May 20, 1969 G. DERUDDER ET AL 3,444,680

APPARATUS FOR YARN COMBINING OR DOUBLING

Filed Oct. 6, 1967 Sheet 1 of 2

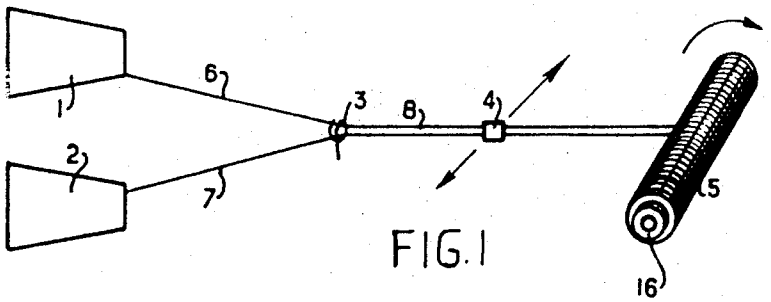


FIG. 1

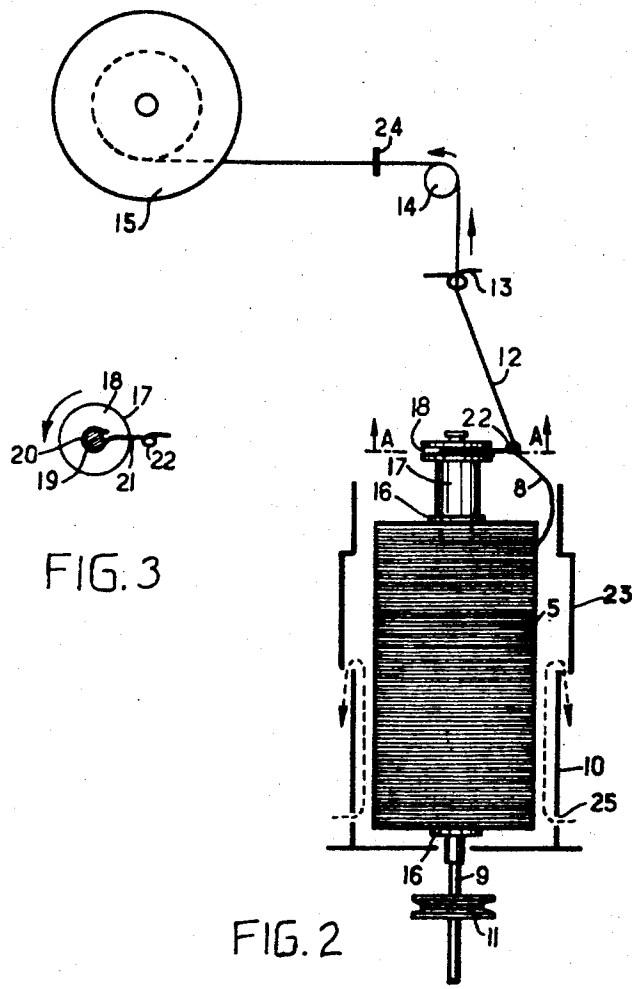


FIG. 2

FIG. 3

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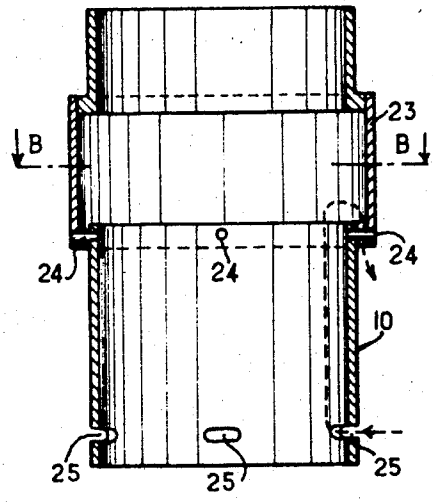


FIG. 4

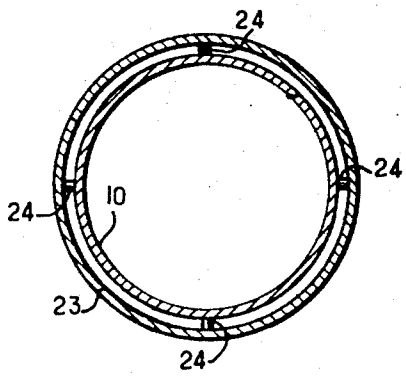


FIG. 5

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APPARATUS FOR YARN COMBINING OR DOUBLING

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Claims priority, application France, Oct. 7, 1966, 18,767
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U.S. Cl. 57—59 6 Claims

ABSTRACT OF THE DISCLOSURE

Multifold yarns are produced by combining two or more yarns and winding them without twist on a bobbin to relatively large dimensions, and twisting is thereafter effected on a continuous frame by providing a freely rotating traveller and guide eyelet through which the yarn is drawn from the rotating package to twist the yarn which is then wound in suitable way. This arrangement permits assembly at a speed greater than 250 m./min. to form packages having a weight greater than 1.5 kg. The bobbin used may be wound to a diameter greater than 100 mm. and a length greater than 200 mm.

Specification

The present invention relates to apparatus for yarn combining or doubling and particularly to a new method of assembling, doubling and twisting yarns by means of ringless spinning frames. The object of the invention is to provide a procedure and equipment intended for yarn packages having a weight greater than 1.5 kg. It is concerned also with an improved spindle for carrying out this procedure.

At present yarns are assembled and twisted according to two principal methods:

According to the first method an initial twist of about 20 turns is produced on a continuous ring spinning frame. The operation may be effected at about 200 metres per minute and at the maximum at 250 metres per minute. This is due to the limiting speed of the travellers on the rings. Yarn packages are obtained which cannot exceed 1 kg. in weight for reasons of balance on the support spindle during the following operation. This operation consists in effecting the final twist on a frame with rotating flyers. These receive yarn packages having a weight less than 1 kg.

According to a second method an initial twist is obtained with a hollow support spindle with a fixed flyer. Allowing for the intended speed of the package the latter cannot exceed 1 kg. This initial twist is followed by a final twist in the same process. This procedure has been described in French Patent No. 1,130,768.

The existing procedures have several disadvantages:

(a) The speed is limited in practice to about 250 metres per minute,

(b) The passage of the yarn through the travellers and near the rings tends to cause fouling,

(c) It is impractical to produce packages having a larger weight than 1 kg.,

(d) The yarn is subjected to tension forces during the operations, hence it is drawn out and loses its elasticity,

(e) When the yarn breaks it is necessary to form a knot in the assembled yarn which has disturbing effects during weaving.

The present invention aims at avoiding these disadvantages and to provide a substantial improvement in the yarn output and quality. One object is to provide for yarn assembly or doubling, in which without twisting and at a very high speed several yarns (generally two) are wound on reels having a weight greater than 1.5 kg. followed by twisting of the yarn obtained on a continuous frame to produce yarn packages having larger dimensions than normal and in the course of which twisting is only effected above an eyelet rotating around the axis of the package and placed above the latter.

The assembly stage, without initial twisting is effected on a special machine where the yarns may travel at more than 250 metres per minute and in general between 300 and 400 metres per minute through a guide which is reciprocated parallel to a large bobbin or winding reel to form a cross-winding, with an amplitude equal to the length of the bobbin so as to distribute the assembled yarns without twist in a regular way on the bobbin which when full contains more than 1.5 kg., say 2 kg. or more.

The bobbin containing the assembled yarn without twist has a diameter greater than 100 mm. and a length greater than 200 mm.

The twisting of the yarn assembled without twist is effected on a continuous frame with stationary open-top cans, the dimensions of which are suitable for containing the aforesaid bobbins and so as to contain in part a traveller carrier placed on the axis of the bobbin and above the latter and intended to support horizontally an arm comprising at one end a hook surrounding a spindle coaxial with the bobbin and at its other end a traveller eyelet, the said cans having a form such that they substantially reduce the upward current of air which tends to be produced in the upper part of the can. The traveller eyelet has the form of a pigtail.

The traveller carrier is of mushroom shape having at its upper part a deep groove in the base of which is wound the traveller hook.

The can comprises in its upper part and around its periphery lateral openings directed towards the bottom in a zone where the can embodies a peripheral enlargement at the point where the yarn tends to balloon outwards.

Other features and objects of the invention will become apparent in the course of the following description which gives a practical and nonlimiting example of the construction. This description is illustrated on the accompanying drawings in which:

FIG. 1 is a diagrammatic perspective view of the assembly device operating without twisting,

FIG. 2 is a vertical diagrammatic section of the twisting device,

FIG. 3 is a section on the line A—A of FIG. 2,

FIG. 4 is a vertical axial section of the can, and

FIG. 5 is a horizontal section of the can on the line B—B of FIG. 4.

In carrying out the method according to the present invention, two or more yarns are combined without twist and wound on to a bobbin or reel and the latter reel is then inserted into the can and twisting is performed during unwinding of the bobbin or reel by rotation of the latter and under the control of a freely rotatable traveller supported by the bobbin or reel, and the apparatus for carrying out this latter stage is shown in FIGS. 2 to 5 of the drawing.

FIG. 1 shows the essential features of the assembly machine in diagrammatic way as applied to the doubling of yarns **6**, **7** drawn from two cops **1**, **2** or other appropriate yarn packages. The yarns **6**, **7** are guided together by means of a pigtail guide **3** and then traverse a guide **4** which is reciprocated parallel to the axis of a bobbin or reel **5** the latter being preferably provided with end flanges **16**. The amplitude of movement of the guide **4** is equal to the space between the flanges of the

bobbin **5**, that is to say, the length of the latter. The bobbin **5** may contain 1.8 kg. of yarn or more.

The operation of this assembly device is very simple. The yarns **6** and **7** coming respectively from the bobbins **1** and **2** pass into the fixed guide **3** to form a doubled yarn **8** which passes through the movable guide **4**. The latter receives a movement such that during the rotation of the bobbin **5** the doubled yarn **8** is distributed uniformly thereon conveniently in the form of a cross-winding. This operation may be effected in practice in such a way that the doubled yarn **8** has a winding speed of 350 metres per minute; this speed may increase up to 500 metres per minute. It is substantially greater than the 250 metres at the maximum attained by classical initial twist devices.

When it is full the bobbin **5** is placed on a pin **9** in a fixed can **10**. Above the pin **9** and the bobbin **5** there is disposed a runner or traveller device which includes a traveller carrier **17** of mushroom shape coaxial with the pin **9** and rotating with the latter. The traveller carrier **17** has in its upper part a deep groove **18** at the bottom of which there is left only a spindle part **19** around which is wound a hook **20** of an arm **21** which is supported horizontally in the groove **18** and is terminated at the outside by an eyelet **22** of pigtail form. This provides a freely rotatable runner or traveller for effecting twisting of the combined yarn.

The can **10** comprises in its upper half section a peripheral enlargement, that is to say, a part of greater diameter formed by a sleeve **23** of larger diameter than that of the can. The can **10** is terminated at the point of the sleeve **23** and the latter provides the connection between the two sections of the can by being fixed hermetically to the upper section but with a throughway connection to the lower section, the sleeve **23** providing a partial coverage between the two sections of the can. This throughway connection is produced by means of four radial elements **24** it being understood that the internal diameter of the sleeve **23** is greater than the outer diameter of the can **10**. The can has openings **25** in its lower part.

The enlargement is intended to avoid the yarn which balloons outwardly in rotation from rubbing against the walls of the can and carrying dirt with it.

If there is no throughway in the upper half of the can there is produced an air movement inside the can which is the greater, the larger is the peripheral speed of the bobbin and the air forced upwardly lifts the yarn in the course of twisting and may tend to cause soiling. By creating throughways the air escapes, as indicated in dotted lines in FIG. 2, and does not act upon the yarn.

The pin **9** and consequently the bobbin **5** are driven by a pulley **11**. On leaving the can **10** the assembled yarn indicated at **8** passes first through the eyelet **22**. Having passed this eyelet the yarn **8** becomes a twisted yarn **12**, passes into a guide in the form of a pigtail **13**, over a rod **14** and finally through a guide **24** to be wound on to a bobbin **15**. During the rotation of the pin **9** the yarn **12** balloons out and is contained in the enlargement of the can **10** formed by the sleeve **23**. The flanges **16** of the bobbin **5** have a diameter a little above that of the core but they may receive a diameter of about 150 mm. of yarn thus clearly larger than the normal diameter of 100 mm.

The procedure according to the invention has many advantages:

(a) Operation is effected at a much higher speed than with usual processes; this speed being in general twice that of the normal speed; there is a substantial saving of equipment and of labour in the first operation,

(b) The first operation of assembly is quite independent of the second where spinning or twisting is effected. Consequently a single setting of the machine for the first operation is sufficient to give yarns of right-hand twist (Z twist) or left-hand twist (S twist); it is sufficient to reverse the bobbin **5** to obtain one twist or the other,

(c) Since the yarns do not pass through travellers movable on rings which must be lubricated, yarns of much better quality are obtained,

(d) Bobbins of twisted yarns are formed having a weight almost double that of the usual weight which speeds up the production process,

(e) Being given that the yarn is subjected to a small tension during assembly and is not subjected to friction by a traveller and in view of the absence of the traveller and the ring it preserves much better elasticity and possesses a better bulk than normal yarns,

(f) In the case of fracture of a single yarn **6** or **7** during the assembly operation it is possible to knot only the yarn which is broken. The resulting knot is much smaller than the knots which are normally made on the assembled yarns and this knot is much less inconvenient during weaving,

(g) Plucking of the outer surface of the twisted yarn is avoided.

What we claim is:

1. Apparatus for combining yarns wound side-by-side without twist on a bobbin, comprising a can, a spindle rotatable within said can, said spindle supporting a so-wound bobbin, means to drive said spindle, a runner support fixed to the upper end of the reel, and a runner rotatably mounted on said support having a guide element for the yarn leaving the bobbin to effect spinning and twisting of the yarn leaving the reel and being fed to a winding point.

2. Apparatus according to claim **1**, wherein the runner support comprises a deep groove formed between peripheral flanges and the runner comprises a nearly closed loop engaging the base of the said deep groove to allow free rotation of the runner, said runner comprising an outwardly directed arm having a pigtail guide eyelet for guiding the yarn towards a winding point.

3. Apparatus according to claim **1**, wherein the can embodies means to attenuate the upward air current produced in the upper part of the can.

4. Apparatus according to claim **1**, wherein the can is provided with a central portion of enlarged internal diameter at the point where ballooning of the yarn leaving the bobbin is likely to occur.

5. Apparatus according to claim **4**, wherein openings are provided in the lower edge of the enlarged part of the can directed downwardly over the outer surface of the lower part thereof and inlets are provided in the base of the lower part to allow for upward circulation of air within the lower part of the can and outward movement of said air flow through said openings.

6. Apparatus according to claim **1**, wherein the yarn leaving the bobbin and twisted by the relative rotation of the runner relative to the yarn passes onward through a guide eyelet and further guide means towards a wind-on bobbin.

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U.S. Cl. X.R.

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