

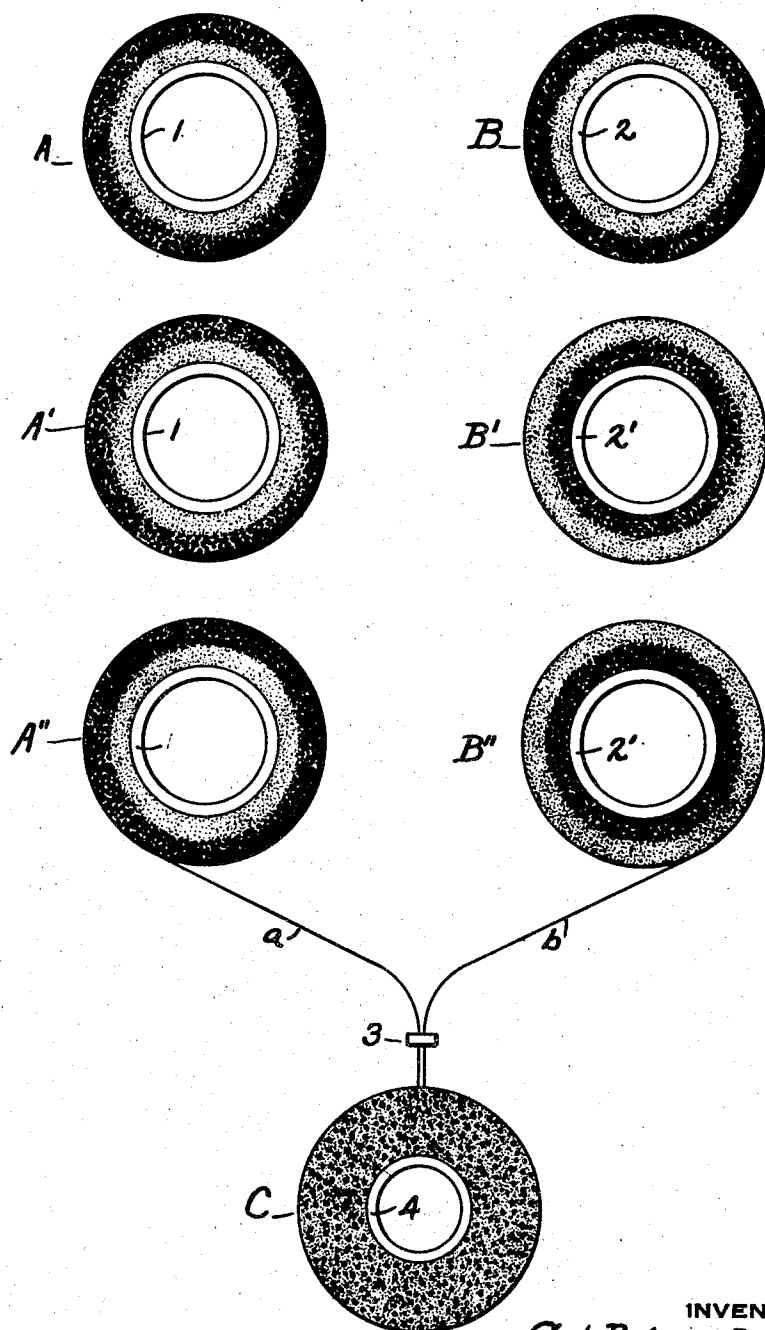
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METHOD OF MAKING CONTINUOUS FILAMENT YARN

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METHOD OF MAKING CONTINUOUS
FILAMENT YARN

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This invention relates to continuous-filament spun yarn, and has for its object the provision of an improved yarn which is a blend of two or more groups of filaments or yarns in longitudinal displacement in respect to their physical properties as manifested by their dyeing affinities. (Filaments in groups, twisted or untwisted, will hereinafter be called yarn.) The invention aims to eliminate or effectively diminish the lack of uniformity in continuous-filament yarn which causes uneven dyeing, and, to this end, provides such a blending of the two or more yarns that a recurring condition existing in a certain part of each yarn due to its structure will be effectively concealed or compensated for by the yarn combined therewith.

My invention provides an improved composite continuous-filament yarn which is a blend of two or more yarns formed by such a longitudinal displacement of the yarns with respect to each other that those portions of the yarn that receive a certain dye effect will not be in contact with a similar portion of the other yarn. For example, with two packages of yarn formed under the same conditions, the outside yarn of one package is combined with the inside yarn of the other package.

The method of my invention, in one of its aspects, comprises forming two spun continuous-filament yarns under similar or identical conditions in packages, inverting the terminals of one of the threads and combining the two threads into a single composite yarn, whereby the thread on the inside of one package is combined with the yarn on the outside of the other package resulting in a blending of the two yarns.

In other aspects of the method of my invention, I may combine the yarn at the exterior of one package with the yarn at an interior position of another package, or I may take shoulder portions of one bobbin package and combine them with the portions between the shoulders of another bobbin package and thereby stagger or scramble any continuously recurring conditions in the blended yarn by eliminating the effect of uneven dyeing.

My invention, in one of its advantageous embodiments, provides an improved method in which the ultimate yarn desired is spun in such a way that one-half of the total number of filaments are wound in spaced relation to the other half, whereby, in effect, two separate, substantially identical yarns are spun, each having a denier and filament count equal or effectively equal to one-half the denier and filament count

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of the ultimate yarn. At a propitious stage in the process which may embrace one or more of such steps as purification, reeling, cone winding, one of the two yarns is backwound so as to invert the terminals thereof while the other is left unchanged. The two yarns are then joined by collecting the yarns together and winding them as a single yarn upon a common receiver, preferably with twist. In this type of longitudinal displacement, the two separate yarns are reversed end for end with respect to each other.

In still another form of longitudinal displacement, I may also unwind a part, say one-half, of one bobbin, and then combine that end, starting at the center of the package, with yarn from the exterior of another bobbin, to form a blend in which the yarns are longitudinally displaced by one-half the length of one end.

The invention will be better understood after considering the following discussion taken in conjunction with the single figure of the accompanying drawing which illustrates diagrammatically a sequence of operations in an embodiment of my invention.

As shown in the drawing, A and B represent two freshly spun annular packages of viscose rayon, as formed, for example, on aluminum bobbins 1 and 2, respectively. The exterior layers of yarn, which have been wound as the end of the spinning period was approached, are indicated by the large dark dots. The interior layers initially wound are indicated by the lighter and smaller dots. A' and B' represent packages A and B at the conclusion of the first step of one of the processes of the invention in which the ends are completely reversed end for end with respect to each other. It will be noted that package B' has been backwound, reversing the inner and outer layers.

The packages A'' and B'' are shown in position for winding their ends in a third bobbin C. The two yarn ends *a* and *b* are passed through the traverse guide 3 and are wound on the bobbin 4 in any suitable manner to form the package C. In package C those filaments of yarn which were first wound to form package A are placed in side-by-side relationship with the filaments of the yarn which are wound last to form package B, and vice versa. As a consequence, the differences in dyeing affinity which are normally associated with the inside and the outside layers of a spinning package are neutralized, and the dyeing affinity is uniform throughout the length of the ultimate thread. If A and B are spun as 75 denier, 20 filament rayon, for example, the

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ultimate product is a thread of 150 denier, 40 filaments. In analogous manner, a thread of 100 denier, 60 filaments can be produced by spinning initially two yarns each of 50 denier, 30 filaments.

Any desired amount of twist may be applied to the blended yarn as it is being wound on the bobbin C. The yarns *a* and *b* are preferably completely purified prior to reaching of the bobbin C; however, purification, such as desulfuring, washing and drying may be carried out on bobbin C.

In carrying out an embodiment of my invention, in forming a package similar to C, I may take the two threads which are ultimately to be combined and spin them onto a common bobbin, but in spaced relation, as taught in principle, for example, in Patent No. 2,139,449 to Karns. After spinning, the two-thread package is washed free of acid, treated with a dilute aqueous solution of ammonium sulfide to remove the liberated, elemental sulfur and rinsed with suitable water. The two threads are unwound from the spin bobbin onto separate spools. This may be done satisfactorily with the apparatus described in Patent No. 2,285,667 to Kontz, or with the apparatus described in Patent No. 2,331,454 to Cooper. The take-up spools are preferably mounted on ring twister spindles, the machine being so adjusted with respect to feed roll and spindle R. P. M.'s that the take-off speed approximates 170 yards per minute, and only a nominal twist, say 0.25 turn, is inserted in each thread. One of the spools is then backwound at high speed. This is done on a suitable machine with a high take-up speed, such as a ring twister, so adjusted with respect to feed roll and spindle R. P. M.'s that the winding rate is of the order of magnitude of 525 yards per minute. In this backwinding operation, the direction of rotation of the take-up spindles is arranged to be opposite to that of the initial take-off operation. Finally, the two spools are mounted side by side on the creel board of a ring twister, and the filaments of the two threads are converged into a single thread as they pass to the feed rolls. In this operation, the machine is adjusted with respect to feed roll and spindle R. P. M.'s so as to provide for a take-up speed of approximately 85 yards per minute and a twist of nominally three turns per inch. The resultant thread, which, for brevity, I call a "cross-matched yarn," is thereafter handled as desired for further treatment and packaging in accordance with methods that are well known in the art.

It will be obvious to persons conversant with the art of manufacturing rayon that numerous modifications can be made in the above described preferred procedure to obtain substantially the same result without departing from the spirit of my invention. Among other things, it will be obvious that it is not absolutely vital that the terminals of the two filament bundles be precisely cross-matched; it is satisfactory to

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have them be substantially closely cross-matched.

I claim:

1. The method of forming an improved continuous-filament yarn which comprises the steps of forming at least two continuous-filament yarns and subsequently combining the two yarns in longitudinal displacement with respect to each other by twisting said continuous-filament yarns together to produce a blended yarn having uniform dye affinity.

2. The method of forming an improved continuous-filament yarn which comprises forming at least two continuous-filament yarns, taking up said continuous-filament yarns in two packages, rewinding one of said continuous-filament yarns to reverse the end-for-end relationship of said packages and combining the two yarns by winding said yarn together on to a common package while applying a twist thereto whereby the yarn from the inside of one package is in contact with the yarn from the outside of another package.

3. The method of forming an improved continuous-filament yarn which comprises forming, under substantially identical conditions, at least two continuous-filament yarns with regularly recurring portions having similar dye affinities, and combining said yarns into a single yarn so as to cause the filaments of one yarn to be longitudinally displaced with respect to the filaments of the other of said yarns.

4. The method of producing from continuous-filament yarns a blended yarn having a uniform dye affinity, which comprises separately forming at least two continuous-filament yarns, taking-up each of said yarns in separate package form, drawing said yarns from different portions of each of said yarn packages, and combining said yarns to produce a blended yarn having uniform dye affinity.

5. The method of producing from continuous-filament yarns a blended yarn having a uniform dye affinity, which comprises separately forming two yarns, taking-up each of said yarns in separate package form, drawing a yarn from the inside of one of said yarn packages and the other of said yarns from the outside of the other of said packages, and twisting said yarns together into a blended yarn having uniform dye affinity.

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