

[54] YARN STRUCTURE AND METHOD OF MAKING SAME
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[51] Int. Cl. D02g 3/04, D02g 3/32
[58] Field of Search 57/3, 6, 18, 36, 50, 34 R, 57/144, 160, 152

[56] References Cited
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[57] ABSTRACT
A yarn and method of making same formed from a roving having a plurality of substantially parallel untwisted discontinuous textile fibers and a single continuous yarn strand wrapped about said roving forming spaced-apart helices having uniform directions.

5 Claims, 5 Drawing Figures



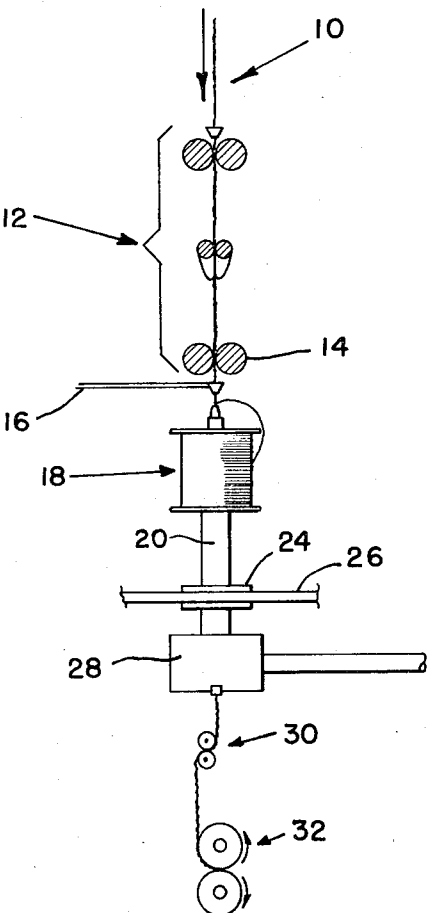


FIG. 1

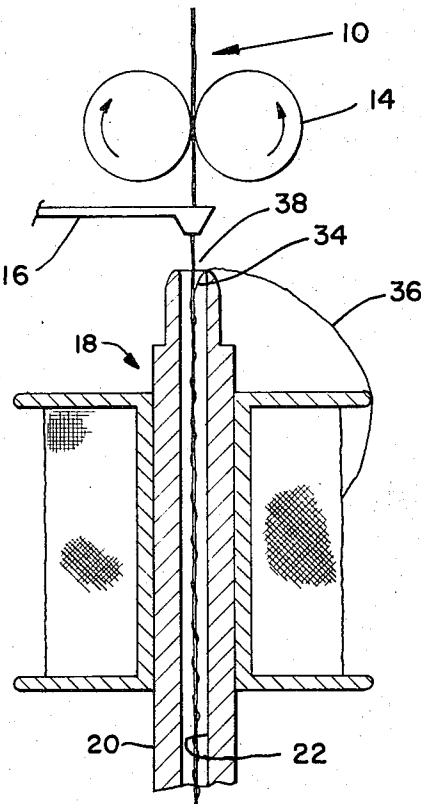


FIG. 2

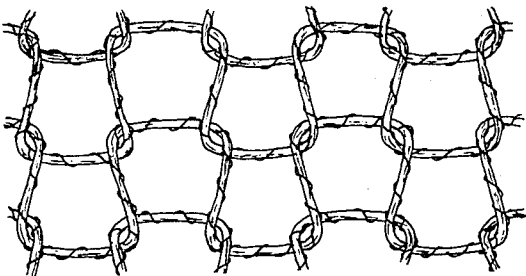


FIG. 4

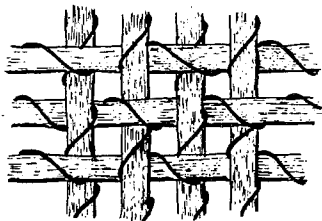


FIG. 5



FIG. 3

YARN STRUCTURE AND METHOD OF MAKING SAME

BACKGROUND, BRIEF SUMMARY AND OBJECTIVES OF INVENTION

The most common types of staple yarns used in the textile industry are those made on ring spinning frames, on open-end spinning frames, and on apparatus commonly referred to as "self twist" spinning machines. In the processing of yarn on either of these machines, twist is required to bind the staple fibers together to form a continuous thread.

In ring spinning, twist is imparted to the drafted roving by rotating the take-up bobbin about its longitudinal axis. It is necessary to employ a ring traveler rotatably carried about a ring which is located concentrically about the bobbin and its longitudinal axis. Imparting twists in this manner imposes great forces on the yarn, and breaks, lint collection and other nonuniformities can occur. Additionally, the production rate is limited by the mechanical limitations of the speed of the ring traveler in its movement around the bobbin.

In open-end spinning, twist is imparted by the turbin fiber collector. Since turbin speeds are in the range of 30,000 to 50,000 r.p.m., the diameter is limited by the centrifugal forces imposed on the turbin bearings. Fibers deposited on the inner flange of the turbin cannot be allowed to overlap themselves, and therefore the lengths of staple fibers that can be processed is limited. It has been found that high twist is necessary to give sufficient yarn strength. Because drafted fibers have to be deposited into the turbin almost individually, some fiber types and lengths cannot be satisfactorily used.

In the "self twist" spinning process, yarns with high residual torque are produced which makes it necessary to ply two ends of opposite torque together in order to knit or weave them satisfactorily.

Variations of plied yarns such as discussed above have been developed representative of which is the disclosure of U. S. Pat. No. 3,070,950 wherein a single twisted strand is wrapped or plied with a separate continuous fiber so that the two are intermingled and form a yarn having certain desirable characteristics.

The present invention is directed to a novel yarn different from any presently produced on conventional spinning equipment since twist is not used to produce a continuous thread. Additionally, certain advantageous characteristics in other yarn producing methods are effectively used. In the broadest terms, this yarn would be formed by wrapping a drafted roving as it emerges from the rolls of a drafting unit with a continuous yarn or binder strand which would thus bind together all of the roving fibers. The roving is formed from a plurality of substantially parallel untwisted discontinuous textile fibers, and this fiber bundle is thus bound together by the cover yarn. Since the leading end of each fiber would be wrapped before the trailing end is released by the front rolls of the drafting unit, a uniform and lint-free yarn will result.

With reference to the yarn covering technical area, core yarn normally passes through a spindle carrying wrapping yarn from a lower position to an upper position. In the present invention, this process is reversed since untwisted and substantially parallel discontinuous fibers would likely separate if conventional wrapping techniques are followed.

From the foregoing, it will be apparent that the primary objective of the present invention is to provide a functional yarn possessing normal yarn characteristics yet which will have more uniformity and greater strength than conventional ring-spun yarns.

Another objective of the present invention is to produce a yarn of the type described which will generate lower lint during the production process than yarn produced in conventional spinning.

A further objective of the present invention is to provide a method for making the yarn as described which will result in a production rate significantly higher than that of ring-spinning and other methods of yarn spinning which are conventionally used today.

These and other objectives of the present invention will become more apparent after consideration of the following detailed specification taken in conjunction with the accompanying drawing wherein like characters of reference designate like parts throughout the several views.

FIGURE DESCRIPTION

FIG. 1 is a schematic and diagrammatic view of the components of an apparatus utilized in producing the yarn comprising the present invention wherein a roving is wrapped with a continuous yarn strand and the resulting product is accumulated on a collecting roll.

FIG. 2 is an enlarged, sectional view of the strand-wrapping station illustrated as one component of FIG. 1.

FIG. 3 is an enlarged plan view of the yarn constituting the present invention.

FIG. 4 is a plan view of a knitted fabric made from the yarn illustrated in FIG. 3.

FIG. 5 is a plan view of fabric woven from the yarn illustrated in FIG. 3.

DETAILED DESCRIPTION OF THE DISCLOSURE

Referring now to the drawings and particularly to FIG. 1, a roving generally designated 10 consisting of a plurality of substantially parallel, untwisted, discontinuous textile fibers is moved downwardly (see arrow) from a supply (not shown) through a roving drafting unit shown generally as 12. The roving emerges from the last pair of drafting rolls 14 in a generally conventional form wherein a plurality of substantially parallel untwisted discontinuous textile fibers are passed between rollers 14 in the conventional manner.

The roving then moves through a guide 16 which is utilized merely as a control measure and then through a wrapping station indicated broadly as 18 comprising a spindle 20 and necessary structure for accomplishing the wrapping operation (see FIG. 2).

The fibers are moved continuously downwardly through a hollow chamber 22 extending through spindle 20 which is, incidentally, driven by an extended hub 24 frictionally engaged by a drive belt 26 in a conventional manner.

It is important within the context of the present invention that the yarn fibers remain untwisted and generally aligned in a parallel relationship. To ensure that this takes place, a vacuum 28 is positioned below spindle 20 so that a resulting air flow is induced in the same direction as the yarn movement. This vacuum 28 also serves to collect any loose lint that might be present in the roving. Additional rollers and other suitable con-

ventional equipment may be used to further ensure yarn uniformity.

Other nip rolls 30 may be used to establish complete yarn uniformity. The resulting product is wound on a take-up roll 32 for subsequent use with knitting machines or looms as might be desired.

To illustrate more acutely the merits of the present invention, reference is directed now to FIG. 2 wherein roving 10 moves between the last roll 14 of drafting unit 12 through guide 16 and into the internal chamber 34 of spindle 20. Spindle 20 naturally deposits yarn strand 36 about roving 10 as it passes through the uppermost entrance 38 as shown.

Depending upon the rotational speed of spindle 20, helices or coils from binder strand 36 are positioned in a uniform and consistent manner as will be shown in FIGS. 2 and 3. Obviously, any change in rotational speed of spindle 20 or movement of roving 10 will alter the turns per unit deposited about the roving.

FIGS. 4 and 5 illustrate representative fabric samples utilizing the present invention which has certain proven advantageous characteristics over and above those conventionally processed yarns. For example, the yarn disclosed in the present invention will be more uniform, stronger, and lower in cost than conventionally produced yarns. Test procedures show that the production rate of the yarn constituting the present invention will be 8 times that of conventional spun yarn and at least twice that of the most recently-developed technique of open-end spinning to produce yarn.

Various fiber combinations may be used in the roving which will be covered by preferably a fine denier yarn such as 20 denier 7 filament nylon, although 30 denier and 70 denier cover yarns have been successfully utilized. The cover yarn can be polyester or conventional spun yarn. Roving fibers are desirably of a length sufficient to be engaged by and extend from the rolls of the drafting unit while their leading ends are being wrapped by the binder strand, and may be, for example, 100 percent polyester, 3 denier per fiber and 3 inch staple length. Obviously blends of polyester, cotton or other fibers are equally suitable for the roving. Any length staple fiber which can be drafted may be used as the roving.

Another roving fiber combination has been developed that will, when wrapped, result in a yarn of novel construction. Spandex can be included in, for example, a cotton, polyester or blended roving for subsequent covering as suggested above to produce an elastic or stretch yarn having a variety of uses in garment fabrics.

Various fabric effects may be obtained by using yarn produced according to the present invention. For example, a dyed cover yarn may be used to achieve a muted tone in the fabric without further dyeing. This can reduce costs by eliminating the use of blends and cross-dyeing.

The following example compares conventional ring-spun yarn and a yarn formed according to the present invention.

EXAMPLE 1

	Conventional Ring-spun Yarn	Cover Spun Yarn No. 1	Cover Spun Yarn No. 2
Roving	1.5 denier, 1.5 polyester staple	1.5 denier, 1.5 polyester staple	1.5 denier, 1.5 polyester staple

EXAMPLE 1-Continued

	Conventional Ring-spun Yarn	Cover Spun Yarn No. 1	Cover Spun Yarn No. 2
Cover yarn	—	70 denier textured nylon	20 denier 7 filament nylon type 66
Size	23.8 cotton count 13.3	21.7 cotton count 10.3	21.7 cotton count 12.0
% coefficient of variation			
Twist	17.1 turns/inch	12 wraps/inch	12 wraps/inch
Tensile strength	25.6 grams force/tex	33.3 grams force/tex	31.7 grams force/tex
Elongation at break	22.7%	24.5%	22.3%

The present invention provides a wide variety of different yarn structures made from different fiber compositions as described and exemplified above. The wrapped yarn disclosed herein is useful for preparing a number of different types of woven, knitted, non-woven and tufted fabrics both in the industrial field as well as the apparel textile field. Many variations of the present inventive concepts are contemplated and are deemed to be within the spirit and scope of the present disclosure. It is to be understood that the invention is not limited by these specific illustrations except to the extent defined in the following claims.

We claim:

1. A yarn comprising a strand of substantially parallel untwisted discontinuous textile fibers, a continuous strand of spandex in said strand of untwisted fibers, and a continuous binder strand wound about said strand of untwisted fibers and forming spaced-apart helices therealong.

2. A method of making yarn which comprises drafting a strand of substantially parallel untwisted discontinuous textile fibers by passing the same through rolls of a drafting unit while downstream thereof wrapping a continuous binder strand about the drafted strand to form spaced-apart helices thereon as the drafted strand in untwisted condition moves from the drafting rolls along a predetermined path of travel and wherein the discontinuous fibers of the strand are generally of a length sufficient to be engaged by and extend from the rolls of the drafting unit while their leading ends are being wrapped by the continuous binder strand.

3. A method according to claim 2 wherein a continuous strand a spandex is incorporated in the drafted strand for being wrapped therewith by the continuous binder strand.

4. A method according to claim 2 including the additional step of further aligning the discontinuous textile fibers of the drafted strand in parallel and untwisted relationship by inducing an air flow longitudinally of the fibers after the fibers emerge from the rolls of the drafting unit.

5. A method of making yarn which comprises drafting a strand of substantially parallel untwisted discontinuous textile fibers by passing the same through rolls of a drafting unit while downstream thereof wrapping a continuous strand about the drafted strand to form spaced-apart helices thereon as the drafted strand in untwisted condition moves from the drafting rolls along a predetermined path of travel and wherein the fibers of the drafted strand are further aligned in parallel and untwisted relationship by inducing an air flow longitudinally of the fibers after the fibers emerge from the rolls of the drafting unit.

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