

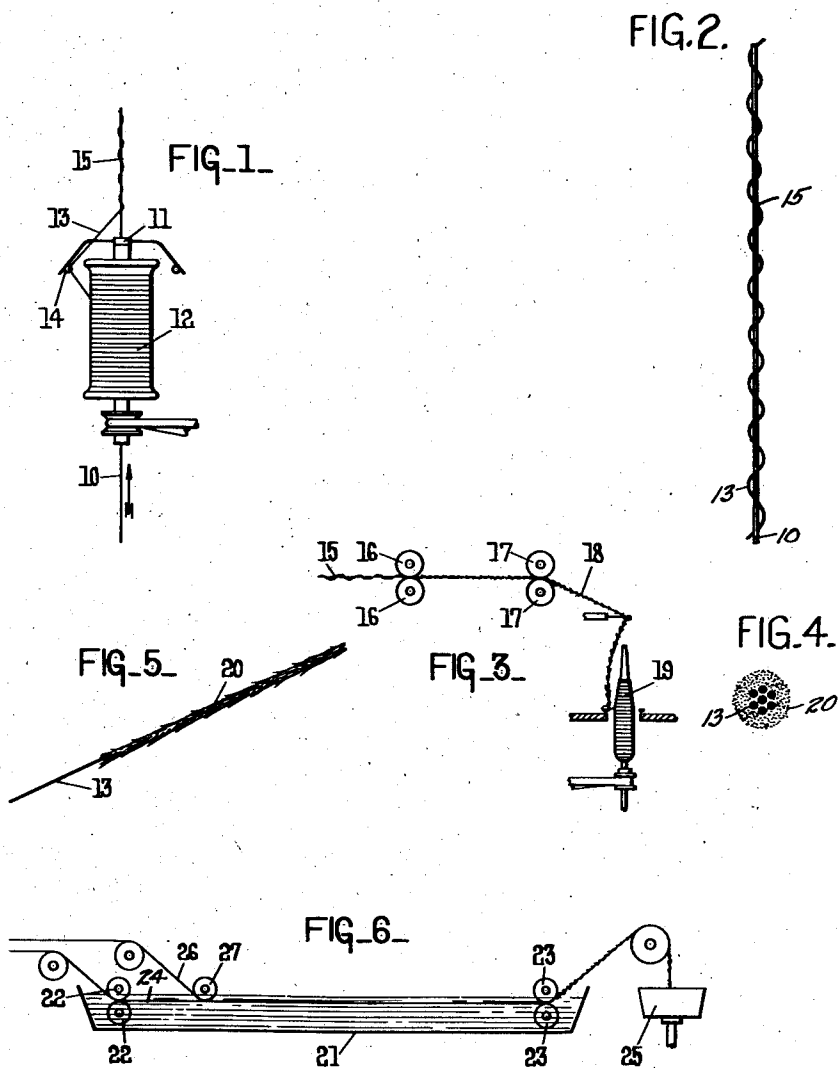
June 16, 1936.

P. F. C. SOWTER

2,044,130

TEXTILE YARN AND THE MANUFACTURE THEREOF

Filed Jan. 26, 1934



Inventor:
P.F.C. Sowter
by
Galt & Galt
Attorneys

UNITED STATES PATENT OFFICE

2,044,130

TEXTILE YARN AND THE MANUFACTURE THEREOF

Percy Frederick Combe Sowter, Spondon, near Derby, England, assignor to Celanese Corporation of America, a corporation of Delaware

Application January 26, 1934, Serial No. 708,404
In Great Britain February 15, 1933

12 Claims. (Cl. 117—34.5)

This invention relates to textile yarns and is particularly concerned with yarns which, while formed wholly or partially from continuous filaments, resemble in appearance and/or properties yarn spun from fibrous material.

According to the invention a yarn of this character has a composite structure, being formed of at least two components, one consisting of continuous filaments all or some of which have been converted into fibrous lengths, while the other is a continuous thread. This latter component may be a continuous filament thread so that absolute continuity is obtained throughout the length of the composite thread notwithstanding the fibrous structure of the other component.

The continuous thread can be completely surrounded by the fibres, thus forming a hidden core adding materially to the strength of the final yarn. It may also assist in binding the fibrous elements of the other component into the composite yarn, and, as explained more fully hereafter, it may assist in maintaining uniformity in the final thread by exercising a control over the other component during its conversion into fibres.

The transformation of the continuous filament component into fibres may conveniently be carried out by a breaking operation. The yarn may also be passed over abrading or cutting means for this purpose.

In doubling the two yarns together as described above care should be taken that any twist imparted in the doubling operation is not such as will impair the appearance or other properties of the final yarn or interfere with the conversion of the filaments into fibres. In fact it may be desirable to carry out breaking while the one component whose filaments are to be broken contains little or no twist. The yarn should therefore be supplied for doubling with a twist suitable for breaking and the doubling operation carried out in such a manner that this yarn receives little or no twist.

Yet a further method of utilizing yarns having different resistances to softening agents is to use as one component a yarn containing an adulterant or coated with a size to reduce its capacity for stretching in relation to the other component. For example, cellulose acetate yarn containing about 5% liquid paraffin introduced by way of the spinning solution or very heavily sized with olive oil or the like may be used. This yarn, even if not differing greatly in twist from the other and normal component, does not stretch as readily and so is converted into fibre in the softening

bath while the other component remains as a continuous filament yarn.

Both yarns are collected together and twisted after the stretching operation, but before such collection the yarn now containing broken filaments may be passed over means such as a sharp edge or abrasive material to effect cutting of the filaments into fibre and/or to lift the fibres so as to impart a loose woolly appearance.

After production of the broken filaments in a stretching bath, the softening agent is removed from the yarn, e. g. by evaporation or washing. In order to enhance the wool-like character of the yarn, it may then undergo a shrinkage treatment, which imparts curl to its filaments and fibres. After such shrinkage treatment the yarn may be slackly wound to allow the curl to set in permanent form.

Slack winding may be effected by reeling or otherwise collecting the yarn on a support running at a peripheral speed less than the speed of delivery of the yarn. Again the yarn may be collected in a centrifugal box putting in a relatively high degree of twist while the yarn is still in a partially swollen condition following the softening or shrinking treatments, this improving the wool-like effect and causing the yarn to set with a crinkle in its filaments and fibres.

The yarns containing broken filaments may be doubled with other yarns of a similar or dissimilar nature, either with regard to the type of constituent filaments or fibres, or as regards the substances constituting the filaments or fibres. Thus two or more yarns containing broken filaments may be doubled together to increase the denier and/or improve their regularity or for any other purpose. Further, the yarns employed for the production of the imitation spun yarn or for doubling with such yarn may be of high, medium or low lustre, and the association of different types of yarns may take place before or after breakage of the constituent filaments.

The yarns or mixed yarns of the invention may be employed in the production of woven, knitted or other fabrics and may constitute either the whole or a portion of such fabrics, for example a fabric may be woven containing a warp of normal yarn and a weft of the imitation spun yarn obtained according to the present invention, or again the warp or weft may be constituted of a normal or imitation spun yarn of cellulose acetate or other organic derivative of cellulose, and the weft or warp of a normal or imitation spun yarn containing regenerated cellulose,

and in this manner materials showing differential dyeing effects may be obtained.

Further, it will be understood that cellulose acetate or other cellulose derivatives may form one component of the imitation spun yarn, while the other contains regenerated cellulose, and again that yarns of other filaments or fibres than those mentioned may enter into the structure of the yarns according to the invention. As regards the continuous component of the final yarn, this need not be a continuous filament yarn but may itself be of a fibrous character.

The accompanying drawing shows by way of example several methods of carrying the invention into effect.

Fig. 1 shows the production of a doubled yarn for conversion by breaking into a yarn having a continuous filament core and a fibrous exterior;

Fig. 2 shows such a doubled yarn;

Fig. 3 shows the breaking operation to which the yarn is subjected;

Figs. 4 and 5 show diagrammatically the cross-section and external appearance of the yarn thus produced, but much enlarged; and

Fig. 6 shows a further type of breaking operation.

Referring to Fig. 1, a heavy denier continuous filament yarn 10 of low twist is drawn through a hollow spindle 11 about which is revolved a bobbin 12 of light denier continuous filament yarn 13, which may be of material the same as or different from that of the yarn 10. The yarn 10 is held under such tension that the yarn 13 as it is carried round by the flyer 14 is doubled loosely about the yarn 10, so forming a doubled yarn 15 in which the lighter yarn 13 is present in a substantially greater length than the yarn 10 (see Fig. 2).

The yarn 15 is then passed through pairs of nipping rolls 16, 17 of which the pair 17 revolves at such a speed in excess of that of the pair 16 that the heavier component 10 of the yarn is extended beyond the breaking point of its filaments. These filaments are in this way converted into fibres of an average length somewhat less than the distance between the nips of the pairs of rolls.

The looser component 13 of the yarn 15 is, however, only straightened, or at any rate only slightly extended, by the action of the rolls and so retains continuity of filament length. The modified material 18 issuing from the rolls 17 is twisted by the ring-spinning device 19, the fibres 20 into which the component 10 has been converted being doubled about the lighter continuous filament core 13, as is shown by Figs. 4 and 5.

At the same time, a certain amount of twisting in the fibres between the filaments of the core takes place, this increasing the strength of the finished yarn. In order to effect such twisting in, the yarn 13 should have little twist, and the direction of rotation of the bobbin 12 should therefore be such that the twisting imparted to the yarn 13 during doubling is in a direction contrary to that of any twist initially in the yarn.

Though the yarn 13 may represent only a small fraction of the bulk of the finished yarn, the continuity of its filaments adds materially to the strength of the yarn. Moreover, the yarn 13 may be of specially strong material, e. g. filaments that have been subjected to stretching beyond their elastic limit, to produce a yarn which, though of fibrous appearance, has exceptional strength.

Fig. 6 shows a stretching bath 21 containing pairs of stretching rolls 22, 23 at such a depth

that yarn 24 passing between the nips of the rolls is submerged in the softening liquid contained in the bath. The yarn 24 may be of the doubled type shown in Fig. 2 or of the types mentioned earlier in the specification in which the component yarns have different extensibilities or twists, or other differences to bring about a different reaction to the stretching and swelling treatment. Again, the yarn 24 may consist of ends of yarns having such different characteristics laid side by side.

The treated material on emergence from the bath 21 is collected in the centrifugal box 25 which doubles the fibrous and continuous yarns together, or, in the case where the yarns were doubled before stretching, applies additional twist. This doubling or twisting of the freshly treated yarn has the effect of adding crinkle to the filaments and fibres.

A further way of using the stretching bath is to feed in one yarn by the rolls 22 and a further yarn 26 by an additional roll 27 operating at a different speed. The outlet speed of both yarns 24 and 26 being governed by the rolls 23, the yarn 26 is stretched to an extent which does not break its filaments while the yarn 24 is stretched to a greater extent and has its filaments broken. The two yarns are doubled together as they are twisted and wound at the box 25.

A softening or swelling treatment similar to that applied by the bath 21 can be given in the case where the stretching rolls are closer together as shown in Fig. 3. In this case, however, a milder agent such as water or 15% acetic acid should be used. Thus, a doubled yarn in which the lighter component 13 is 20% longer than the heavier component 10 may be stretched between the rolls 16, 17 to 40% of the length of the yarn 10. This yarn is broken into fibre, but the yarn 13 first straightens and then stretches only to 20% of its length, this stretching of the softened material being insufficient to break the filaments. The yarn containing the broken filaments may be twisted while wet.

What I claim and desire to secure by Letters Patent is:—

1. Method of producing yarn resembling spun yarn, said method comprising associating two yarns at least one of which is composed of continuous filaments, breaking into fibres the filaments of the one component yarn, and causing said fibres to surround the other component.

2. Method of producing yarn resembling spun yarn, said method comprising doubling a continuous filament yarn with a yarn of greater length, breaking the filaments of said continuous filament yarn into fibres, and causing said fibres to surround the other yarn.

3. Method of producing yarn resembling spun yarn, said method comprising doubling a continuous filament yarn with a yarn of greater length, stretching the doubled yarn sufficiently to break the continuous filament component into fibres but not to break the other component, and causing the fibres to surround said other component.

4. Method of producing yarn resembling spun yarn, said method comprising subjecting to a softening treatment two continuous filament yarns having different resistances to softening agents, stretching the yarns to extend the more easily softened yarn and to break the filaments of the other yarn into fibres, and twisting the fibres thus produced about the extended yarn.

5. Method of producing yarn resembling spun

yarn, said method comprising subjecting to a softening treatment two continuous filament yarns having different degrees of twist, stretching the yarns after softening of the lighter twisted yarn but before the stronger twisted yarn has been softened to the same extent, the stretch applied being sufficient to break into fibres the filaments of the less-softened yarn while merely extending the filaments of the other yarn, and twisting the fibres thus produced about the extended yarn.

6. Method of producing yarn resembling spun yarn, said method comprising subjecting to a softening treatment two continuous filament yarns one of which has an oil content to enable it to resist softening, stretching the yarns to extend the more softened yarn and to break into fibres the filaments of the other yarn, and twisting the fibres thus produced about the extended yarn.

7. Method of producing yarn resembling spun yarn, said method comprising feeding two yarns at different rates into a stretching bath, withdrawing them from the bath at the same rate, which rate is sufficiently high to break into fibres some at least of the filaments of the slower-fed yarn while merely extending the faster-fed yarn, and twisting together the fibres and the extended yarn.

8. Method of producing yarn resembling spun yarn, said method comprising associating two yarns at least one of which is composed of continuous filaments, breaking into fibres the con-

tinuous filaments of the one component yarn, causing said fibres to surround the other component and slackly winding the resultant product.

9. Method of producing yarn resembling spun yarn, said method comprising passing between successive pairs of breaking rollers a yarn comprising a continuous filament yarn having a yarn of greater length loosely doubled about it, extending the yarn to break into fibres the filaments of the continuous filament yarn while straightening the other yarn, and twisting the fibres produced from the one yarn about the straightened other yarn.

10. Yarn resembling spun yarn, said yarn comprising a core of fine continuous filaments of organic derivatives of cellulose, and fibres formed from continuous filaments of organic derivatives of cellulose, said fibres completely covering said core.

11. Yarn resembling spun yarn, said yarn comprising a strong core of stretched continuous filaments of cellulose acetate, and fibres formed from continuous filaments of cellulose acetate, said fibres completely covering said strong core.

12. Yarn resembling spun yarn, said yarn comprising a core of continuous filaments of organic derivatives of cellulose, and fibres formed from continuous filaments of organic derivatives of cellulose, said fibres being bound into such core and protruding therefrom so as to cover completely said core.

PERCY FREDERICK COMBE SOWTER.

CERTIFICATE OF CORRECTION.

Patent No. 2,044,130.

June 16, 1936.

PERCY FREDERICK COMBE SOWTER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 57, after "in" insert of; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of September, A. D. 1936.

(Seal)

Leslie Frazer
Acting Commissioner of Patents.