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Van der Werf

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[54] **METHOD FOR THE MANUFACTURE OF YARN**

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[21] Appl. No.: **270,152**

[30] **Foreign Application Priority Data**

Oct. 5, 1971 Netherlands 13624

[52] **U.S. Cl.** ..... **57/164;** 57/35; 57/153; 28/75 R; 156/148

[51] **Int. Cl.** **D02g 3/40**

[58] **Field of Search** ... 57/35, 157, 164, 156, 157 R, 57/140 BY, 157 F; 28/75 R, 76 R; 156/148, 393

[56] **References Cited**

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Primary Examiner—John Petrakes
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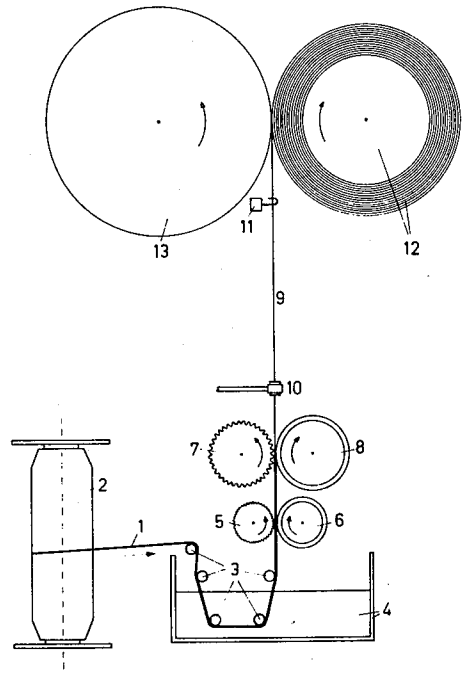
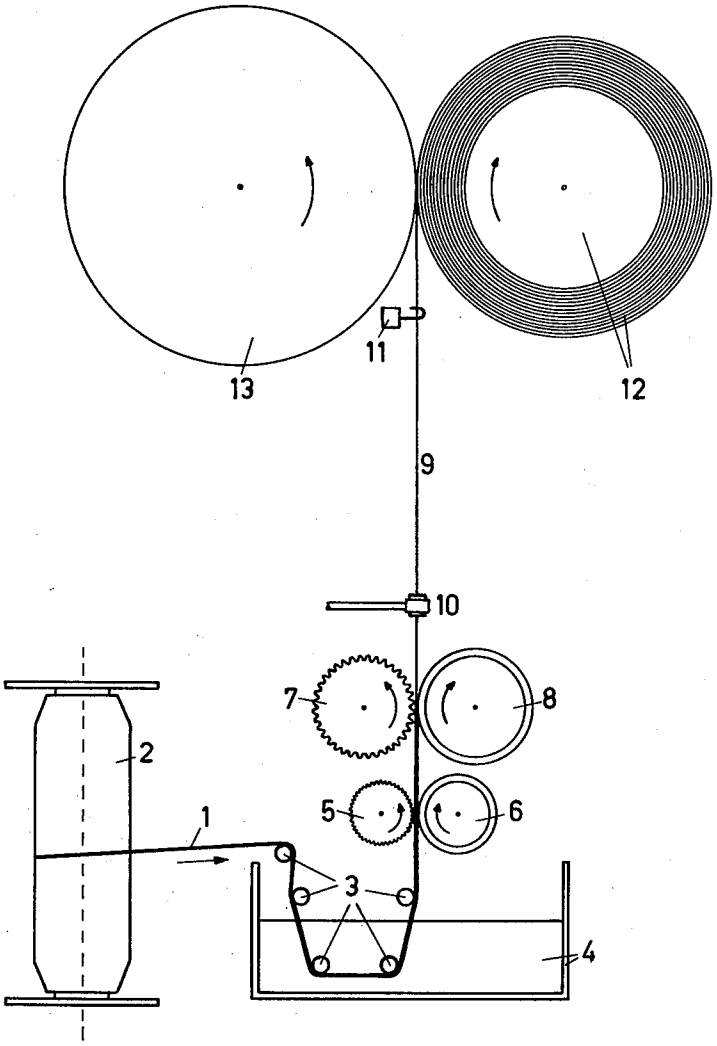
[57] **ABSTRACT**

The invention relates to a method for the manufacture of yarn from a roving of staple fibre material consisting of at least two components. The processes to which the roving is subjected includes the wet drafting of the roving at great speed to form a thinner fibrous sliver and the bonding of said fibrous silver. At least one of the fibre components, of which the staple fibre material is composed, provides for this bonding.

7 Claims, 1 Drawing Figure

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METHOD FOR THE MANUFACTURE OF YARN

The invention relates to a method for the manufacture of yarn from a roving of staple fibre material formed of at least two components. The method includes drafting of the roving to form a thinner fibrous sliver at great speed and the bonding of this fibrous sliver. The bonding of the fibrous sliver is necessary if the method is applied to the manufacture of twist-free yarn or yarn with a relatively low twist.

A method for the manufacture of twist-free yarn is described in ITS Weaving 1/1971, pages 29, 30 and 37, where the drafting of the roving to form a thinner fibrous sliver takes place in a dry condition, whereupon the bonding of the fibrous sliver so obtained is effected by the supply of an active bond and subsequent drying.

In the British patent No. 1.186.233 a method for the manufacture of twist-free yarn is described, where the drafting of the roving to form a thinner fibrous sliver takes place in a wet condition and the bonding agent required for the bonding of the fibrous sliver is added to the fibrous material in a non-active form. The bonding agent is then subjected to an activating treatment. More specifically, the bonding of the fibrous material occurs as follows: the roving, which is in an unsaturated wet condition, is washed with an excess supply of starch-grain suspension, after which the fibrous sliver wound to a fibre package is subjected to a heat treatment, the temperature, the environmental moisture and the duration of which are adapted to the gelatination of the starch-grains present in the fibre package, and subsequently dried.

In said article of ITS Weaving and also in the above-mentioned patent the bonding agent required is added to the fibrous material during the process of manufacturing the yarn from the roving.

The object of the present invention is to provide a completely new method of bonding the roving, in which the bonding agent is not added to the fibrous material during the afore-mentioned process itself.

To this effect the staple fibre material according to the invention is formed of components at least one of which provides the bonding.

The bonding agent required for the bonding of the fibrous sliver is therefore present in an inactive form. In order to accomplish bonding of the fibrous sliver, the fibrous component providing for the bonding should be activated after the roving has been drafted to a thinner fibrous sliver. The choice of this fibre component determines the method by which the activation takes place.

In the present application in question a mixture of different fibres is used and, in accordance with the invention, at least one of the fibre components provides for the bonding. Thus the roving may contain a natural fibre, as fibre component, which does not provide for the bonding, for instance such as cotton or synthetic fibres as polyamide, polyester or stabilised polyvinyl alcohol. One of the following types of fibres can be used for the bonding component:

- fibres which are expandable, gelatinisable or soluble in water, such as unstabilised polyvinyl alcohol (PVA) or alginate fibres;
- fibres soluble in mixtures of water and suitable organic solvents (e.g. acetone, formic acid, acetic acid, etc.) such as di- and tri-acetate fibres;

- melting fibres such as polyamides melting under a relatively low temperature or polyalkylene compounds (polyolefines)

Furthermore, it is possible to use a roving in which several of the non-bonding fibres are provided in addition to bonding fibres, such as cotton with polyester and unstabilised PVA as the bonding fibre. It should be noted that not every combination of fibres providing for the bonding with fibres not providing for the bonding can be used.

As already described, the method used for the activation of the bonding fibres is determined by the type of fibre used for this purpose. When using unstabilised polyvinyl alcohol, alginate fibres etc., it is necessary to bring the fibrous sliver into a wet condition before bonding. The bonding fibre component causes bonding with and between the surrounding fibre components during the bonding process of the fibrous sliver by expanding, gelatinising, or partial solving, and subsequent drying. "In a wet condition" means "in an aqueous medium". As already mentioned, with the use of di- or tri-acetate fibres, mixtures of water and suitable organic solvents can be used instead of water. The process of expanding, gelatinising or partial solving can be accelerated by performing this process under an increased temperature.

If a melting fibre is used as the bonding fibre component, bonding with and between the other surrounding fibre components during the bonding of the fibrous sliver is achieved by melting this component under an increased temperature or subjecting it to a sufficient surface softening, and subsequent cooling. The fibre material should therefore be in a dry condition before the bonding step.

The methods described above for the activation of the bonding fibre components can be applied to a process in which the drafting of the roving occurs in a wet condition and also to a process in which this occurs in a dry condition. Also the two methods of activation can both be applied to the manufacture of twist-free yarn and to obtain yarn with a relatively low twist. The activation of the bonding fibre component can be omitted during the spinning of the yarn with a relatively low twist and be delayed to the moment when higher standards are set to the yarn.

If the drafting of the roving occurs in a wet condition, then the thinner fibrous sliver so obtained, with the application of melting fibres, should be dried before the bonding process.

In the following, a method for the manufacture of twist-free yarn from a roving is described as an example where the roving contains unstabilised PVA as the bonding fibre. This example will be explained with reference to the FIGURE which illustrates schematically the arrangement of a device suitable for that purpose.

The roving **1**, which is pulled off the roving bobbin **2**, is guided, with the aid of guiding elements **3**, through a reservoir filled with water **4** containing an agent that renders the roving more permeable to water, and fed to a drafting device, of which the serrated roller **5** and the rubber roller **6** form the feed rollers and the serrated roller **7** and the rubber roller **8** the delivery rollers. Here the roving is drafted to form a thin fibrous sliver **9**, which, subsequently, is passed through the pneumatic false-twisting element **10** and the traversing element **11** and is wound to form a fibre package **12** which is driven by a winding roller **13**.

As known from the afore-mentioned British patent No. 1.186.233, during the drafting process in a wet condition, the coherence of the fibres was found to be such that, especially with high delivery speeds of the drafting device, an uninterrupted and smooth thin sliver can be formed; furthermore, it was found that the smoothness of the yarn improved as the speed increased. The drafting takes place between the feed rollers and the delivery rollers of the drafting device; here the peripheral speed of the rollers **7** and **8** of the delivery rollers is one order of magnitude larger than the peripheral speed of the rollers **5** and **6** of the feed rollers. The roving runs between the roller pairs **5, 6** and **7, 8** through a free drafting field. The means used earlier in the drafting field, such as needles, pins, rollers and belts, for the purpose of increasing the coherence amongst the fibres, were found to exert by this method, as described in said British patent, an adverse influence on the drafting process and on the quality of the yarn. The sliver drawn from the drafting device is then fed to the winding device via the falsetwisting element **10.**

The false twisting causes the coherence of the fibres to be temporarily increased after the drafting to such an extent as to render the sliver strong enough to cover the distance between the driving device and the winding device and to resist any tensile stresses it may encounter on its way.

For false twisting a pneumatic false-twisting device is employed. For this purpose the fibrous sliver is guided through a mainly cylindrical bore into which a number of blowing nozzles open tangentially. In this way, a rotating air column can be formed within the bore, the rotation of the air column being transmitted to the passing sliver. The number of revolutions may easily be increased to such an extent that in this respect to limitation whatever of the speed of the yarn will be encountered.

After passing the twisting element, the sliver is wound on a perforated core and formed into a fibre package **12.** During this winding process it is important that no part of the slivers should touch any other part of the sliver lengthwise, because, after bonding, these two parts of the sliver would be joined together so firmly that yarn rupture would almost certainly occur at this place when unwinding the yarn. For this reason it is necessary to use the cross-wound bobbin, the turns of which touch each other crosswise only, as the necessary winding form of the sliver because it has been found that two sliver parts that cross each other after they have been bonded will not form a bonding that is stronger than the yarn itself. The peripheral speed of the drive roller **13** is a little less than the delivery speed of the drafting device, thus avoiding undesirable tensions in the fibrous sliver.

After the sliver has thus been formed into a package, the package is taken from the core and is subjected to a steam treatment for some time. The package is then dried and cooled, whereupon the bonded yarn can be unwound from the package.

In the above-described method Ne 0.8 roving was used, containing 90 percent cotton and 10 percent PVA fibre; after a 20-fold elongation, a steam treatment for 25 minutes at about 80°C and drying at about 105°C, an Ne 16 cotton yarn was obtained. It was found that the PVA in the fabric, which was obtained by the yarn so produced, could be very easily removed.

Also in the same way, an Ne 12 viscose fibre yarn was obtained from an Ne 0.6 roving containing 92.5 percent viscose rayon fibre and 7.5 percent PVA fibre, after drafting, steam treatment and drying as in the previous example.

What we claim is:

1. A method of manufacturing twistless yarn from a staple fibre material having at least two fibre components, one of which is potentially adhesive upon application at least of moisture, including the steps of:

drafting a roving of said staple fibre material in a wet condition to form a fibrous sliver,

activating said potentially adhesive fibre component to render it adhesive, and

completing said adhesive activation subsequent to said drafting step such that said fibres are bonded together by said adhesive component.

2. A method according to claim **1,** comprising in addition the step of winding before the drafted yarn has obtained full strength by completion of bonding.

3. A method according to claim **2,** wherein said completing step is performed subsequent to said winding step.

4. A method according to claim **1,** wherein said adhesive fibre component is unstabilized polyvinyl alcohol.

5. A method according to claim **1,** wherein said potentially adhesive component is soluble in a mixture of water and an organic solvent.

6. A method according to claim **5,** wherein said potentially adhesive component comprises di-acetate fibres.

7. A method according to claim **5,** wherein said potentially adhesive component comprises tri-acetate fibres.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,877,214 Dated April 15, 1975

Inventor(s) Herman Antonius Van Der Werf

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading:

Priority application number should read --7113624 --

Column 1, line 48, "fibrous" should read -- fibre --.

Column 3, line 35, "to" (second occurrence) should read -- no --.

Signed and Sealed this

Twenty-eighth Day of *November 1978*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

DONALD W. BANNER
Commissioner of Patents and Trademarks