaments is particularly advantageous with respect to dyeing, because they can be dyed more deeply and with radically better penetration when they are undrawn.

When undrawn filaments are used, it is usually necessary to apply a steeper initial helix angle θ than is the case with drawn yarns. This is because the drawing tends to decrease the helix angle, making the helix angle shallower. Undrawn yarn packages cost less than drawn yarn packages, and are much less susceptible to breakage, particularly when filaments are plied.

In using the apparatus of FIG. 3, wherein the filament packages are positively driven, it has been observed that the peripheral speed of the filaments varies depending upon the diameter of the filament package at the time. Thus, with constant speed drive, the periph-

eral speed of the filaments decreases as the filaments are removed from the package. It is preferable to compensate for this effect by gradually increasing the speed of rotation of the filament package as its diameter decreases and this can be accomplished by using standard electronic devices well known in the textile field, for maintaining a constant peripheral speed of the filaments.

A wide variety of other modifications may be made. For example, when it is desired to produce a crimped continuous filament yarn which is nevertheless sufficiently compact to be processed mechanically without twisting or other treatment, the core filaments may be crimped in the undrawn condition and then subjected to counterclockwise and clockwise helical wrapping of wrapper filaments, following which the product may be drawn. The drawing tends to remove a substantial amount of the crimp, but subsequent heat setting restores some of the crimp and produces a yarn having beneficial characteristics.

On the other hand, it is sometimes desirable to dye the undrawn core filaments, with or without crimping, and then to perform the clockwise and counterclockwise helical wrapping operations, followed by drawing and heat setting. This is advantageous because of the dye receptivity which is inherent in undrawn filaments.

In accordance with this invention, yarns can be made which are self-texturizing by using as the wrapper filaments materials having different shrinkage characteristics than the material of which the core filaments are composed. The use of wrapper filaments which shrink more than the core filaments also tends to produce a yarn having pronounced qualities of coherence and compactness.

Yarn in accordance with this invention may, of course be subjected to one or more subsequent operations, such as twisting or jet entangling, for example. Indeed, in some types of ordinary jet entangled zero twist yarns, subsequent handling operations tend to take out a significant amount of entanglement. With yarn according to this invention, the presence of the helically arranged wrapper filaments tends to provide a permanent base, or anchor, for filaments subsequently displaced by jet entanglement and the product is thus more resistant to disentanglement during subsequent processing or handling operations.

Various other modifications may be resorted to without departing from the spirit and scope of this invention. For example, equivalent elements may be substituted for those specifically disclosed herein, certain features of the invention may be used independently of other features, and various modifications may be made in the form of the method by which the wrapper filaments are applied to the core filaments, all within the spirit and scope of this invention as defined in the appended claims.

The following is claimed:

1. Compact yarn comprising a plurality of flexible continuous core filaments having substantially zero twist wrapped in coherent fashion under low tension by flexible wrapper filaments spirally arranged about and in contact with said core filaments, the number of core

filaments being greater than the number of wrapper filaments, at least one of said wrapper filaments being arranged in a clockwise direction and at least another in a counterclockwise direction, said wrapper filaments being composed of continuous filament synthetic polymeric material, and one such wrapper filament being spiraled over the exterior of said core filaments and repeatedly and successively over another wrapper filament as well.

2. The yarn defined in claim 1 wherein said core filaments are continuous filaments of synthetic polymeric material.

3. The yarn defined in claim 2 wherein at least the majority of said core filaments and at least the majority of said wrapper filaments are composed of essentially the same synthetic polymeric material.

4. The yarn defined in claim 1 wherein said wrapper filaments are composed of undrawn synthetic organic material.

5. The yarn defined in claim 1 wherein both said wrapper filaments and said core filaments are composed of undrawn synthetic organic material.

6. The yarn defined in claim 1 wherein the yarn has a denier of about 10 to 10,000.

7. The yarn defined in claim 1 wherein the wrapper filaments comprise numerically about 1 percent - 20 percent of the total filaments of the yarn.

8. The yarn defined in claim 1 wherein the core filaments and the wrapper filaments are closely adjacent and randomly tangled.

9. The yarn defined in claim 1 wherein the core filaments and the wrapper filaments are twisted about the yarn axis.

10. The yarn defined in claim 5 wherein said core filaments are continuous filaments.

11. The yarn defined in claim 1, wherein the core filaments are crimped undrawn, and are subsequently heat set.

12. The yarn defined in claim 1, wherein the wrapper filaments are wrapped about said core filaments at substantially zero tension.

13. The yarn defined in claim 1, wherein the wrapper filaments comprise numerically about 2% to 10% of the total filaments of the yarn.

14. In a method of making a compact yarn, the steps which comprise continuously feeding a multiplicity of drawable continuous synthetic core filaments along a predetermined path, continuously applying a continuous synthetic drawable wrapper filament in a spiral manner around the core filaments, continuously applying another continuous synthetic drawable wrapper filament in a counter spiral manner around the core filaments plus the wrapper filament previously wrapped, and drawing the resulting yarn.

15. The method defined in claim 14, wherein the core filaments are crimped prior to the application of the wrapper filaments.

16. The method defined in claim 14, wherein the core filaments are dyed prior to the application of the wrapper filaments.

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