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METHOD AND APPARATUS FOR THE MANUFACTURE OF BAST FIBRE YARN

Filed Feb. 21, 1961

FIG. 1

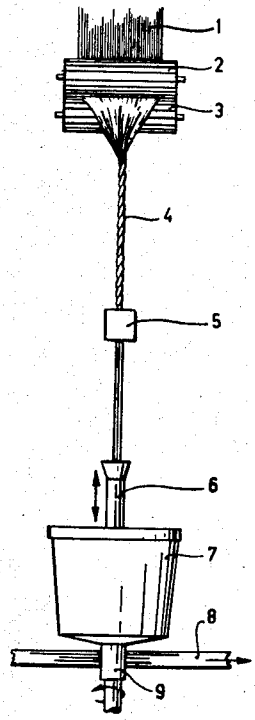


FIG. 2

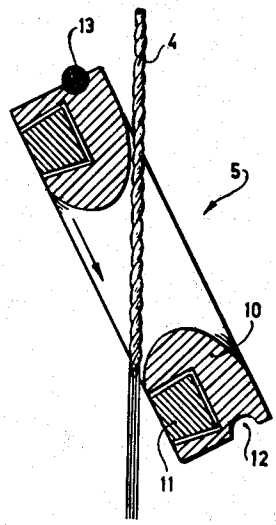


FIG. 3

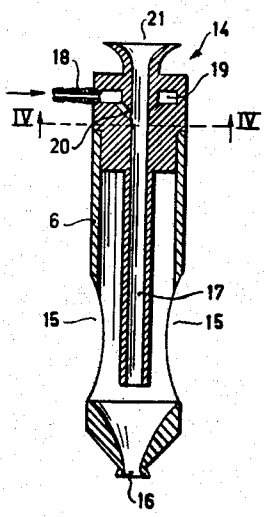
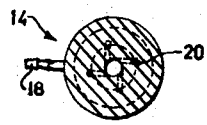


FIG. 4



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METHOD AND APPARATUS FOR THE MANUFACTURE OF BAST FIBRE YARN

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5 Claims. (Cl. 57—51.6)

This invention relates to a yarn from bast fibres, and to fabrics containing this yarn, and is more particularly concerned with a method and an apparatus for the manufacture of this yarn.

The known yarns from bast fibres, such as linen yarns, are all twisted yarns. As with yarns from other fibrous material the twist serves to obtain a proper cohesion of the single fibres.

It has for long been known that it is not possible to obtain from pure fibres or mixtures thereof a properly cohesive yarn without twisting them together.

Not until the twisting has been effected can the fibres transmit to one another sufficiently great frictional forces to prevent the cohesion of the yarn from being disturbed.

The degree of twist required to this end is dependent on the nature of the fibres.

The twisting of a yarn now is a very costly process. Moreover, the twist inserted, once the yarn has been woven into a fabric, may have an unfavourable effect on the strength of the yarn. For the purpose of elucidation it should be added that in a fabric the cohesion of the single fibres is to some extent obtained as a result of the weave pattern of the fabric.

Particularly with closely woven fabrics the cohesion of the single fibres may, as a result of the weave pattern, be greater than the cohesion obtained by the twisting process.

In that case it was found that as a result of the fibres being arranged less parallel in a twisted yarn, the strength of the fabric is liable to be reduced by too high a twist in the yarn. This has also been found to be true if the yarn has been used in knitted fabrics or other products.

It is an object of the present invention, in order to avoid said reduction in strength and also to avoid the high cost of yarn twisting, to provide a bast fibre yarn with a twist factor smaller than 1.4, and of which the single fibres are bound together by adhesives naturally present in the bast fibres from which these yarns are manufactured.

For the purpose of elucidating the term twist factor it should be added that this quantity is determined by the relation $t=\alpha\sqrt{Ne_2}$, where t is the number of turns per Brit. inch, α the twist factor, and Ne_2 the British yarn number indicating the thickness of the yarn. In actual practice the bast fibres are generally spun using a twist factor of approximately 2. With the usual spinning methods it is practically impossible to spin a cohesive yarn using a twist factor smaller than 1.6.

It has been found, surprisingly, that the amount in which the adhesives are naturally present in bast fibres is so great and their binding force so excellent as to permit a proper cohesion of the yarn.

It has been found that a yarn according to the invention may be cheaper and/or stronger than the known yarns, and that a product obtained from these yarns may be stronger than the products obtained from the known yarns.

It should be added that non-twisted or non-twined yarns are known. These consist, for instance, of endless filaments which have by way of synthesis been spun from a

melt, a solution, or in a coagulation bath. These yarns, however, have not the character of a fibre yarn.

Also non-twisted fibre yarns are known of which the fibres are kept together by adhesives added thereto. However, the addition of these adhesives in such a way that a satisfactory yarn is obtained is a difficult and costly process, which requires very special adhesives.

With the yarn according to the invention, on the other hand, a sufficient amount of good quality adhesive is already naturally present.

It is another object of the invention to provide fabrics containing at least partly a bast fibre yarn with a twist factor smaller than 1.4, of which yarn the single fibres are bound together by the natural adhesives present in the bast fibres from which the yarn is manufactured.

Still another object of the invention is to provide a methed for manufacturing a bast fibre yarn, which comprises passing a wet roving of bast fibres through a drafting frame and subsequently drying and collecting the yarn originating from the drafting frame.

Also an object of the invention is to provide a method according to which the yarn obtained from the drafting frame is first wound into packages, in which form it is dried. It has been found that the drying of the yarn while it is in package form is simpler and more economical than while it is traveling.

It has been found possible by starting from retted bast fibres a yarn may be obtained according to the method of the invention.

A better yarn may be obtained according to the invention, if the wet roving is obtained applying chemical decomposition of the bast fibre stalks after scutching.

It has been found that particularly favourable results are obtained by a chemical decomposition, in which the roving is treated successively with a 0.1–2.0% alkali hydroxide solution for ½ to 7 hours at a temperature between 50 and 100° C. and with a 0.1 to 2.0% alkali chlorite solution for 1 to 8 hours at a temperature between 50 and 90° C., as is known from Dutch Patent No. 94,773.

When the yarn leaves the drafting frame, it is flattened to a ribbon. Since the twist, which is now lower than usual, goes back less far to the drafting frame, the cohesion of the fibres in this ribbon is small.

In order to avoid thread breakage near the drafting frame, the yarn may be collected onto a conveyor belt and be transported as long as it has not been twisted together.

This method may be objectionable in that the apparatus must be provided with an additional complicated device.

It is an object of the invention to avoid said drawback by condensing the yarn immediately after it has left the drafting frame.

This can be effected by pressure and/or rolling, e.g. by means of rubbing leathers. In that case the single fibres are rolled together without receiving an appreciable amount of false twist.

A disadvantage to this method consists in that during the periodic reversal of the movement of the rubbing leathers the fibres are not rolled together over a certain distance.

Therefore, it is still another object of the invention to provide a method in which the condensing is effected by a false-twisting device.

By using these methods it may happen that locally, over very short distances, there is a higher twist in the yarn than corresponds to a twist factor smaller than 1.4. Over longer yarn lengths, however, the twist factor remains on an average below 1.4.

The winding or collecting of the yarn may be carried out in many ways.

By preference, however, use should be made, according to the invention, of a potspinning device.

The advantages thereof over other collecting mechanisms consist in that it builds up very little tension in the yarn, while the tension which it does receive is very uniform.

In addition, a spinning pot takes up the yarn at any speed at which it is fed thereto without this causing variations in the yarn tension.

It is true that in that case some twist is imparted to the yarn, but the amount of twist may be so low that it can be adapted to the demands made on the yarn or the end-product.

Various systems are conceivable for the false-twisting of the yarn which has left the drafting frame.

Many of these, however, have not been found suitable for the false-twisting of a rather weak, wet, and somewhat slimy thread as discussed here.

A preferable embodiment of a false-twisting device which does not show these drawbacks consists of a ring rotatable about its axis, which ring is coupled to a driving mechanism.

The yarn is passed along the inner wall of this ring, so that it rolls off thereover, which is accompanied by the yarn being false-twisted.

The shape of the inner wall of the ring may vary.

According to the invention, however, a favourable embodiment of a rotatable ring has been found, the inner surface having the shape of a hyperboloid of revolution.

According to the invention the yarn is passed according to a straight generatrix of this hyperboloid along the inside thereof.

The advantage of said shape of the ring consists in that the yarn rolls off along the inner surface of the ring in such a way that it is false-twisted and transported simultaneously.

Consequently, hardly any tension is built up in the direction of travel of the yarn.

By a different preferable process according to the invention the yarn is false-twisted by passing it through a vortex chamber in which air is whirled in the direction of travel of the yarn.

This process permits the yarn to be false-twisted without it being necessary for the yarn to come into contact with any part of the false-twisting device.

This process allows of an additional advantage if use is made of a potspinning device as a means of winding the yarn, i.e. if according to the invention the air from the vortex chamber is blown through the funnel tube of the potspinning assembly.

The threading of the yarn through the funnel tube can then be done in a simple way, since the vortex chamber sucks the yarn inside and blows it through the funnel tube.

Apart from comprising the methods described it is also an object of the invention to provide an apparatus for the manufacture of bast fibre yarns, which apparatus includes in combination a drafting frame, a false-twisting device and a collecting device.

Another object of the invention is to provide an apparatus for the manufacture of bast fibre yarns, including in combination a drafting frame, a dryer and a collecting device.

In the above text it has already been described that the false-twisting device may comprise a rotatable ring whose inner surface may have the shape of a hyperboloid of revolution, said ring being coupled to a driving mechanism.

A different embodiment of the apparatus according to the invention is provided with a potspinning device as a winding means and a false-twisting device comprising a vortex chamber. In this vortex chamber debouch several air intakes in a direction which has an axial and a tangential component, the axial component pointing in the direction of the spinning pot.

A conceivable construction of this apparatus is such

that the vortex chamber is attached to the upper end of the traversable funnel in the spinning pot and debouches in said funnel.

In this way the vortex chamber and funnel assembly may be rendered self-threading.

In the drawings, which illustrate embodiments of the invention:

FIGURE 1 shows a diagrammatic front view of an apparatus, in accordance with the invention;

FIGURE 2 shows a longitudinal section of an embodiment of the false-twisting device;

FIGURE 3 shows a longitudinal section of a funnel tube comprising a vortex chamber; and

FIGURE 4 shows a cross section of the vortex chamber according to FIGURE 3 taken along the section line IV—IV.

Referring now to FIGURE 1, it is seen that a roving 1 is caused to pass a drafting zone between a pair of drafting rollers 2 and 3.

The drafting zone and the rollers 2 and 3 form part of a conventional drafting frame.

The yarn 4 leaves the drafting frame and receives a high amount of false Z-twist. From the drafting frame the yarn goes to a false-twisting device 5 which is shown diagrammatically.

The means by which the yarn is finally collected is a potspinning device.

This potspinning device comprises the spinning funnel 6 which can traverse in the direction of the arrow.

Said funnel extends into the spinning pot 7 which is driven in the direction of the arrow by a bolt 8. The shaft 9 serves to support the spinning pot 7 and to transmit the movement of the belt 8 thereto.

The supporting shaft is shown diagrammatically and may be of any known type.

FIGURE 2 shows an embodiment of the false-twisting device 5.

Said device comprises a ring 10 of which the inner surface is formed by a hyperboloid of revolution.

The bearing of this ring 10 is shown diagrammatically and is effected by means of a stationary ring 11.

The ring 10 may be driven by a string 13 which is mounted in a recess 12 and which may be moved in a known way.

The ring 10 is so positioned that the vertically travelling yarn 4 is in contact with the ring 10 according to a straight generatrix of the hyperboloid of revolution.

If the ring 10 is moved in the direction of the arrow by means of the string 13, a Z-twist will be imparted to the yarn 4 in the zone between the drafting frame and the false-twisting device.

Said false-twist condenses the yarn 4. FIGURE 3 shows a different embodiment of the false-twisting device. The latter consists of a vortex chamber 14 which is placed on the funnel tube 6 with which it forms an integral part. The funnel tube 6 has near its bottom end two diametrically opposed recesses 15. The tube 6 itself ends at its bottom in a narrowed opening 16. A tube 17 extends from the vortex chamber 14 to near the opening 16 in the funnel tube.

At the side of the vortex chamber 14 there is an inlet 18 for compressed air, which opens into an annular chamber 19.

From this chamber 19 four narrow channels 20 extend obliquely to the vortex chamber proper (17).

In FIGURE 4, which represents a cross section along the line IV—IV in FIGURE 3, the arrangement of the four channels 20 is shown.

Owing to this arrangement a vigorous whirl can be produced in the tube 17, which whirl both imparts a false-twist to the yarn 4 and transports it through the tube 17.

In order to ensure that the yarn is sucked properly into the funnel tube, the latter has been provided at its top with a trumpet-shaped opening 21.

While the invention has been described in terms of

preferred embodiments thereof, it is apparent that many different embodiments may be made without departing from the spirit or the scope of the invention and it is to be understood that the invention is not limited by the specific illustrations except to the extent defined in the following claims.

What is claimed is:

1. A method for manufacturing a bast fibre yarn, which comprises scutching bast fibre stalks, chemically decomposing said scutched stalks, passing a wet roving of the bast fibres so obtained through a drafting frame, passing the yarn originating from the drafting frame according to a straight generatrix along the inner wall of a ring rotating about its axis said rotating ring having an inner surface in the shape of a hyperboloid of revolution, whereby said yarn is rolled and a false-twist is imparted thereto at a relatively low level of tension in said yarn, and subsequently drying and collecting said twisted yarn.

2. A method for manufacturing a bast fibre yarn, which comprises passing a wet roving of bast fibres through a drafting frame, passing the yarn, originating from the drafting frame, according to a straight generatrix along the inside of a hyperboloid of revolution rotating about its axis, whereby said yarn is rolled and a false-twist is imparted thereto at a relatively low level of tension in said yarn, and subsequently drying and collecting said twisted yarn.

3. A method for manufacturing a bast fibre yarn, which comprises scutching bast fibre stalks, chemically decomposing said scutched stalks, passing a wet roving of the bast fibres so obtained through a drafting frame, passing the yarn, originating from the drafting frame, according to a straight generatrix along the inside surface of a ring rotating about its axis, the inside surface of said rotatable ring having the shape of a hyperboloid of revolution, whereby said yarn is rolled and a false-twist is imparted thereto at a relatively low level of tension in said yarn, winding the yarn originating from the drafting frame into packages and drying said packages.

4. A method for manufacturing a bast fibre yarn, which comprises passing a wet roving of bast fibres through a drafting frame, passing the yarn, originating from the drafting frame according to a straight generatrix along the inside surface of a ring rotating about its axis, the inside surface of said rotatable ring having the shape of a hyperboloid of revolution, whereby said yarn is rolled and a false-twist is imparted thereto at a relatively low level of tension in said yarn, and subsequently drying and collecting said twisted yarn.

5. An apparatus for the manufacture of bast fibre yarns including, in combination, a drafting frame, a ring rotatable about its axis, the inner surface of said rotatable ring having the shape of a hyperboloid of revolution, a driving mechanism for said ring, and a yarn collecting device, said rotatable ring being so positioned between said drafting frame and said collecting device that yarn, originating from said drafting frame, passes through said ring, along said inner surface of said ring according to a straight generatrix.

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