

[54] COMPOSITE FALSE-TWIST YARN

[75] Inventor: Jashwant J. Shah, Springfield, Mass.

[73] Assignee: Bigelow-Sanford, Inc.,
Thompsonville, Conn.

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[58] Field of Search 57/139, 34 AT, 140 R,
57/144, 140 BY; 139/391, 383, 39 R, 420, 426

[56] References Cited

UNITED STATES PATENTS

2,571,087	10/1951	Underwood et al.	57/139 X
3,577,873	5/1971	Waters	57/144
3,537,251	11/1970	Kimura et al.	57/34 AT X
3,509,709	5/1970	Tsuruta et al.	57/34 AT X
3,468,120	9/1969	Hildebrand	57/34 AT UX

Primary Examiner—Donald E. Watkins
Attorney—H. L. Kirkpatrick

[57]

ABSTRACT

Novel stable, composite false-twist yarn normally made up of three or more singles of similar or different types and/or sizes or colors of such singles, or made up of plied staple and/or continuous filament constituent yarns (preferably initially formed from at least four yarns in two separately twisted, and cabled, pairs), characterized by the said constituent yarns self-interlocking among themselves at spaced intervals, along the length thereof, and fixing yarn twist zones of substantial length between adjacent twist reversals between zones of opposite yarn twist, said interlocking serving to isolate and maintain the twist integrity in each of said zones and, preferably, also characterized by different circular orientation (clock positions) of the three or more yarn ends at twist reversal points between adjacent opposite twist zones; and to novel fabrics incorporating the same.

12 Claims, 3 Drawing Figures

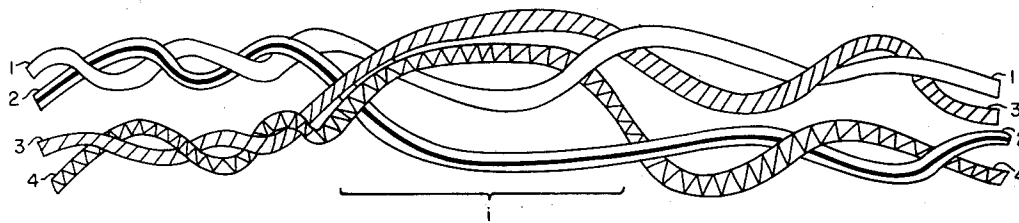


FIG. 1

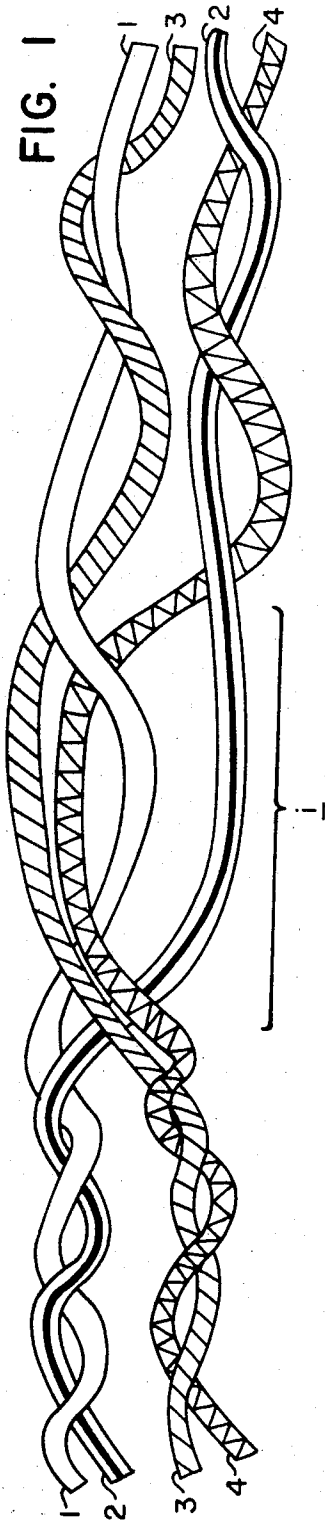


FIG. 2

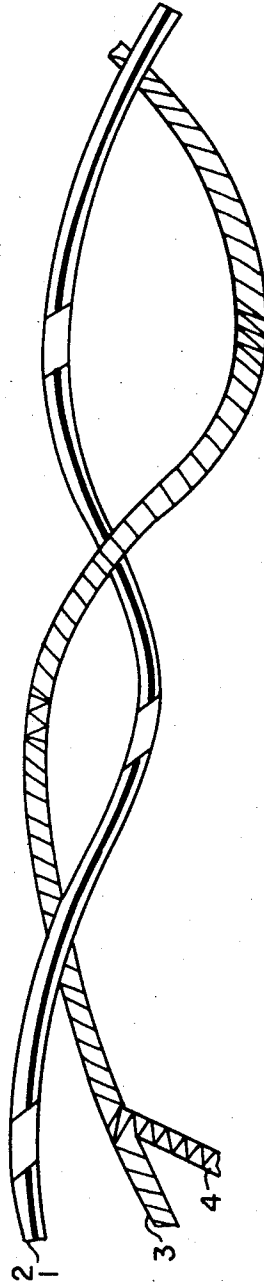
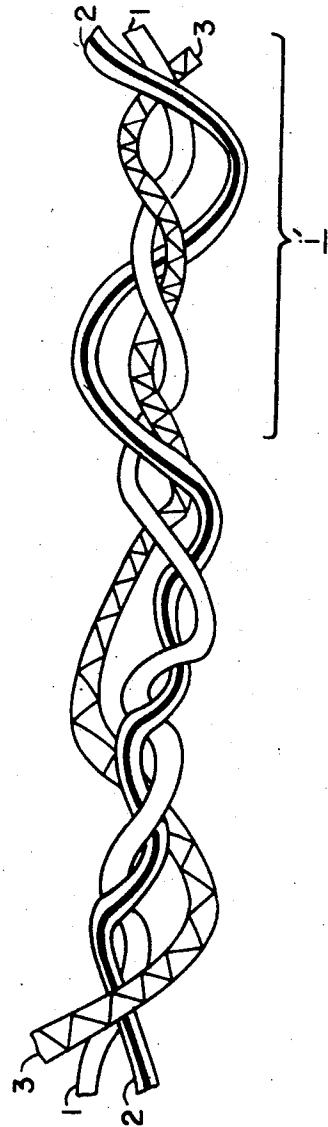


FIG. 3



COMPOSITE FALSE-TWIST YARN

This invention concerns novel composite S and Z false-twist plied and cabled yarns and pile fabrics made from the same, providing superior, less-expensive yarns, and pile fabrics of more uniform visual appearance. It has long been commercially difficult to produce pile fabrics of uniform appearance without a substantial (and expensive) percentage of seconds or rejects because of unsightly streaks and other visual defects in the finished goods. This invention, however, does provide pile fabric yarns, and woven pile fabrics made therefrom, that substantially eliminate such rejects, and that can be produced much more economically than the present-day art affords.

Appearance in pile fabrics is of vital importance, whether for use in home, office, or elsewhere, but the present invention provides other advantages, for example, the self-interlocked yarn is balanced and does not snarl or kink; the cabled yarn can retain all the characteristics of the component single yarns such as bulk, twist/in, etc.; the yarn is good for woven and especially tufted carpet processing since it is stable, due particularly to the substantial elimination of zero twist; and, where desired, color combinations along the length and/or change in direction of twist along the length impart different visual characteristics to the yarn, as desired. These changes along the length when used for carpet pile warps break the normal yarn color continuity which, in conventional yarns, tends to cause streaks. This is accomplished without appreciably affecting the quality or integrity of the yarn structure either during fabrication or in traffic service.

The prior art inventors in the field of S and Z false-twist yarn have been engrossed with the problems of minimizing untwisting with resultant long-lengths of zero twist between segments of opposite twisted yarns. These nodes of zero twist are troublesome due to various consequent disadvantages, including, primarily, loss of strength.

By the employment of this invention, however, involving the novel interlocking of at least three, and preferably four or more, plied and cabled yarns, zero twist lengths of yarn can be greatly reduced and, indeed, as a practical matter, substantially eliminated, providing the advantages above set forth.

A further, and advantageous as well as an unexpected result and advantage of the invention in eliminating visual fabric defects, lies in the control of the circular orientation (clock-like relationship when viewed in transverse cross-section) of the three or more yarn elements in the assembly. The past and present prior art practise of retaining the individual yarn-end clock-like positions in an effort to avoid fabric streaks (for example in the use of moresque yarns) is now shown to be wholly unnecessary, if not wrong. Thus, special guides (such as the "Shamrock") attached to twisting machines, to assure that each yarn end is always in the same relation to the other ends, are not necessary. In accordance with this invention, streak-free moresque yarn is produced by frequent changes at twist reversal points in the circular orientation of the individual ends being plied or cabled.

While the primary objective is to produce novel yarns plied or cabled, or both, that can be used to provide novel colorful and/or streak-free looped or cutpile carpet, such yarn can also be employed to impart these

same desirable random moresque characteristics to fabrics for upholstery, apparel, drapery and other fabrics, whether assembled by tufting, weaving, knitting, sewing, or other methods.

The novel stable false-twist yarns of this invention are normally made up of three or more singles of similar or different types and/or sizes or colors of such singles of plied staple and/or continuous filament (including monofilament) constituent yarns (preferably initially formed from at least four yarns in two separately twisted, and cabled, pairs), characterized by the said constituent yarns self-interlocking among themselves at spaced intervals, along the length thereof, and fixing yarn twist zones of substantial length between adjacent twist reversals between zones of opposite yarn twist, said interlocking serving to isolate and maintain the twist integrity in each of said zones and, preferably, also characterized by different circular orientation (clock-like positions) of the three or more yarn ends at twist reversal points between adjacent opposite twist zones; and to novel fabrics incorporating the same.

In the drawings illustrating yarns of the invention:

FIG. 1 is a diagrammatic side view of a length of an enlarged and a loosened four-end yarn with each yarn so marked as to readily distinguish it from the others;

FIG. 2 is a similarly enlarged diagrammatic side view of a different length of the yarn of FIG. 1; and

FIG. 3 is a diagrammatic side view of an enlarged and loosened three-end yarn with each end so marked as to distinguish it from the others.

Referring to FIG. 1 of the drawings and reading from left to right, — yarn ends 1 and 2 are plied together to form a pair as are yarn ends 3 and 4 to form a second pair, cabled with the first pair until at and during the interchange or interlock bracket *i*, the ends of each pair momentarily change their positions (or partners) without plying or cabling and, on the right side of the bracket *i* become paired as 1 – 3 and 2 – 4, respectively. It will be appreciated that the before-mentioned enlarged FIG. 1 is somewhat distorted in order better to illustrate the resultant interlocking at the twist reversal point within the much elongated bracketed interlock *i*. Also, in practice, though for clarity not shown in the drawings, cabling of the pairs is, preferably, usually present on each side of each interlock *i*, and the pairs need not have the same plying or cabling twist. More specifically, and again reading from left to right in FIG. 1, the Z-twist pairs 1 – 2 and 3 – 4, respectively, are so led to the bracket *i* where they are false twisted S and thus S cabled on the left-hand side of the bracket *i* reversal point (therein changing partners so as to become paired 1 – 3 and 2 – 4), and led and becoming false twisted Z, and thus cabled Z, on the right-handed side of said bracket *i*. This is followed by another same sequence, and so on.

FIG. 2 separately shows the pairs of ends 1 – 2 and 3 – 4 actually cabled together as they are to the left of the interlock *i* of FIG. 1, whereas to the right of the bracket *i*, though not shown, the changed pairs 1 – 3 and 2 – 4 normally would be cabled.

FIG. 3, similarly enlarged, shows a three-end yarn structure in which plied yarn ends 1 – 2, as a pair, are cabled with a single unpaired yarn end 3, again reading from left to right, until at and within the bracketed interlocking interchange *i'*, yarn end 3 becomes paired to form pair 1 – 3, leaving yarn end 2 functioning as a single cabling end, with S cabling false twist on one side

of the interlock and Z cabling false twist on the other side of the interlock to complete the sequence, and so on.

Various types of apparatus may be employed in the manufacture of the yarn of this invention, for example, suitably modified pneumatic false twisters of the prior art, for example as described in the patent to Breen et al. U.S. Pat. No. 3,116,588 of Jan. 7, 1964. With any of such pneumatic twisting apparatus there may be employed the usual well-known preparatory apparatus plus any desired preliminary yarn twisting, plying and cabling equipment, plus wind-up equipment, all long well-known and used in the yarn making and handling art.

Having described my invention, I claim:

1. A stable composite false-twist yarn comprising at least three single yarn ends, at least two of which ends are plied to form a plied yarn pair with at least one other yarn end cabled therewith to form a false twist cabled yarn, said cabled yarn having relatively long-length zones of cabled S twist alternating with relatively long-length zones of cabled Z twist, with the constituent yarns being self-interlocked at twist reversal points between closely adjacent false-twist zones at which points at least one yarn of a plied yarn pair is separated from its yarn partner in said pair and is replaced by another yarn which there joins said partner providing an interlock whereby untwisting between adjacent false-twist zones is substantially prevented.

2. A stable composite false-twist yarn comprising at least four single yarn ends, at least two pairs of which ends are plied to form plied yarn pairs cabled together to form a false-twist cabled yarn, said cabled yarn having relatively long-length zones of cabled S twist alternating with relatively long-length zones of cabled Z twist, with the constituent yarns being self-interlocked at twist reversal points between closely adjacent false-twist zones at which points at least one yarn of a plied yarn pair is separated from its yarn partner in said pair and is re-

placed by another yarn which there joins said partner providing an interlock whereby untwisting between adjacent false-twist zones is substantially prevented.

3. A stable composite false-twist yarn comprising at least four single yarn ends, at least two pairs of which ends are plied to form at least two plied yarn pairs cabled with at least one yarn end to form a false-twist cabled yarn, said cabled yarn having relatively long-length zones of cabled S twist alternating with relatively long-length zones of cabled Z twist, with the constituent yarns being self-interlocked at twist reversal points between closely adjacent false-twist zones at which points at least one yarn of a plied yarn pair is separated from its yarn partner in said pair and is replaced by another yarn which there joins said partner providing an interlock whereby untwisting between said adjacent false-twist zones is substantially prevented.

4. The novel yarn of claim 1 characterized by different circular orientation of the yarns at twist reversal points between adjacent opposite twist zones.

5. The novel yarn of claim 2 characterized by different circular orientation of the yarns at twist reversal points between adjacent opposite twist zones.

6. The novel yarn of claim 3 characterized by different circular orientation of the yarns at twist reversal points between adjacent opposite twist zones.

7. A novel pile fabric having a base and affixed thereto pile yarn as called for in claim 1.

8. A novel pile fabric having a base and, affixed thereto, pile yarn as called for in claim 2.

9. A novel pile fabric having a base and, affixed thereto, pile yarn as called for in claim 3.

10. A novel pile fabric having a base and, affixed thereto, pile yarn as called for in claim 4.

11. A novel pile fabric having a base and, affixed thereto, pile yarn as called for in claim 5.

12. A novel pile fabric having a base and, affixed thereto, pile yarn as called for in claim 6.

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