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PRODUCTION OF TEXTILE YARNS

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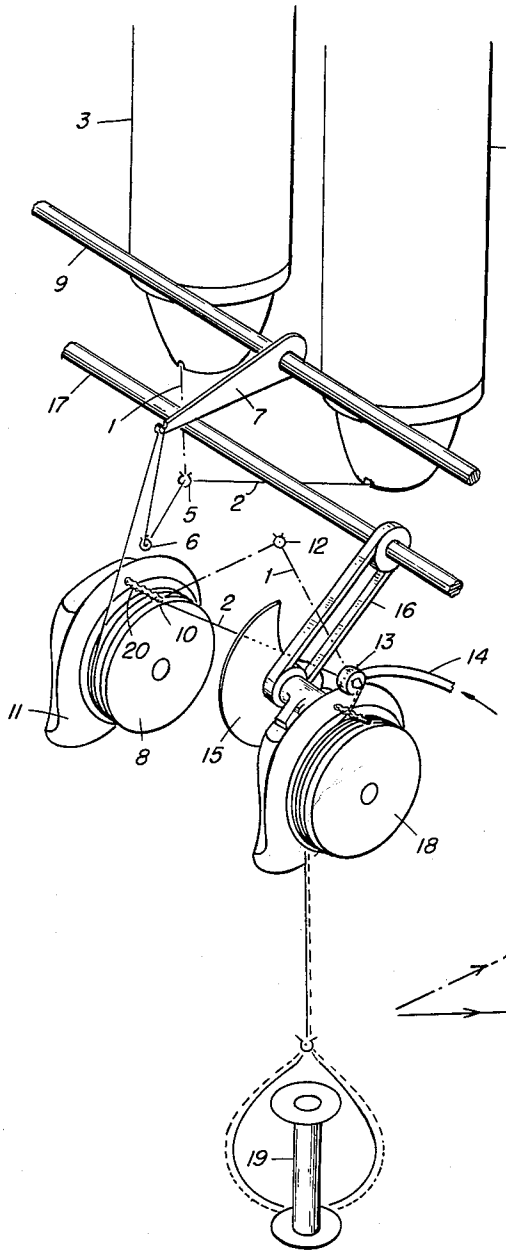

FIG. 1

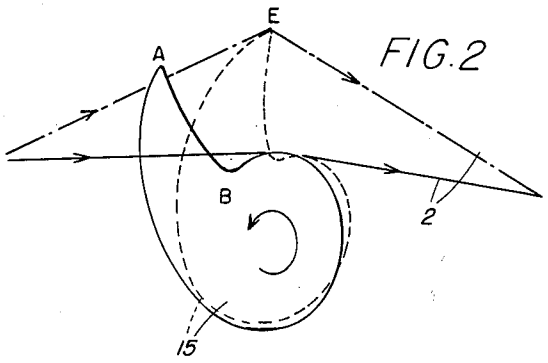

FIG. 2

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PRODUCTION OF TEXTILE YARNS

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This invention relates to the production of textile yarns, and in particular to a novel type of fancy yarn. The yarn of this invention is characterised by a number of yarns of varying denier which are combined in a novel manner to provide a series of neps in the final yarn.

A process has recently been developed, as described for example, in Breen's United States Patent No. 2,783,609, for the production of bulky yarns by passing a bundle of continuous filaments from a supply package through a turbulent zone produced, for example, by a high velocity jet of air, so that the filaments are caused to form loops and convolutions at random intervals. The loops and convolutions may be fixed in position in the collected yarn by twisting the bundle of filaments before or after the bundle is fed to the turbulent zone.

We have now found that the type of bulking process using a turbulent zone can be used to produce novel fancy yarns as characterised above without necessarily forming loops and convolutions in the filaments by a process comprising the following steps:

(*a*) Two or more continuous-filament bundles are produced having a similarly varying denier;

(*b*) The two or more varying denier filament bundles are associated together in such a way that, while the denier variations either coincide or are offset by a constant distance, in other words bear a constant unvarying linear relation to each other, the bundles are nevertheless still separable;

(*c*) One or more of the bundles are then passed at a uniform speed into a turbulent bulking zone while

(*d*) The other bundles are separated and fed to the bulking zone at a speed which is rapidly varied at random intervals to provide lengths of overfed filaments which form neps in the turbulent zone, and

(*e*) All the bundles leaving the turbulent zone are twisted together.

The filament bundles used in this invention are produced by the standard dry spinning technique and the process is accordingly applicable to all types of dry spun fibres for example of cellulose acetate, both the secondary and triacetate, and soluble vinyl polymers, for example the acetone-soluble copolymers of acrylonitrile and vinylidene chloride. The filaments may also be spun dyed that is to say the spinning solutions may contain one or more colouring materials; they may be the same or different colours.

The process of this invention is conveniently carried out using two bundles of filaments only and it will therefore be described in more detail with particular reference to the use of two bundles. The process is preferably carried out in a continuous manner, that is to say the two varying denier filaments as produced from the spinning cells by varying the draw-off speed of both in known manner may be collected side by side on a godet so that the variations in denier coincide or are offset by a constant distance and one bundle is then passed from the godet direct to a bulking jet while the other is passed at a rapidly-varying speed to the same jet. In order to make the denier variations coincide the two bundles of filaments leaving the cells are made to travel over the same distance to the guide which varies the draw-off speed. By making one of the bundles travel over a slightly longer path than

the other, the denier variations can be offset by the difference in length between the paths. Generally, the offset distance will not be greater than 10 inches. The varying speed to the jet may be achieved by passing the bundle to the jet by way of a number of guides and allowing the bundle during such travel to ride on the surface of a rotating cam so shaped that at certain parts of the cam revolution the bundle is lifted by the rotating cam surface and when it reaches another part of the cam having a sharp edge which suddenly releases the bundle, it allows an extra length of filaments to be suddenly overfed into the jet and form a nep on the bundle fed in at constant speed.

The bundles of filaments leaving the air jet are preferably passed first to a collecting godet and then to a twisting and collecting device such as a ring spinning machine. The collecting godet may have the same surface speed as that of the first godet in which case there is no bulking of the filaments by the jet so that the resultant twisted yarn is substantially free from loops and convolutions; alternatively the godet may have a slightly lower surface speed to enable a certain amount of bulking resulting in the formation of loops to take place in the jet. The godets are preferably mounted on the same shaft and any desired variations in the speed may then be obtained by using godets of different diameter.

The denier of the two bundles of filaments used and also the number of filaments in the bundles may be the same or different.

The present invention is illustrated by way of example in the accompanying drawings in which

FIGURE 1 is an end view of a machine according to the invention and

FIGURE 2 is a view of the cam showing the paths of the one bundle of filaments over it.

In the drawings, two bundles of filaments **1**, **2** are withdrawn from spinning cells **3**, **4** respectively and are passed by way of eye guides **5**, **6** and a slubbing guide **7** to a first godet **8**. The slubbing guide **7** is mounted on a slubbing shaft **9** which is oscillated in known manner by a randomly operated mechanism (not shown) so that the length of the filaments between the guides **6** and **7** is randomly varied, thus producing a varying draw-off speed and consequent variations in denier. Such yarns of varying denier are frequently referred to as "slub yarns."

The filament bundles **1**, **2** are associated on godet **8** so that their denier variations coincide. Bundle **1** is withdrawn at a constant speed from godet **8** by way of an eye **10**, mounted at the end of a grooved rod **20** attached to a bracket **11** on which godet **8** is mounted, to a second eye **12** and then to a bulking air jet **13** to which air is supplied by a pipe **14**. At the same time, the second bundle **2** is withdrawn from godet **8** by way of the guide eye **10** and passed to the air jet **13** in front of which a cam **15** is rotated. The cam **15** is rotated by means of a driving belt **16** driven by a layshaft **17** which is rotated by a variable speed motor (not shown). The effect of the cam **15** is shown in FIGURE 2 the bundle **1** being lifted by the cam until it reaches the edge E whereupon it is suddenly released and the accumulated filament length is taken up by the jet **13** to form a nep. The drop of the cam **15** (that is the length of the edge A—B) may be varied as desired in order to control the size of the neps obtained in the collected yarns. We have successfully used cams in which the drop has been from 3 to 4 inches.

From the air jet **13** the bundles **1**, **2** are passed more than once round a second godet **18** and are then collected in known manner as a twisted yarn on a bobbin **19**.

The denier variations in the bundles **1** and **2** may be offset by providing a further guide for bundle **2** between

the bottom of the cell 4 and the guide 5, thereby increasing the path of bundle 2 compared with that of bundle 1.

The invention is illustrated by the following examples:

Example 1

Two secondary cellulose acetate bundles of 110 denier, 28 filaments were collected from the spinning cells, the denier of the filaments was randomly varied in known manner as shown in the drawings, and both bundles were collected at 60 metres per minute on a godet 6.5 inches in diameter. One of the bundles was passed direct to an air jet of 0.040 to 0.045 inch diameter supplied with air at 30 lbs./in.^{2}. The other bundle was passed to the air jet over a cam driven by a variable speed motor and shaped as shown in FIGURE 2 with a drop of 3 inches and rotated at an average of 44 revolutions per minute. From the jet the bundles passed at 60 metres per minute to a second godet also 6.5 inches in diameter and mounted on the same shaft as the first godet and were collected as a twisted yarn on a ring twisting machine.

The yarn collected was a nep slub yarn, 220 denier, 52 filaments. The yarn was substantially free from surface loops so that the jet had functioned solely to form the neps in the yarn.

The procedure of the example may be varied by using a second godet 6.4 or 6.3 inches in diameter so that the yarn is slightly bulked, with a corresponding increase of about 1½ or 3 percent respectively in the denier of the collected nep slub yarn.

Example 2

The procedure described in Example 1 was repeated using two 80 denier, 26 filament bundles of cellulose acetate yarn and the nep cam was rotated at an average of 48.5 revolutions per minute. The product was a nep slub yarn, 160 denier, 52 filaments.

Example 3

The procedure used in Example 2 was repeated but using a spinning speed of 100 metres per minute and the nep cam was rotated at an average of 60 revolutions per minute with a corresponding increase in the frequency of operation of the varying denier, or slubbing guide.

Examples 4 to 6

The procedures described in the above Examples 1 to 3 were repeated with the only change that a cam with a drop of 4 inches was used. The products were similar to those obtained in the corresponding examples but the neps were more prominent.

Variations in the length of the slubs in the finished yarn may be obtained by carrying out the procedure described in any of the above examples and passing the one bundle of filaments over a path which from the base of the spinning cell to the guide 7 is from 2 to 4 inches longer than the path of the other bundle.

What we claim is:

1. A process for the production of a fancy textile yarn which comprises producing at least two continuous-filament bundles having a similarly varying denier, associating the said bundles together in such a way that the denier variations bear a constant unvarying linear relation to each other, the bundles being still separable, passing at least one of the bundles at a uniform speed into a turbulent zone while at least one of the bundles is fed to the same turbulent zone at rapidly-varied random intervals to provide random lengths of overfed filaments which form neps in the turbulent zone and twisting together all the bundles leaving the turbulent zone.

2. A process for the production of a fancy textile yarn which comprises producing two continuous-filament bundles having a similarly varying denier, associating the said bundles together in such a way that the denier variations bear a constant unvarying linear relation to each other, the bundles being still separable, passing one of the bundles at a uniform speed into a turbulent zone while the other bundle is fed to the same turbulent zone at rapidly-varied random intervals to provide random lengths of overfed filaments which form neps in the turbulent zone and twisting together the two bundles leaving the turbulent zone.

3. A process as claimed in claim 2 wherein the speed of the bundles leaving the turbulent zone is the same as the speed of entry of said bundles to the zone, whereby the final collected yarn is substantially free from surface loops.

4. A process as claimed in claim 2 wherein the two bundles of filaments are continuously produced by dry spinning and are passed direct from the spinning cells by way of an oscillating guide producing variations in the denier of the filaments to a collecting godet, from which the bundles are passed to the turbulent zone.

5. Apparatus for producing a fancy textile yarn comprising dry spinning apparatus for producing at least two dry-spun bundles of filaments, a randomly oscillated slubbing shaft, at least one slubbing guide mounted on the said slubbing shaft whereby variations in the denier of the filaments are produced, a godet for collecting the resultant bundles of varying denier filaments so that the denier variations bear a constant unvarying linear relation to each other, a jet for producing a turbulent zone, means for feeding at least one of the bundles of varying denier filaments to the jet at a constant speed together with means for feeding at least one of the bundles of varying denier filaments to the jet at a speed which is rapidly varied at random intervals to provide random lengths of overfed filaments which form neps in the jet and a twisting and collecting device for twisting the bundles together to form a nep yarn.

References Cited in the file of this patent

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