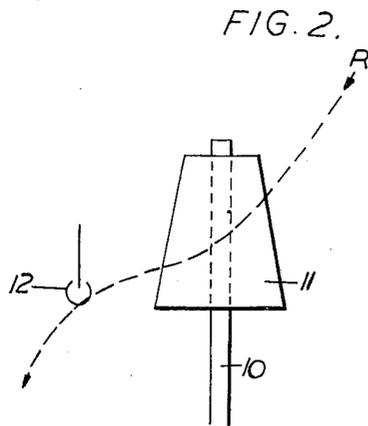
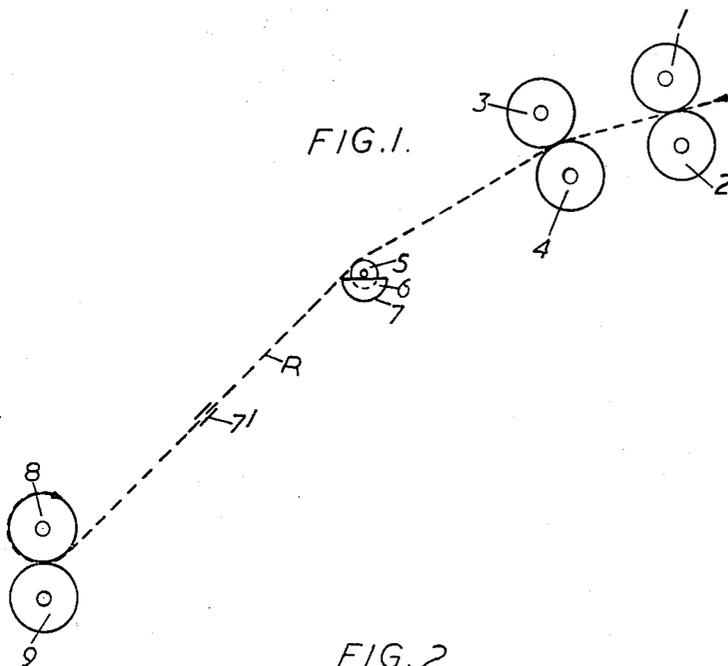


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TOW, SIZING THE TOW, FALSE TWISTING AND WINDING
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PRODUCTION OF TWISTLESS YARNS BY DIRECT SPINNING TO TOW, SIZING THE TOW, FALSE TWISTING AND WINDING

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1 Claim. (Cl. 57—157)

This invention relates to a method and apparatus for producing an untwisted yarn by direct spinning and more particularly to the treatment of a continuous filament bundle in a continuous process for converting the bundle into an untwisted yarn composed of short lengths of fibers.

In direct spinning, and notably in the method in which a sliver of parallel filaments is stretched between two pairs of rollers until its breaks, a sliver of discontinuous fibers is obtained, which is thereafter twisted, for example by means of a spindle of a twisting frame of the ring and traveller type.

If it is desired to obtain a high twist, the winding-on speed is necessarily limited. It would obviously be possible to wind-on at a higher speed and to twist in a second operation, but this would increase the cost of production and would lower the efficiency of the direct spinning. Moreover, when the twist is reduced, the number of breakages rapidly increases.

It is already known to size yarns of discontinuous parallel fibers, for example with latex or resins, for the purpose of producing yarns comprising bonded fibers which can be used in weaving.

Attempts have been made to improve the behavior of the slivers in the conventional spinning method using fly frames, and devices exist in which there is provided in association with the balloon guide a member which imparts a false twist. There also exist devices in which the balloon guide is replaced by a false twist member. The breakages during spinning are thereby reduced and it is possible in some cases to increase the speed to some extent.

An object of the present invention is to provide a novel and improved method for producing such untwisted fiber yarns.

According to the present invention, untwisted yarns are produced in direct spinning by sizing the sliver as it leaves the stretching rollers with an aqueous solution of a readily water-soluble binder, while at the same time imparting a high twist to the fibers, whereby the filaments are assembled and bonded together. The gripping of the filaments ensures that they adhere together over their entire length, and an extremely small quantity of binder is required to effect a complete cohesion of the mass.

The twist is imparted by a false twist device. Since very little binder is required, a dilute aqueous solution may be employed, and the yarn can be caused to absorb a very small quantity thereof so that, at the outlet from the false twist device, only a small quantity of the water is absorbed by the yarn and some of this is eliminated in the air prior to winding. Hence the yarn can be wound without intermediate drying.

This method has proved particularly interesting in the direct spinning of slivers of fine filaments, for example of at least 1 denier, of regenerated cellulose, since it permits of increasing the speed of direct spinning two to four times, for example by the use of the device according to Patent No. 2,635,295. However, the method of

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the invention is not limited to this particular embodiment. Similarly the direct spinning with stretching until breakage has been specifically mentioned in the foregoing, but the process may also be applied in combination with any other direct spinning method, for example with staggered cutting of a sliver of continuous filaments.

The use of a water soluble binder facilitates desizing after the weaving or knitting of the yarns which thereafter open out and give particularly full and soft fabrics.

It is to be noted that the quality of the yarns obtained in accordance with the invention is suitable for use in weaving or knitting and is comparable to that of normally twisted yarns. This is particularly true of yarns formed of fine filaments, probably by reason of the excellent adhesion of the filaments which have undergone the false twist.

In the case of the aforesaid yarns formed of fine filaments another completely unexpected result is also obtained. The fabrics obtained with these yarns, of which the filaments have undergone very high stretching in the chemical process of their production, giving rise to very high tenacity, exhibit some transverse fragility which results in lower resistance to rubbing, for example on known wear-testing machines. In the case of yarns obtained in accordance with the invention, the de-sized fabric exhibits much higher resistance to wear than fabrics formed from the usual broken yarns consisting of the same material. The increase in the wear resistance may be from 300% to 400%. The absence of twist in the filaments apparently causes them to work under more favorable conditions when subjected to transverse rubbing.

For the sizing, there may be employed small quantities of gelatin solutions, more especially an aqueous gelatin solution containing from 11 to 20 grams per liter.

The apparatus employed in accordance with the invention comprises a direct spinning device, followed by a sizing member comprising a wetting roller half immersed in a sizing bath, which is preferably heated, and a false twist member, which is followed by a winding device to which the untwisted sized yarn is guided.

The speed of the wetting roller is important since it determines the rate of absorption of the bath. The false twist to be imparted depends upon the count of the filaments. The false twist imparted to the yarn, in turns per meter, is obviously equal to the speed in turns per minute of the false twist member divided by the speed of the yarn in meters per minute.

The choice of the false twist member is not vital, and there may be used, for example, tubes comprising a transverse bar, or a lateral eye. The false twist may with advantage be imparted by friction on a rotating member, as described in detail in the application Serial No. 782,564, filed December 23, 1958. This device permits dispensing with threading.

The invention will be better understood by referring to the following description taken in connection with the drawing in which:

Fig. 1 is a diagrammatic view showing an embodiment of the invention; and

Fig. 2 is a detail view showing a modified type of twister.

In Fig. 1 a bundle of 2200 deniers comprising 5500 strands of filaments of regenerated cellulose having a tenacity of 6.5 grams per denier and a dry elongation of 8% is converted into a sliver, metric number 90, on the device comprising the supply rollers 1 and 2 and feed rollers 3 and 4, which run twenty-two times faster than the first mentioned rollers. The latter two rollers 3 and 4 operate to feed the sliver at a speed of 40 meters (against about 13 meters in the case of the normal process without sizing and false twist).

The yarn in the form of a sliver R of discontinuous

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fibers is brought into contact with a wetting roller 5 half immersed in a sizing bath 6 contained in a trough which may be heated, for example, by a resistor (not shown).

For a bath containing 12 to 15 grams of gelatin the optimum temperature is 60° C. to 75° C. A satisfactory degree of sizing giving a non-sticky gel is obtained with a speed of rotation of seven to ten revolutions per minute of the sizing roller.

After the sizing, the yarn passes through a false twist tube 7 and the size solidifies. The yarn is thereafter wound on a spool 8 driven by a driving roller 9. The speed of the false twist tube is 27,000 revolutions per minute, giving 675 turns per meter.

The yarn obtained has a tenacity of 4.5 grams per denier with a dry elongation of 4½%. The tenacity indicates a high yield, since a comparable twisted yarn has a tenacity of 5 grams per denier.

In Fig. 2 the false twist device of Fig. 1 is replaced by a rotating member consisting of a frustum of a cone, preferably covered by a rubber jacket and on which the thread describes a helical arc. The rotation, for example at 4500 to 5000 revolutions per minute produces by friction a "rolling" of the yarn along the surface of the cone which results in a false twist.

A sized yarn R advances as indicated by the arrow. Fixedly mounted on a spindle 10 is a conical sleeve 11 of rubber. The yarn R passes around the sleeve 11 in a helical arc limited by an outlet guide 12. From the said guide, the yarn is directed to the spool 8 of Fig. 1.

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Although a specific embodiment of the invention has been shown for purposes of illustration, it is to be understood that various changes and adaptations may be made therein as will be readily understood by a person skilled in the art.

What is claimed is:

The method of producing twistless yarns by direct spinning, which comprises stretching a bundle of parallel filaments to breakage to form a twistless sliver composed of discontinuous fibers, sizing and twistless sliver with a small quantity of an aqueous solution of a water soluble binder in an impregnating zone and applying a false twist to the sized sliver to impart a high momentary twist to the sliver which feeds back to said impregnating zone and disappears in an untwisting and drying zone after the sliver passes the false twisting device, to form thereby a twistless impregnated yarn, and winding the twistless impregnated yarn.

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