

United States Patent

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[54] YARN TREATMENT PROCESS

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[51] Int. Cl. **D02j 1/22, D02j 1/12**

[58] Field of Search **57/140, 157 R, 34 B, 157 F, 57/51, 51.3; 28/72**

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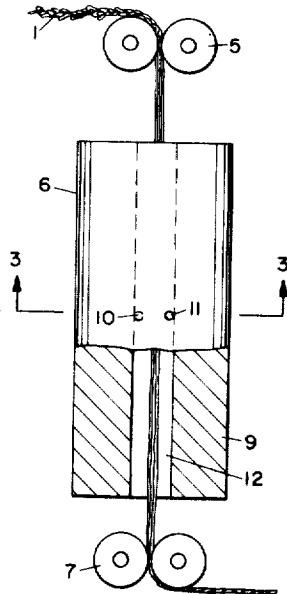
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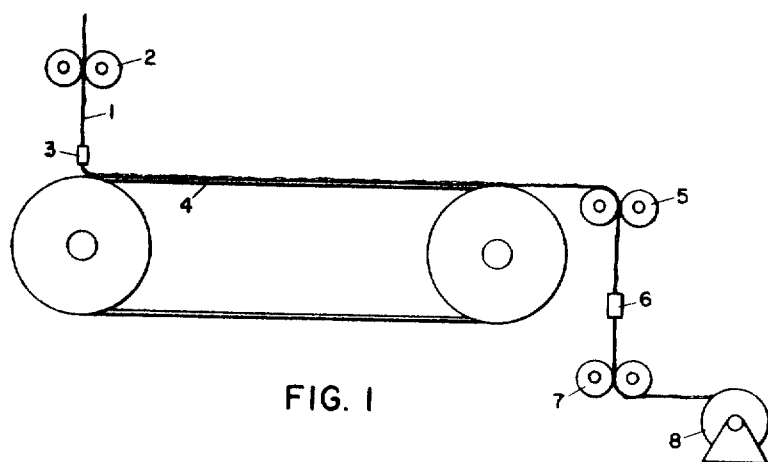
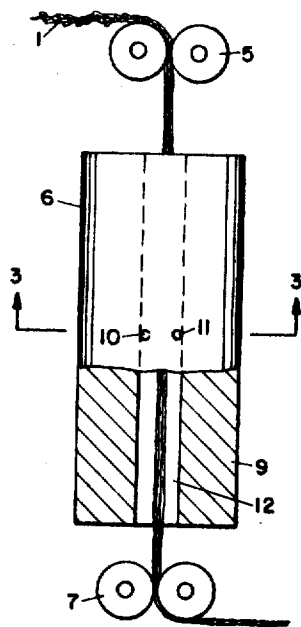
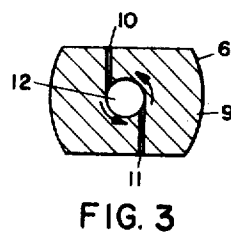
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[57] ABSTRACT

Yarns prepared by a fluid jet bulking technique have been found to contain a large number of loops which interfere with processing when the yarns are tufted into carpets. These loops are removed by subjecting the yarn to a false untwisting operation while under a tension of at least about 0.02 gram per denier.

2 Claims, 2 Drawing Figures





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YARN TREATMENT PROCESS

This invention relates to the preparation of bulked continuous filament yarns of synthetic polymer. In particular, it relates to the preparation of such yarns by means of a fluid jet.

The value and utility of continuous filament yarns of synthetic polymer is greatly enhanced by treatment of the same to impart a crimp to the otherwise smooth continuous filaments. In recent years, methods have been developed whereby such a crimp is produced by passing a yarn through a jet under the influence of a fluid heated to a temperature sufficient to plasticize the synthetic polymer. Many variants of the fluid jet bulking process are described in the art, e.g., U.S. Pat. Nos. 2,959,909, 3,471,911 and 3,156,828.

It is frequently desirable to ply, i.e., twist, two or more ends of yarn prior to subjecting them to the bulking operation. When a ply yarn is processed by a fluid jet bulking technique, a yarn exhibiting a large number of loops normally results. For many purposes, the yarn is commercially attractive in this state, but for other purposes, it is not satisfactory. For example, the loops cause difficulty during tufting by catching on the package and at the needles, causing stops and backpicking.

The purpose of this invention is to provide a method by which these loops can be removed from fluid jet bulked, ply yarns. The method of the invention comprises applying to fluid jets bulked ply yarn a false twist in a direction reverse to the ply twist and in an amount to cause the yarn momentarily to assume a zero twist state while subjecting said yarn to a tension of at least about 0.02 gram per denier.

The process according to the invention is illustrated in the attached drawing in which:

FIG. 1 is an illustration of a fluid bulking process including the false twisting step of this invention;

FIG. 2 is a section of a false twisting jet; and

FIG. 3 is the view along line 3—3 of FIG. 2.

In carrying out the process of the invention with particular reference to the drawings, a ply yarn 1 is drawn from a yarn supply (not shown) by means of pinch rolls 2, through a fluid bulking device 3 onto a foraminous screen 4. The yarn is advanced away from the fluid jet by the motion of the foraminous screen and fed via feed rolls 5 through the false twisting jet 6 and around snubbing roll 7 to wind up 8.

Referring to FIGS. 2 and 3, the false twist jet 6 comprises a metal body 9 having compressed gas inlet openings 10 and 11 disposed diametrically of a center bore 12 and substantially tangential thereto. A loopy, fluid jet bulked, ply yarn 1 is advanced by feed rolls 5 into the center bore 12 of the jet. A compressed gas is fed under pressure through inlets 10 and 11 and, by virtue of the tangential positioning of the inlets, creates a circumferential torque within the bore as indicated by the arrows to impose a twisting action on the loopy yarn. Since the yarn is secured by feed rolls 5 and snubbing roll 7 at the inlet and outlet, respectively, of the jet, the twisting action will amount to false twisting which will be confined to the area between the snubbing points. Gas inlets 10 and 11 are so positioned that they will impose their twisting action on the yarn in a direction reverse to that in the yarn as fed to the jet. That is to say, if the yarn has S twist, the jet will be positioned to impose Z twist thereon and vice versa. Gas

pressure is adjusted so that the reverse twist is substantially equal in magnitude to the original twist in the yarn. The net result is thus a temporary false untwisting to a substantially zero twist condition.

As stated, the yarn in the false twisting jet is secured between rolls 5 and 7 positioned at the inlet and outlet, respectively, of the jet. The false untwisting action of the jet is thereby confined to the section of the yarn that is within the jet. In addition, the yarn winder 8 is operated at a higher speed than feed rolls 5, at the entrance. While the yarn is in the substantially zero twist state, the individual yarn ends are liberated from the restraining influence exerted by the twist so that tension on the yarn occasioned by the faster operation of the winder pulls the loops out of the loopy filaments and pulls the delooped filaments back into the yarn bundle. Normally the differential between the speed of the feed rolls and the yarn winder will be sufficient to maintain a stress of about 0.02 gram per denier on the yarn during the period when the yarn is at zero twist. The stress applied to the yarn is not critical so long as it is sufficient to straighten the yarn, but not sufficient to stretch it. Thereafter, as the yarn leaves the jet and passes around snubbing roll 7, the original twist re-establishes itself, the filaments are locked into their individual yarn bundles, and the yarn is rewound.

The yarn to which the method of the invention is applicable is any continuous filament, fluid jet bulked, synthetic thermoplastic ply yarn which contains undesired loops. It is particularly useful on yarns made from polypropylene and nylon.

The compressed gas employed in the jet is preferably air, although any inert gas can be employed equally well. Inasmuch as the function of the gas is simply to impose the false twist on the yarn, it is neither necessary nor desirable that it be heated above room temperature. The gas pressure required to effect the false untwisting is variable, depending upon the amount of ply twist in the yarn. The required pressure can easily be determined by examining the yarn as it leaves the false twist jet and making adjustments accordingly.

The following example is presented to demonstrate the operation of the process.

EXAMPLE

A 2,600 denier, 120 filament, two ply polypropylene yarn having 0.125 tpi of Z singles twist and 0.250 tpi of Z ply twist was bulked by means of a jet in the manner shown in U.S. Pat. No. 3,471,911. The yarn leaving the screen had a large number of loops visible to the naked eye. This yarn was passed through a false twisting jet to a wind up station and collected on a bobbin. Air was supplied to the twisting jet at 30 psig and the winder speed was adjusted to maintain 50 grams tension on the yarn.

The yarn leaving the jet and being wound on the bobbin appeared free of loops to the eye. To demonstrate that the loops were actually removed, the air to the false twisting jet was turned off. The tension on the yarn immediately increased to greater than 100 grams, indicating a shortening of the yarn due to the loops remaining therein, rather than being removed during the false untwisting.

What I claim and desire to protect by Letters Patent is:

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1. A process for removing loops from a twisted, fluid jet-bulked ply yarn composed of continuous filaments of synthetic polymer which comprises applying to said yarn a false twist in a direction reverse to the ply twist and in an amount substantially equal to that of the ply twist in said yarn to cause said yarn momentarily to as-

sume a zero twist status while subjecting said yarn to a tension of at least about 0.02 gram per denier.

2. The process of claim 1 in which the polymer is polypropylene.

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