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[54] BULKY YARN AND METHOD OF PRODUCING THE SAME

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[51] Int. Cl. **D02g 3/04, D02g 1/02**

[58] Field of Search **57/139, 140 R, 140 BY, 57/144, 156, 157 R, 157 TS, 157 MS**

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[57]

ABSTRACT

A bulky yarn comprising staples constituting a spun yarn and thermo-plastic synthetic filaments both of which are crimped and mixed uniformly in a loose and twisting state. The bulky yarn may be produced by feeding the spun yarn and the thermo-plastic synthetic filaments, and then crimping by passing them through processes of twisting-heat setting-releasing twist.

6 Claims, 6 Drawing Figures



FIG. 1



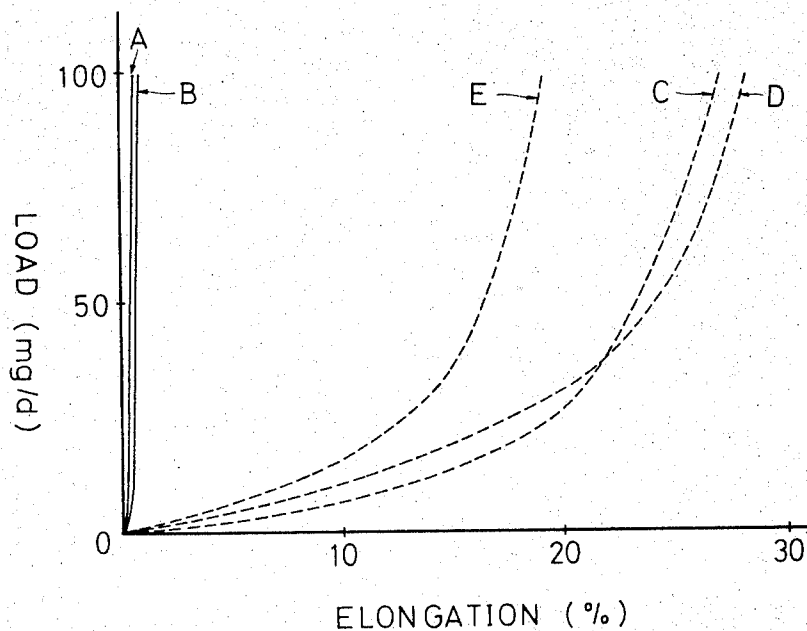
FIG. 2



FIG. 3



FIG. 6



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FIG. 4

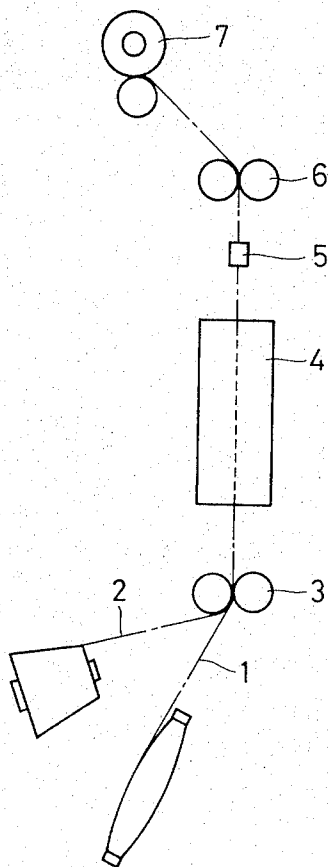
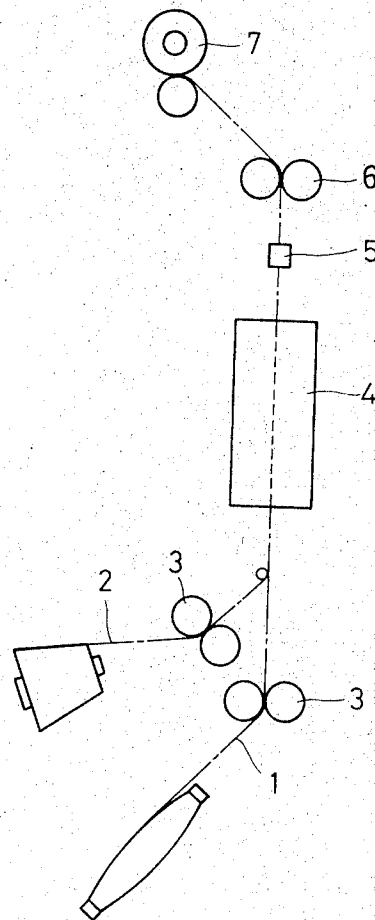


FIG. 5



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BULKY YARN AND METHOD OF PRODUCING THE SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a high bulky yarn and a method of producing the same, and more particularly to the high bulky yarn comprising staples which constitute a spun yarn, and thermo-plastic synthetic filaments. The yarn may be produced by a crimping method of the invention.

1. Description of the Prior Art

Many bulky or stretch yarns such as a bulky yarn produced by shrinking acrylic filament and the like (hereinafter referred to as "a high bulky yarn"), a spun yarn comprised of conjugated staples (hereinafter referred to as "a conjugated yarn"), a core yarn produced in a spinning process by covering bulky filaments fed as core yarn by staples, and other specified twisting yarns are known in the prior art. However, each of the conventional textured yarn and the bulky or stretch yarns have certain defects.

A high bulky yarn is bulked by mix spinning of shrinking staples and non-shrinking staples and then by wet setting the yarn so that only the shrinking staples shrink to form the core and shorten the length of the yarn about 20 percent, thereby causing the non shrinking staples to stick out of the yarn as shown in FIG. 1. This high bulky yarn has poor stretching and shrinking properties. In the yarn, the shrinking staples are separated from the non-shrinking staples, and the surface of the yarn formed by non-shrinking staples sticking out of the yarn is irregular and rugged. Moreover the high bulky yarn has poor elasticity and strength because the elasticity and the strength of the yarn come from the shrinking staples.

The conjugated yarn is provided bulkiness, the same bulkiness as bulky filaments have, by heating a yarn which is spun by staples having crimping properties to cause crimping. Therefore the bulkiness and stretch of the yarn are not enough since the staples are restricted by the twist of the yarns. The core spun yarn are spun by the manufacturing method mentioned above. It is the yarn, as shown in FIG. 2., comprising bulky yarn 1 in the core part of the yarn and staples 2 covering said core which is a yarn in ideal condition. But in fact it is difficult to achieve a condition wherein the bulky yarn is set in the core part and the surface of the yarn is not made uniformly by forcing out the bulky yarn to the surface. When a bulky yarn having a denier less than 17 percent of a denier of the core yarn is used as a core yarn in order to improve the aforementioned above inconvenience, it may be too expensive by using such a core yarn of fine denier and may have less bulkiness and stretch.

Other covering yarn using a bulky yarn as a core yarn and using a spun yarn as a winding yarn, non-twisted yarn and etc. are too highly priced, have low strength of the yarn, are fluffy, thereby rendering them not suitable for practical use.

SUMMARY OF INVENTION

An object of the invention is to provide a new bulky yarn comprised of staples constituting a spun yarn and synthetic filaments.

A further object of the invention is to provide a simple process of producing the bulky yarn.

Another object of the invention is to provide a bulky yarn having high bulkiness and good stretch.

Still another object of the invention will become apparent upon consideration of the following description when taken in conjunction with the accompanying drawings.

This invention relates to a bulky yarn comprising staples constituting a spun yarn and thermo-plastic synthetic filaments which are crimped and are mixed uniformly in a loose and twisting state. The bulky yarn is produced by feeding the spun yarn and the thermo-plastic synthetic filaments, and then crimping them by passing them through a process of twisting-heat setting-releasing twist.

A feature of the invention is that the spun yarn and the synthetic filaments are fed by means of the same feed rollers or by means of different feed rollers individually.

BRIEF DESCRIPTION OF THE DRAWINGS

The aforementioned and other objects and features of the invention will be apparent from the following detailed description of a specific embodiment thereof, when read in conjunction with the accompanying drawings in which

FIG. 1 shows a schematic and fragmentary view of "high bulky yarn" in the prior art;

FIG. 2 shows a schematic and fragmentary view of core spun yarn in the prior art;

FIG. 3 shows a schematic and fragmentary view of the bulky yarn of the invention;

FIG. 4 shows a schematic view illustrating an apparatus for false twist which is used to work the invention;

FIG. 5 shows schematic view of illustrating another apparatus for false twist which is used to work the invention; and

FIG. 6 shows a graph illustrating elongation diagrams of the yarn by the invention and of the conventional yarn.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 4 and FIG. 5 of the drawings, there is shown an apparatus for false twist which is used to work the invention. In these drawings feed rollers 3, heater 4, false twist spindle 5 and take-up motion 7 are illustrated, of which the detailed structures of the inner parts are the same as of conventional ones. Filaments 1 and spun yarn 2 are used as yarns for raw materials. They are fed, pulled and arranged by the same feed rollers 3 as shown in FIG. 4 or by different feed rollers individually as shown in FIG. 5, to a false twist machine 5 for doubling and twisting. In this manner the filaments 1 and spun yarn 2 are pulled and arranged to the false twist machine and any direction of false twist can be selected, but reverse direction of false twist against first twist may be selected if desired. Such false twist in the reverse direction creates fine crimp in the yarns by leading numbers of false twist. Moreover in this process such false twisting spun yarn 2 comes into a non twisted state momentarily so that synthetic filaments 1 and staples constituting the spun yarn 2 are mixed uniformly and the spun yarn is made bulky and stretched together with the filaments 1. Thus in the invention the bulky yarn whose surface is flat and uniform may be

produced by only one process. When the direction of false twist is the same direction as that of first twist of the spun yarn, almost the same effect as above can be achieved by adding twist to the spun yarn and the filaments in the reverse direction against that of first twist after false twist, or by doubling and twisting them in the reverse direction against that of first twist before false twist.

Referring to FIG. 3 of the drawings, there is shown a schematic and fragmentary view of bulky yarn of the invention, illustrating that the thermo-plastic synthetic filaments 1 and the spun yarn 2 are both crimped and are mixed uniformly in a loose and twisting state.

In one embodiment of the invention using a spun yarn including thermo-plastic synthetic staples, the staples are also crimped and thus a higher bulky yarn may be obtained. That is, in the invention notwithstanding a direction of false twist a uniform yarn having less torque may be obtained by adding a twist in a reverse direction against that of the false twist after false twisting. If the bulky yarns of the invention are treated with steam, are making the yarns into a hank, bulkiness and elasticity are improved. In order to mix the staples into the filament uniformly, the denier of the filament should be about 15 - 40 percent the denier of the spun yarn. More particularly, to maintain feeding of the spun yarn and also to give bulkiness it is desirable to use filaments of about 30 percent denier, longer staples constituting spun yarn may also be used, and the more desirable mixing and twisting of staples and filaments may be performed.

In the bulky yarn of the invention comprising staples and filaments which are mixed in a loose and twisting state and are crimped together the defects of conventional yarn such as low strength caused by fluffiness, and fine denier of yarns are eliminated. The yarn of the invention has uniform stretch and bulkiness and has not only the feeding of spun yarn but also the feeding of filaments. It is a spinning yarn, in which staples of spun yarn are mixed properly, having high bulkiness, stretching, soft feeling to the touch and uniform surface of the yarn.

In the method of the invention the spun yarn and the thermo-plastic filaments are fed by the same feed rollers or by different feed rollers and are crimped by a method of twisting-heat setting-releasing twist so that they are mixed uniformly and have high bulkiness and stretch. In the invention crimping is very easy and the yarn is not cut in the process of crimping. Therefore, since the filaments are crimped at the same time and made bulky and stretch, they are lower in price as compared with known core-spun yarn and their output can be higher. The following are examples of the high bulky yarn of the present invention.

Example 1

A polyester-wool blended yarn 1/40's and tetoron filaments 75d are pulled and arranged and twisted for false twist under a condition of rotating a false twisting spindle 100,000 times/min., S-Twist, twisting number 1750 times/m, heat setting temperature 225°C and percent of feeding -2 percent. Two yarns thus obtained form two folded yarns giving them Z-twist of 80 times/m. This yarn can be used as yarn for knitting a flat knitted fabric. A yarn obtained in accordance with

this example is a yarn having a bulkiness of 2 - 3 times that of material, 18 percent of elongation, and is soft to in touch.

Example 2

A spun yarn of acrylic fiber 100 percent, 1/60's and nylon filaments 50d are pulled and arranged and twisted for false twist under a condition of rotating of a false twisting spindle 1,000,000 times/min., S-twist, twisting number 2150 times/m, heat setting temperature 180°C and percentage of feeding 0 percent. After that followed Z-twist and adding twist. The yarn thus obtained is one having a bulkiness of 2 - 3 times that of material and 28 percent of elongation. When the yarn is knitted in a fabric by a circular knitting machine, it has great bulkiness and elastic elongation compared with spun yarn for material.

The following table shows data in regard to a special quality in bulkiness of two yarns of the invention and three known yarns.

Yarn species	material	count of yarn	bulkiness specific volume	specific gravity
A. normal spun yarn	acrylic fiber 100%	1/60"	2.67 cm ³ /g	0.38 g/cm ³
B. conjugated yarn	acrylic fiber 100%	2/60"	3.13	0.32
C. core-spun yarn	acrylic fiber nylon false twist yarn	2/24"	7.50	0.13
D. yarn of the invention	ester-cotton blended yarn ester filament	185d/2	6.12	0.16
E. yarn of the invention	ester-wool blended yarn ester filament	300d/2	5.86	0.17

Elongation diagrams of these A - E yarns are illustrated in FIG. 6. From this data and diagrams it is known that the yarn of the invention has a bulkiness 2 - 3 times that of normal spun yarn and conjugated yarn. In the special quality of elongation the yarn of the invention is almost identical with core-spun yarn using nylon filament which is excellent in elongation and, as illustrated in the elongation diagram, the elasticity of the yarn of the invention in the beginning is more than that of core-spun yarn.

It is believed that the bulky yarn of the present invention and the method of producing it will be apparent from the foregoing description. While the bulky yarn and the method have been described as being suitable for the object of the invention, it will be obvious that various changes and modifications may be made therein without departing from the spirit and scope of the invention, as defined in the annexed claims.

What is claimed is:

1. A bulky yarn comprising staples of spun yarn crimped and loosely and uniformly mixed and intertwined with thermo-plastic synthetic filaments to form a yarn having a uniform consistency along its entire length and width.

2. A method of producing a bulky yarn comprising forming a blend of a spun yarn and thermo-plastic synthetic filaments and crimping said yarn and filaments by passing them through a process of twisting-heat setting-releasing the twist and thereby mixing said staples and filaments uniformly.

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3. The bulky yarn as claimed in claim 1 wherein the denier of the filaments is from 15 to 40 percent of the denier of the spun yarn.

4. The bulky yarn as claimed in claim 3 wherein the denier of the filaments is 30 percent of the denier of the spun yarn.

5. The method as claimed in claim 2 wherein the spun yarn and the filaments are blended and fed to the

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twisting-heat setting-releasing the twist process by the same feed rollers.

6. The method as claimed in claim 2 wherein the spun yarn and the filaments are fed to the twisting-heat setting-releasing the twist process by different feed rollers.

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