United States Patent

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[54] PROCESSING OF FLAX DERIVED YARNS

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[52] **U.S. Cl.** .....**57/156,** 28/72 R, 57/157 R

[51] **Int. Cl.** **D01h 7/92**

[58] **Field of Search** .....28/72.1, 72.11, 72.13, 72 R; 57/156, 157 R, 157 TS, 34 R, 34 HS

[56] **References Cited**

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[57] **ABSTRACT**

A method of processing flax derived yarns having a natural stiffness due to the presence of a resin bonding size in the yarn to make the yarn more suitable for production into a fabric. The yarn is given a false twist by passing it in frictional engagement with a linearly preceding portion of itself to physically work the yarn thereby breaking down the bonding size.

9 Claims, 3 Drawing Figures

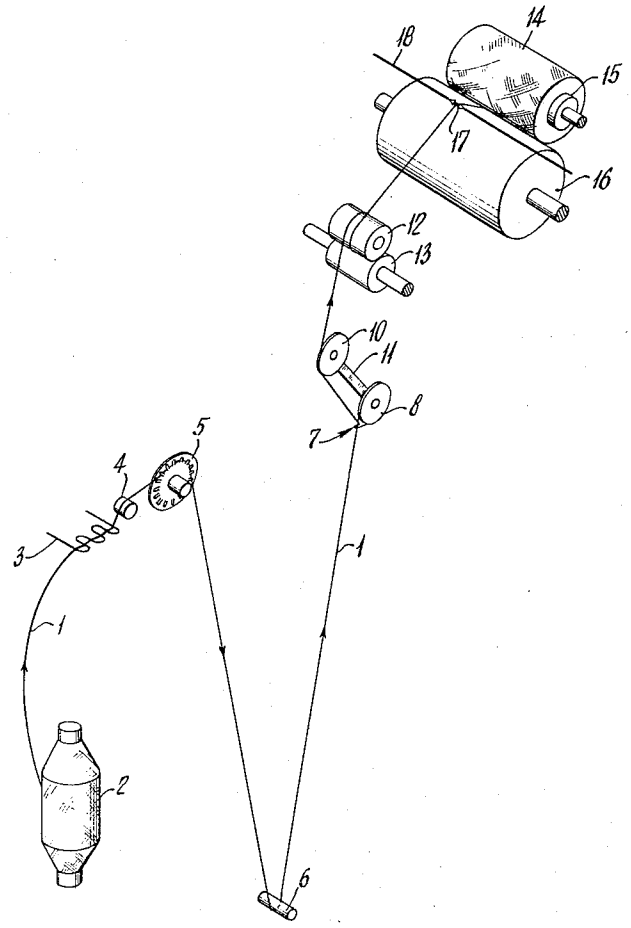

Fig. 1.

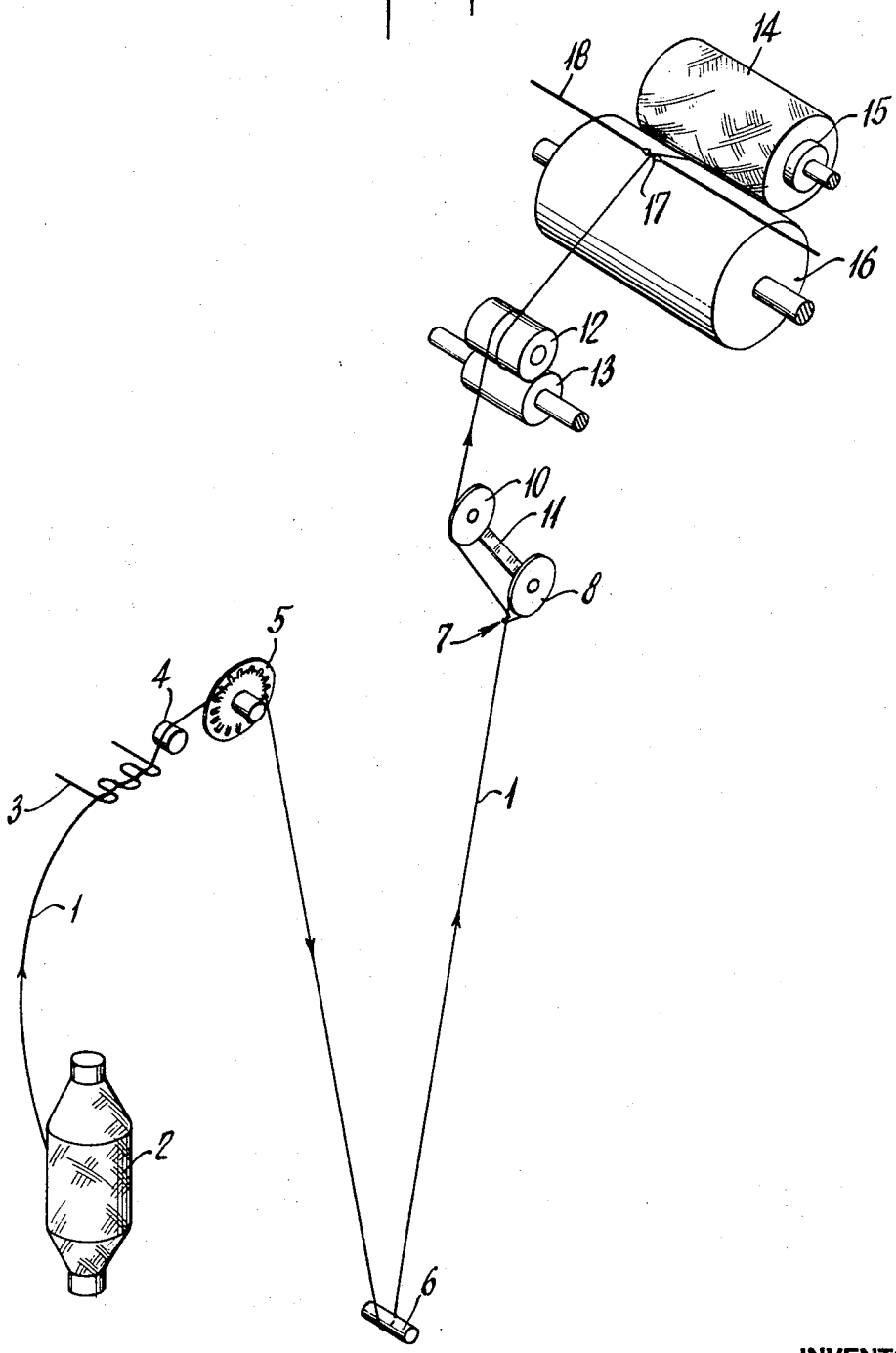

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Fig. 2.

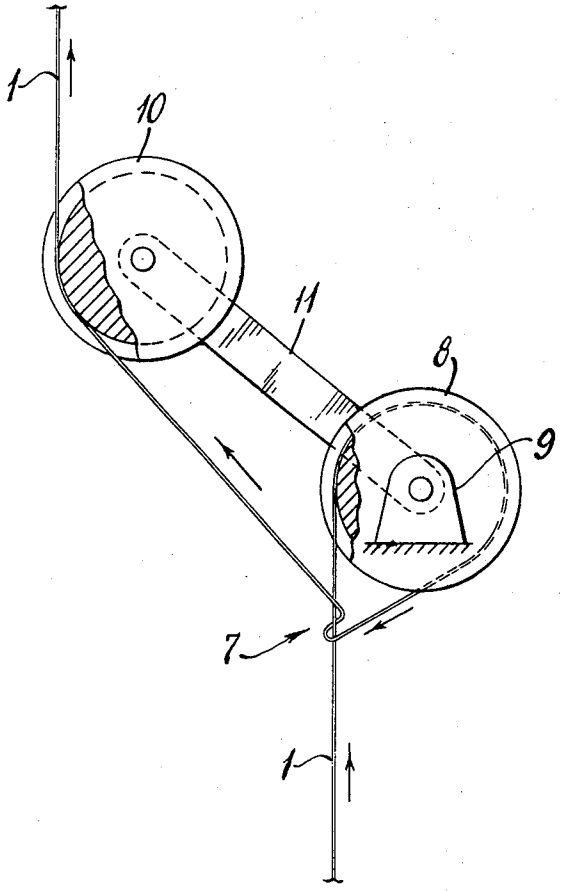
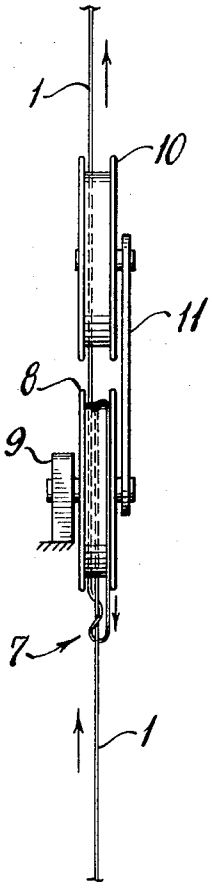


Fig. 3.



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PROCESSING OF FLAX DERIVED YARNS

This invention relates to the processing of flax derived yarns, and more specifically although not exclusively, linen yarn and more particularly to the treating of such yarn with the purpose of making it more amenable to production into fabric.

A disadvantage of linen, which is becoming increasingly important as fully synthetic thermoplastic yarns compete directly to any ever greater extent with linen yarns for usage in fabric, is that due to the basic production techniques by which it is formed into yarn from its natural fiber, the linen yarn possesses a natural stiffness (due basically to the presence of a resin bonding size in the yarn) to the extent that it is practically impossible to carry out any knitting operation, be it weft or warp, on a commercial basis. This is because the stiff yarn is unable to take the distortion into the tight loops necessary to form a knitted structure. This is particularly disadvantageous with respect to the practical inability to warp knit the yarn. In addition the stiffness of the yarn creates difficulties in weaving, due to the tendency of the yarn when used as weft not to lie completely straight during weaving unless subjected to undesirably high tension.

This natural yarn stiffness in the linen can be at least partially alleviated by chemically removing the bonding size, and indeed usually is so removed during normal chemical treatment of the fabric, such as scouring. However to carry out a special chemical process for the purpose of removing the size prior to forming the yarn into fabric would be too costly to be economically possible.

It is therefore an object of the present invention to overcome or at least reduce the above mentioned disadvantages without the need for a costly chemical process.

According to one aspect of the present invention there is provided a method of processing flax derived yarn which comprises passing the yarn in continuous movement transversely across and in frictional engagement with a linearly preceding portion of itself, whereby a false twist is applied to the yarn at the position of frictional engagement, which runs back in the yarn preceding said position.

We believe that the success of the false twisting operation in accordance with the invention is due to the physical working which the false twisting operation exerts upon the yarn.

It has been found that this application of false twist constitutes a form of physical working of the yarn which is highly suitable for opening the yarn and thereby breaking down the bonding size so as to reduce the stiffness in the yarn and make it sufficiently malleable to be capable of knitting.

The false twist may be applied in a direction tending to increase, during false twisting, the true twist already present in the yarn.

Alternatively the false twist may be applied in a direction tending to reduce, during false twisting, the true twist already present in the yarn.

It has been found that in the latter case the product yarn is softer and more pliable than in the former case, but is also weaker under tension and contains more broken filaments and is generally more "hairy" than in the former case.

The yarn may be processed by being continuously passed around a guide, or a fixed or rotatable pulley, and then moved transversely across a portion of the yarn approaching the guide or pulley.

Where a rotatable pulley is used, this may be freely rotatable or it may be driven or, in some instances, incorporate a rotation retarding member such as a friction braking member.

The yarn may be formed into a knot at the position (hereinafter called the false twisting position) where it frictionally engages transversely with itself. This knot may be of a simple form, e.g. one part of the yarn may be looped around the other.

The yarn may be positively fed towards the false twisting position by means for example of a positively driven capstain pulley, and the yarn may be positively fed from the false twisting position directly to a yarn take up package.

Alternatively, the yarn may be pulled up to and through the false twisting position solely by positive drive means situated beyond the false twist position, the yarn being subjected to a controlled tension means disposed prior to false twisting in order to apply a tension to the yarn during false twisting appropriate to the friction requirements for twisting. The tension means may be adjustable to provide for adjustment of the tension in the yarn and hence the friction during false twisting.

Adjustment of the friction during twisting may also be obtained by varying the relative angles of approach to and retreat from the false twisting position. This may be accomplished in part by arranging that the yarn after finally leaving the false twisting position passes around a guide member the position of which is adjustable relative to the false twisting position.

In order that the invention may be more fully understood, one embodiment thereof will now be described by way of example with reference to the accompanying drawings in which:

FIG. 1 is a diagrammatic view of one embodiment of yarn processing apparatus according to the invention;

FIG. 2 is an enlarged side elevation of the false twisting portion of the apparatus shown in FIG. 1; and

FIG. 3 is a front elevation of the portion of apparatus shown in FIG. 1.

It will be seen in the Figs. that yarn **1** from a supply package **2** passes through a straightening wire finger guide **3**, over a guide **4** and then around a magnetic hysteresis tensioning and twist stopping device **5** of a well known kind. The device **5** is capable of adjustment to vary the tension. The yarn then passes around a guide **6** and on to a false twisting position generally indicated by numeral **7**.

This portion of the apparatus is shown most clearly in FIG. **2**.

The yarn approaching from the guide **6** passes around a freely rotatable grooved pulley **8** mounted in a bearing **9** and upon leaving this pulley is wrapped around the approaching portion of the yarn as shown at **7**. Thereafter the yarn passes around a further freely rotatable grooved pulley **10**. The pulley **10** is mounted for rotation upon an arm **11** which in turn is pivotable about the axis of rotation of the pulley **8** so that the position of the pulley **10** is infinitely variable about the axis of the pulley **8**. By this means the angle between the yarn approaching to and retreating from the false twisting position **7** can be varied.

After leaving the pulley **10** the yarn passes around a positive drive pulley **12** and associated nip roller **13**, and then on to a take up package **14** carried by a bobbin **15**, the package **14** being driven by frictional engagement with a positively driven drum **16**. The yarn is cross-wound on to the package **14** by means of a yarn traverse guide **17** mounted on a reciprocatary traversing wire **18**, reciprocated by a known traversing means (not shown for simplicity).

It is to be noted that by adjustment of the tension applied to the yarn by the device **5** and by adjustment of the radial position of the pulley **10** relative to the pulley **8**, the false twist applied to the yarn can be varied, and hence the degree of opening and flexibility given to the yarn can be varied.

In addition it should be noted that although as mentioned earlier we believe the success of the present invention is due to the physical working which the false twisting operation exerts upon the yarn, we also believe it to be important for success of the method that the physical working should as much as possible be due to the false twist itself entering and then leaving the yarn, and as little as possible be due to the physical abrasion of the yarn upon itself at the false twisting position **7**. We believe that such abrasion increases the filament breakage of the yarn and increases its "hairiness", and thereby generally weakens the yarn. Consequently in practice the tension applied by the device **5**, and the radial position of pulley **10** are preferably so adjusted as to provide for the maximum application of false twist to the yarn with the minimum of abrasive friction of the yarn upon itself at the false twisting position **5**.

What we claim is:

1. Method of processing flax derived yarn having a natural stiffness due to the presence of a resin bonding size in the yarn which comprises passing the yarn in continuous movement transversely across and in frictional engagement with a linearly preceding portion of itself whereby a false twist is applied to the yarn, at the position of frictional engagement, which runs back in the yarn preceding said position, the yarn being physically worked by the false twisting whereby the bonding size is broken down so as to reduce the stiffness in the yarn and make the yarn sufficiently malleable to be capable of knitting.

2. Method according to claim 1, wherein the false twist is applied in a direction tending to increase, during false twisting, true twist already present in the yarn.

3. Method according to claim 1, wherein the false twist is applied in a direction tending to reduce, during false twisting, true twist already present in the yarn.

4. Method according to claim 1, wherein the yarn is passed continuously about a guide member and thence transversely across a portion of the yarn approaching the guide member.

5. Method according to claim 4 wherein the yarn is formed into a knot at the position where the yarn is moving continuously across and in frictional engagement with a linearly preceding portion of itself.

6. Method according to claim 5, wherein the knot is of simple form comprising one part of the yarn looped around another part.

7. Method according to claim 6 wherein the yarn is positively pulled up to and through the position of frictional engagement, and is subjected to controlled tension.

8. Method according to claim 7, wherein the yarn leaving the position of frictional engagement passes around a guide member the position of which is adjustable relative to said position, for varying the angle between the portions of the yarn approaching and leaving said position.

9. Method according to claim 1 wherein the linearly preceding portion of yarn at the position where the yarn is passing in continuous movement transversely across itself is maintained substantially straight.

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