ABSTRACT

In a spinning operation in which two strands are fed from separate nip positions and are twisted together into a single ply at a convergence point, twist is incorporated into the single strands by intermittently blocking the twist at a position between the convergence point of the strands and the point of application of the twist. The operation can be performed by a standard spinning frame modified to incorporate a convergence guide and a twist blocking device.

15 Claims, 3 Drawing Figures
APPARATUS AND METHOD FOR THE MANUFACTURE OF TWISTED AND PLEDY YARN

BACKGROUND OF THE INVENTION

This invention relates to the production of textile yarns and in particular to yarns of a multi-ply structure in which at least two individual strands of fibres are combined in such a way that the compound structure contains twist in the individual strands as well as plying twist. The objectives in using multi-ply yarns and two-fold yarns in particular, rather than singles yarns is to improve the performance of the yarns in subsequent processes such as weaving and to enhance the properties of the resulting fabrics. This invention aims to produce such a yarn in a single spinning operation.

In the ensuing discussion, reference will be made to the twist in the strands and in the plied two-fold yarns. It will be realised that the existence and direction of twist is relative to the viewing position of the observer; throughout this specification, the twist will be described with reference to the axis of the plied yarn or the individual strand as the case may be, as seen by a stationary observer from a position displaced laterally from the yarn.

Yarns of the type disclosed herein, in which at least two strands are twisted together while incorporating singles twist into each of the strands, are usually intended for weaving into normal fabrics and are preferably uniform in the sense that at any position along the length of the yarn the single strands are wound substantially equally about one another with neither predominating.

PRIOR ART

U.S. Pat. No. 3,695,019 discloses a process for forming a yarn comprising at least two strands plied together, wherein there is twist in each of the individual strands. In the process described therein, single strands emerging from separate feeding points of a drafting mechanism are twisted together at a convergence point which is moved so as to cyclically vary the distance between the convergence point and the feeding points while at the same time the rates of feeding each strand to the convergence point are maintained substantially equal. This process produces a yarn structure in which the plying twist between the strand is maintained in a given direction, but varies cyclically in intensity along the length of the structure and in which each of the strands is itself twisted with twist of cyclically varying direction and intensity.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a simple process and apparatus for producing, in a single twisting operation, a yarn comprising at least two strands plied together, wherein there is twist in each of the individual strands.

A particular object of the invention is to provide a simpler and more compact apparatus than that described in U.S. Pat. No. 3,695,019 for the production of yarn of the type disclosed therein.

In accordance with the invention there is provided a process for producing a yarn, comprising at least two strands plied together, wherein there is twist in each of the individual strands. The process comprises the steps of separately feeding each strand from a feeding point and converging them at a convergence point, twisting the strands together, and intermittently blocking the twist at a position between the convergence point of the strands and the point of application of the twist.

The strands are preferably both fed from a single conventional drafting unit, the feeding points being preferably arranged so that they are symmetrical about a plane passing through the convergence point.

The invention also provides apparatus for producing a yarn comprising at least two strands plied together, and wherein there is twist in each individual strand, which apparatus comprises means for separately feeding each strand from a feeding point, convergence means for converging the separate strands, twisting means for applying twist to the converged strands to twist them together, and intermittently operable twist blocking means for effecting intermittent blocking of the twist at a position between the convergence means and the point of application of the twist.

One apparatus suitable for application of the invention comprises essentially a standard spinning frame having drafting mechanisms each arranged to deliver a strand through a conventional thread guide, such as a simple “pot-eye,” to the traveller of a conventional ring spindle.

In this apparatus, each drafting unit is modified to supply two separate strands to a convergence guide where they are plied together and spun on to the spindle as a two-fold yarn. Without further modification, a yarn of the “double-rove” type, with only very little randomly occurring strand twist would then be produced. Modification of such an apparatus for operation according to this invention may be carried out as shown in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic front elevational view of part of a spinning frame modified according to this invention;

FIG. 2 is a cross-sectional view of such an apparatus taken on a line similar to line 2—2 in FIG. 1; and

FIG. 3 is a somewhat exaggerated diagrammatic view of a yarn according to this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The spinning frame includes any conventional drafting section, such as the double apron systems shown in FIG. 1, including front drafting rollers 2, which draft a pair of strands 3,3' and feeds them through “pot-eye” 4 to a cap or ring spinning spindle 6. To this extent the apparatus is a conventional apparatus.

In accordance with the invention, the apparatus is modified by providing a convergence guide 12 at the point Y and, at a point between the “pot-eye” 4 and the convergence guide 12, a pair of rollers 7, 8 arranged to be rotated at a peripheral speed substantially equal to the delivery speed of the yarn and to provide an intermittent nip between them. One of the rollers 7 is a plain roller whilst the other roller 8 has a section 11 cut out from one side over part of its length and positioned such that the yarn will pass through it. The convergence guide 12 is located at approximately the position which would be occupied by the natural convergence of the strands if the rollers 7, 8 were not operative and may typically be of the order of
The spun yarns were then steamed and cleaned and without further treatment warped and woven on a Saurer Loom. The weave was 2 x 2 hopsack and 2/2 twill stripe with 29.1 ends per cm. and 27.2 picks per cm. 0.22 weaving breaks per 1,000 ends per 10,000 picks were recorded.

The yarns contained an average stand twist of 4.5 turns per 6-cycle length being 10 cm. The coefficient of variation of evenness of the yarn was 16.1 percent and the tenacity was 6.98 gf/tex.

**EXAMPLE 2**

Two 390 tex rovings of 22 micron wool with a mean fibre length of 65 mm. were drafted on one double apron drafting unit to produce two strands of 29 tex each. The separation of the strands was 18 mm. and they were combined at a convergence guide 12 situated 30 mm. below the nip of the front drafting rollers. From the convergence guide the combined strands passed through the intermittent twist blocking rollers 7 and 8 then via a pot-eye to a conventional ring spindle with a ring diameter of 55 mm. The nip line of the twist blocking rollers was 80 mm. from the front roller nip and the diameter of the relieved roller was 32 mm. with one-half of the circumference of the roller relieved. A twist of 510 tpm was inserted at a spindle speed of 9,000 R.P.M. and 1.6 spinning breaks per 100 spindle hours were recorded.

The yarns were then steamed and cleaned and without further treatment used for the warp in the production of a Barathex fabric. Weaving performance and fabric properties were comparable to those obtained with conventional two fold yarns.

The yarns contained an average twist of three turns per one-half cycle, the cycle length being 10 cm. The coefficient of variation of evenness of the yarns was 13.9 percent and the tenacity was 7.56 gf/tex.

We claim:

1. A process for producing a yarn, comprising at least two strands plied together, and wherein there is twist in each individual strand, which process comprises the steps of separately feeding each strand from a feeding point, converging the strands at a convergence point, twisting the strands together, and intermittently blocking the twist at a position between the convergence point of the strands and the point of application of the twist.

2. A process according to claim 1, wherein the twist is blocked by nipping the converged strands between two co-operating nipping members.

3. A process according to claim 1, wherein the feeding points are both disposed on a single conventional drafting unit.

4. A process according to claim 1, wherein the feeding points are both disposed symmetrically about a plane passing through the convergence point.

5. A process for producing a yarn, comprising at least two strands plied together, and wherein there is twist in each individual strand, which process comprises the steps of separately feeding each strand from a feeding point, twisting the strands together, and, at a position between the convergence point of the strands and the point of application of the twist, intermittently nipping the converged strands between two co-operating nipping members said feeding points being arranged so that the strands are disposed symmetrically about a plane passing through the convergence point.

6. Apparatus for producing a yarn comprising at least two strands plied together and wherein there is twist in each individual strand, which apparatus comprises means for separately feeding each strand from a feeding point, convergence means for converging the separate strands, twisting means for applying twist to the converged strands to twist them together, and intermittently operable twist blocking means for effecting intermittent blocking of the twist at a position between the
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5 convergence means and the point of application of the twist.

8. Apparatus according to claim 7, wherein the twist blocking means comprises a pair of co-operating nipping members arranged to intermittently nip the converged strands therebetween.

9. Apparatus according to claim 8, wherein the nipping members comprise a pair of rollers arranged to form a nip between them, at least one of said rollers having a relieved portion on its circumference such that on rotation of the rollers the nipping of twisted strands is rendered intermittent by said relieved portion.

10. Apparatus according to claim 7 wherein the feeding points are both disposed on a single conventional drafting unit.

11. Apparatus according to claim 7 wherein the rates of feeding of the strands from their respective feeding points are substantially equal.

12. Apparatus according to claim 7, wherein the means for feeding each strand are so arranged that the strands are disposed symmetrically about a plane passing through the convergence point.

13. Apparatus for producing a yarn comprising at least two strands plied together and wherein there is twist in each individual strand, which apparatus comprises means for separately feeding each strand from a feeding point, convergence means for converging the separate strands, twisting means for applying twist to the converged strands to twist them together, and, at a position between the convergence means and the point of application of the twist, a pair of co-operating nipping members arranged to intermittently nip the converged strands therebetween, the means for feeding each strand being so arranged that the strands are disposed symmetrically about a plane passing through the convergence point.

14. Apparatus according to claim 13, wherein the nipping members comprise a pair of rollers arranged to form a nip between them, at least one of said rollers having a relieved portion on its circumference such that on rotation of the rollers the nipping of twisted strands is rendered intermittent by said relieved portion.

15. Apparatus according to claim 13, wherein the feeding points are both disposed on a single conventional drafting unit.

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