

Sept. 3, 1963

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3,102,379

SHANTUNG-EFFECT YARN AND METHOD OF PRODUCTION

Filed March 15, 1961

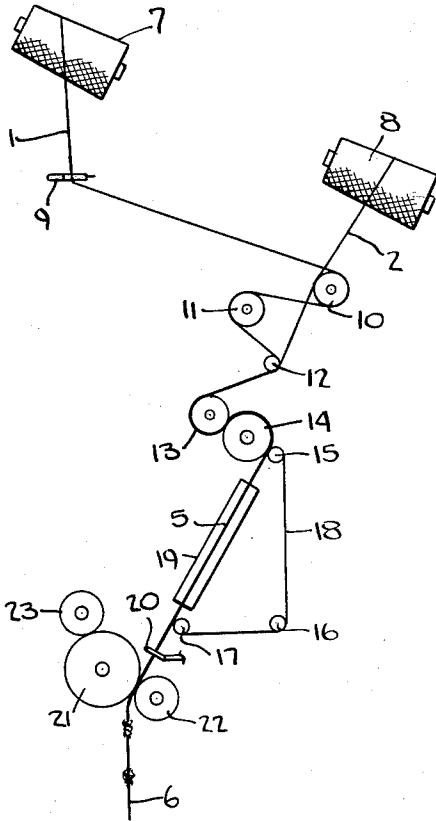


Fig. 1.

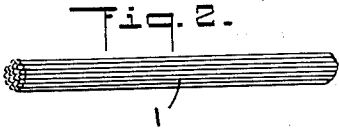


Fig. 2.

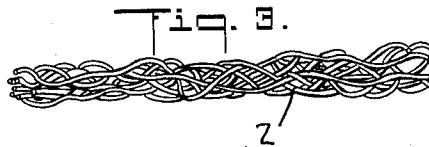


Fig. 3.

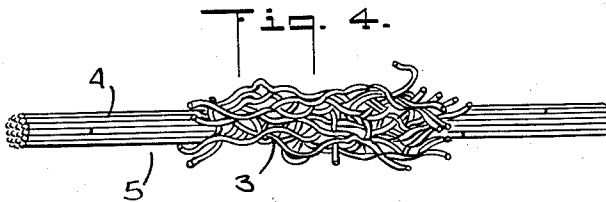


Fig. 4.

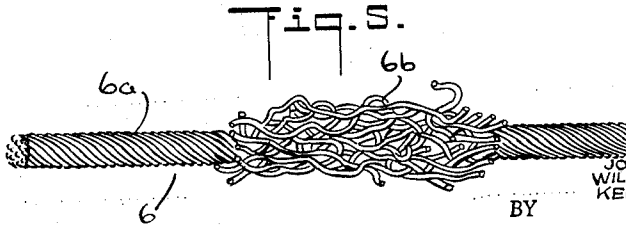


Fig. 5.

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SHANTUNG-EFFECT YARN AND METHOD OF PRODUCTION

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Filed Mar. 15, 1961, Ser. No. 95,997

2 Claims. (Cl. 57-140)

This invention relates to yarns and more particularly relates to spinning of composite yarns so as to produce a Shantung-effect.

Shantung originally was a silk fabric made mostly in Shantung province of China on hand looms. It was characterized by uneven yarns in the filling which gave an interesting slubbed or nubbed texture. The visual effect associated with silk Shantung has a certain amount of popularity, especially in sportswear, women's summer suits, pajamas and robes. There is consequently a considerable demand for what may be termed "Shantung-effect" fabrics of modern man-made fibers.

Shantung was, as aforesaid, an effect first realized in the hand-made fabrics of China. Such effort is of course economically impossible today, and the prior art has reflected this by producing Shantung-effect in man-made fiber fabrics more economically by machine techniques. However, these prior art techniques have nevertheless been characterized by an additional expense in production over plain fabrics so as to be inconsistent with the high volume low cost fiber production associated with modern technological and economic conditions. In short, the interesting effect of Shantung has not been so highly desirable as to justify the considerable added expense over plain fabrics. And yet there is a ready market for Shantung-effect goods at a price competitive with plain goods.

What has been needed, in order to make Shantung-effect fully competitive with plain fabrics, is a process capable of producing a yarn upon virtually standard machinery and using virtually standard materials, that nevertheless may be woven into a Shantung-effect fabric. Such a product and process would be fully amenable to high volume production and would involve very little capital outlay, and would be largely interchangeable with ordinary fabric facilities. Shantung-effect would then become an optional feature of design whose employment would be reflected in sales to certain sections of the market, and that could justify its inclusion as a feature by a price fully competitive with plain fabrics produced by modern production techniques.

It is accordingly a principal object of the invention to provide a method and product adapted to utilize substantial amounts of standard high volume textile machinery so as to allow production of Shantung-effect fabrics in man-made fibers at prices fully competitive with plain fabrics.

Another object of the invention is to provide a man-made fiber yarn adapted to produce Shantung-effect fabrics, which yarn may be produced in high volume at low cost.

Another object of the invention is to provide such a yarn from substantially standard textile materials.

Another object of the invention is to provide a method for producing such a yarn that may be practiced upon substantially standard textile machinery so as to be relatively interchangeable with the production of plain yarn so as to minimize capital outlay and increase production flexibility.

Other objects and a fuller understanding of the inventive principles will be apparent upon examination of the following detailed description. It should be understood that this description is merely illustrative of the

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inventive principles, and in no way is a limitation thereupon, but rather merely serves as a complete disclosure thereof in a specific embodiment. Departures from the embodiment yet within the scope of the inventive principles will be apparent to those skilled in the art, and all such variations are contemplated.

In the drawings:

FIG. 1 is a schematic of the steps involved in practicing the invention;

FIG. 2 is a schematic plan view of a section of an example of tow used in the practice of the invention;

FIG. 3 is a schematic plan view of a section of an example of a stretch yarn used in the practice of the invention and shown in a relaxed state;

FIG. 4 is a schematic plan view of a section of a drafted tow yarn having nubs of stretched yarn therealong; and

FIG. 5 is a schematic view of a section of the finished yarn of twisted and drafted tow having soft nubs therealong.

Referring now to the drawings, the invention comprises in general drafting a continuous filament tow 1 together with a closely associated continuous filament stretch yarn 2 until the filaments of the tow 1 rupture individually, and then continuing to draft until the filaments of the stretch yarn rupture. Upon rupture of the stretch yarn, the resultant stretch yarn ends will, if allowed, contract into nubs 3 along the drafted tow 4. The resulting nubby yarn indicated generally at 5 is then twisted into yarn 6. Fabric woven from yarn 6 will produce a Shantung-effect.

It will be apparent to those skilled in the art that the above procedure is similar to the direct-spinning process for production of yarn from continuous filament tow. As aforesaid, it is a feature of the invention that this similarity exists so that relatively standard direct spinning machinery and relatively standard raw materials might be used to produce Shantung-effect yarn, thereby making such yarn highly competitive.

Shown in FIG. 1 is a basic schematic for a drafting operation similar to the well-known direct-spinning method, but modified to practice the present invention. From source 7 continuous filament tow 1 is fed into the process, and from source 8 continuous filament stretch yarn 2 is fed into the process.

Tow 1 is understood in the art to be composed of continuous multifilaments of artificial fiber having no twist and varying from 1100 to 750,000 denier with a filament number range of 600 to 250,000. Any artificial fiber tow may be used with the present process, the desired end product determining the choice. It has been found that polyesters are particularly suitable to the present process.

Stretch yarn 2 will be understood by those skilled in the art to indicate generically thermoplastic filaments or yarns having a high degree of potential elastic stretch and rapid recovery. Such stretch yarns are produced by various processes, such for example as by twist curling and false twisting. The essential feature required in such yarns by the present process is that they have high extensibility and rapid recovery. Extensibility should preferably be at least 1.5:1. Such yarns include for example those manufactured under the trademarks Helanca, Flufflon, and Superloft. All such yarns present a soft nubby texture when relaxed. All other yarns having these characteristics are contemplated, the above serving only as examples. While stretch yarns fabricated in various artificial fibers are satisfactory with the present process, it has been found that polyesters give excellent results, particularly the polyester of the trademark Dacron.

Tow 1 is angled around porcelain guide 9 to tension it and then around porcelain guide rollers 10 and 11 to porcelain guide 12. Stretch yarn 2 is angled somewhat over porcelain guide roller 10 so as to tension it to a nearly fully extended state. The stretch yarn is thereupon fed to porcelain guide 12 where it joins the aforesaid tow 1. It has been found that an important aid in preventing the stretch yarn 2 from drafting with the tow 1 in the remainder of the process is to insert at least one turn of twist, either S or Z, into the normally zero twisted stretch yarn as it leaves source 8. Such a technique is well-known to those skilled in the art. The twist thus imparted helps prevent the stretch yarn from drafting with the tow after the stretch yarn ruptures, but it should be understood that this twist is an expedient that merely aids the formation of soft nubs which generally though not as reliably form without such twist. In general not more than five turns are required, and two and one half is highly satisfactory for most conditions.

A porcelain guide 12, the tow 1 and stretch yarn 2 meet as aforesaid, and are thereupon pressed in close association between rubber coated pressure roller 13 and steel pressure roll 14. The associated tow and yarn travel over roll 14 and are thereupon nipped between it and steel apron drive roll 15.

Situated at some distance from rolls 13, 14 and 15 are steel fluted rolls 22 and rubber coated pressure roll 21 which tightly mesh together. Roller 23 is a felt or similar cleaning roller in contact with roller 21. The shaft speeds of rollers 13, 14 and 15 are such that the associated tow and yarn passing thereover travels at a first linear rate. The shaft speeds of rolls 21 and 22 are such that the associated tow and yarn nipped therebetween travels at a second linear rate, higher than said first rate. The consequence is that said associated tow and yarn therebetween is tensioned and drafted at a fixed amount.

Associated with steel apron drive roll 15 is steel idler roll 16 and steel guide rod 17. Leather belt 18 travels around these three members, and is driven by roll 15. In ordinary direct spinning, leather apron belt 18 carries the tow as it is drafted. But since loose ends of stretch yarn are carried along as described hereafter, a plastic chute 19 surrounds belt 18 to prevent such ends from riding laterally off.

As tow 1 and associated stretch yarn 2 leave the nip of rolls 13, 14 and 15 and travel toward rolls 21, 22, they begin to be drafted. Individual filaments of tow 1 begin to rupture and the tow begins to draft. At a point of drafting beyond the breaking of the tow filaments, the stretch yarn ruptures. The stretch yarn ruptures after the two filaments and during the tow drafting because of the greater extensibility of the stretch yarn, although it was largely extended when fed into the process. When the stretch yarn ruptures, each end snaps or contracts to its relaxed outline. It cannot snap free of tow 1 because the two are bound at least at the nip of rollers 21 and 22 and at the nip of rollers 14 and 15. When the stretch yarn so contracts, it forms soft nubs 3 on the tow, which composite is indicated generally at 5.

A certain amount of further tow drafting takes place after the stretch yarn ruptures and contracts. To prevent the ruptured stretch yarn from also drafting after rupture, the twist referred to above was inserted. If upon rupture the stretch yarn does not free itself of the tow along its length except at one point, usually the nip of the rollers, then it will not contract into soft nubs 3. Generally the stretch yarn will so free itself and contract fully, but to increase the reliability of this action the aforesaid twist has been found beneficial. The torque of the twist tends to aid in freeing the bulk of the ruptured stretch yarn.

The drafted tow and nubby stretch yarn, indicated generally at 5, is guided through tow traverse guide 20 and through the aforesaid rollers 21 and 22 whereupon it emerges from their nip and a twisting process (not shown) known to those skilled in the art. The resultant twisted and nubby yarn is indicated generally at 6, and is suitable for weaving into fabrics with Shantung-effect.

As aforesaid, it will be instantly recognized to those skilled in the art that the instant process is essentially adaptable to the Direct Spinner manufactured by the Saco-Lowell shops. A feature of the invention is that the production of Shantung-effect yarn may be practiced upon well-known textile machinery by following the inventive process. Feasible economy and production interchangeability and flexibility are thus associated with the production of Shantung-effect yarn and fabric.

The finished yarn will comprise a twisted tow yarn 6a having at intermittent spaced periods therealong a plurality of soft nubs 6b. The intermittent nature of the spacing of the nubs results from the random nature of the break at distances from the nip of rollers 13, 14 and 15 and from the nip of rollers 21 and 22. Longer and shorter ends are thus randomly produced, and result in intermittent nubs which give a pleasant and genuine Shantung-effect to fabric manufactured therefrom.

It will be apparent to those skilled in the art that other types of tow and stretch yarn, as well as other arrangements for drafting, may be employed in the exercise of the inventive principles. The examples are illustrative, not limiting. All such variations are within the herein disclosed invention.

What is claimed is:

1. A yarn which when woven will produce a Shantung-effect fabric comprising a twisted tow having drafted and broken filaments, and a series of soft nubs disposed along said twisted tow, said nubs being formed by the contracted end portions of lengths of a relaxed stretch yarn.

2. A yarn which when woven will produce a Shantung-effect fabric comprising a twisted tow having drafted and broken filaments, and a series of soft nubs disposed at randomly intermittent points along said twisted tow, said nubs being formed by the contracted end portions of lengths of a relaxed polyester stretch yarn.

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