April 13, 1965 P. K. KORIKOVSKY 3,177,642

COMBINED SPINNING AND TWISTING FRAME AND METHOD FOR PRODUCING TWISTED YARN

Filed Jan. 25, 1963 2 Sheets-Sheet 1

Fig. 4.

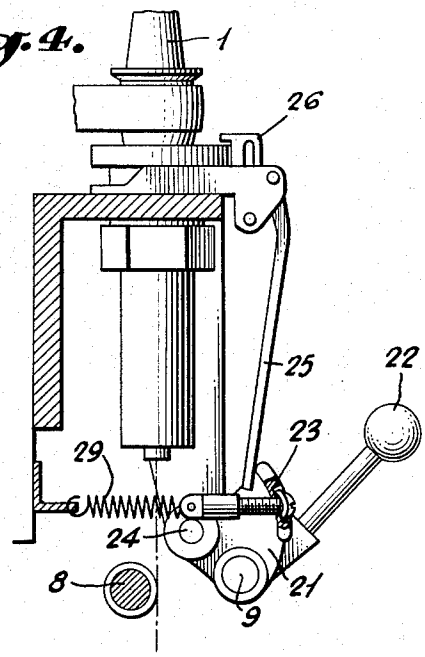


Fig. 3.

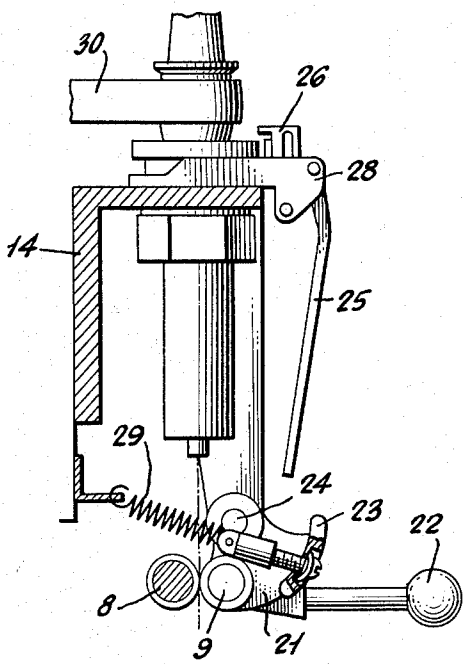
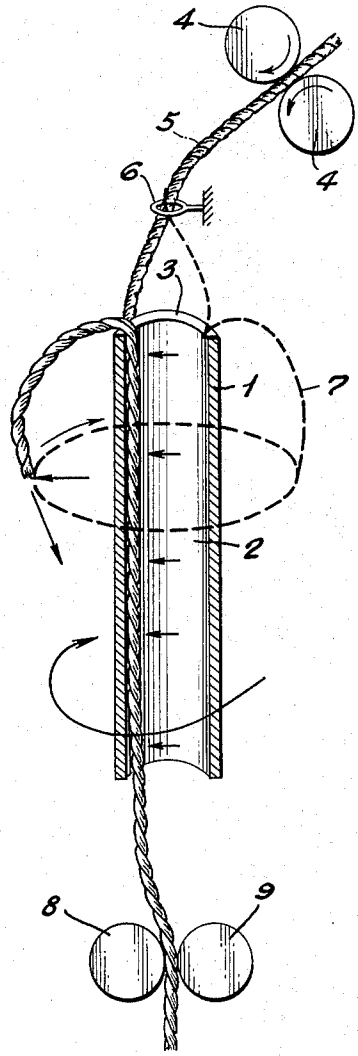


Fig. 1.



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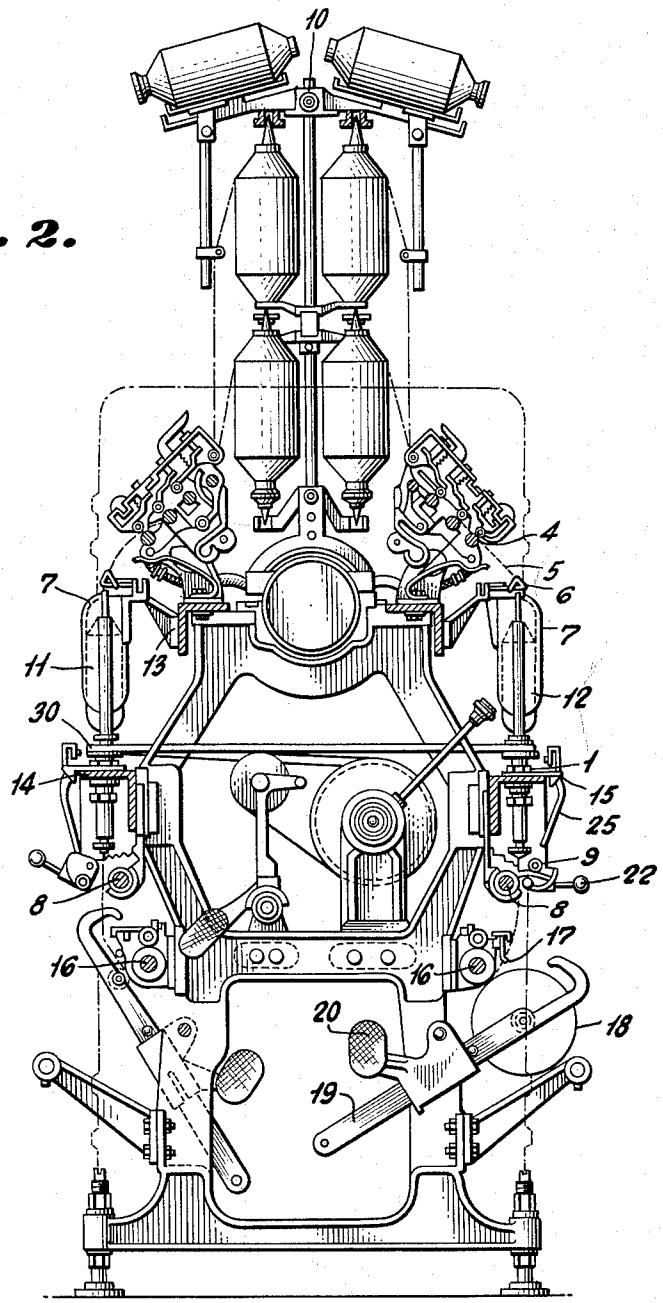
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COMBINED SPINNING AND TWISTING FRAME AND METHOD FOR PRODUCING TWISTED YARN

Filed Jan. 25, 1963 2 Sheets-Sheet 2

Fig. 2.



INVENTOR

P. K. KORIKOVSKY

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COMBINED SPINNING AND TWISTING FRAME AND METHOD FOR PRODUCING TWISTED YARN

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6 Claims. (Cl. 57—34)

The present invention relates to the textile industry and more specifically to methods and apparatus for producing twisted yarn.

As is generally known, in the textile industry there are used methods for producing twisted yarn on combined spinning and twisting frames which simultaneously effect spinning (50%), doubling, and twisting of the yarn with winding onto bobbins (U.S.S.R. Patents Nos. 106,123, 106,976, 107,743 and others).

In the heretofore known methods, the three processes connected with the production of twisted yarn, spinning, doubling and twisting are performed in one operation, i.e. the roving or sliver coming from the drafting means of the spinning and twisting frame and the yarn coming from the cop on the hollow spindle of the given frame are threaded together in the spindle bore and doubled by means of twisting and tensioning devices built in the spindle or mounted directly at its butt face. The ready twisted yarn coming out of the spindle bore is wound on the bobbin of the winding means.

Such methods of producing twisted yarn present a number of advantages as compared with other methods also in current use where spinning, doubling and twisting are performed separately using different machines for each operation.

These advantages include the reduction of process operations and the consequent reduction of the equipment required, increase of labor efficiency, economy in floor space and energy consumed, substantial decrease of waste, as well as the possibility of producing large cops of twisted yarn without winders.

However, the use of the above-mentioned methods present a number of difficulties and drawbacks.

The main drawback is the failure to simultaneously produce on one frame different counts of yarn from different fibers bearing in mind that these methods require the employment of a ring with a traveller, tensioners and other devices that must of necessity be changed when passing from the production of one yarn count to another yarn count.

The application of these devices limits the speed of ready yarn delivery and is the cause of a great breakage of the yarns to be doubled, thereby resulting in a high percentage of waste.

The aforementioned methods also present difficulties which are encountered at threading the spun yarn and yarn emanating from the cop and passing the same through these devices.

Many attempts have been made to overcome these difficulties and drawbacks but all of such prior attempts have failed, and it is an object of the present invention to eliminate these difficulties and drawbacks.

Broadly, the present invention relates to a novel method for producing twisted yarn and a novel combined spinning and twisting frame.

It has been established that the present invention permits the production simultaneously on one frame yarn of different counts from different kinds of fibers and, in addition, allows an increase of labor efficiency, reduction in yarn breakage and percentage of waste material.

According to the present method, broadly the doubling and twisting of the yarn is effected by rotating the yarn

unwound from the cops on the spindles of the combined spinning and twisting frame in relation to the spun yarn without using any tensioning devices and doubling and twisting of the yarn is performed on the section between the spindle and the delivery means.

For more clearly showing the proposed method and indicating the advantages thereof, there is described one of the possible uses of the invention with respect to a combined spinning and twisting frame.

In the present spinning and twisting frame, which is similar to known frames for effecting spinning simultaneously, doubling and twisting of yarns with winding the same on bobbins, there is provided with a roving frame, a drafting means and hollow spindles incorporating brakes. Doubling of the yarn which comes from the package on the spindle together with the yarn delivered from the drafting means is effected in the spindle bores. Under the spindles are disposed delivery means consisting of a cylinder provided with top pressure rollers and winding means, each comprising a winding cylinder, a thread guide and a bobbin onto which is wound the ready yarn which is pressed against the cylinder by means of a lever having associated therewith a counterweight.

However, in contrast to the heretofore known machines, in the proposed type of frame for operating in accordance with the present invention, the hollow spindles have a free through bore with an open inlet and outlet, and the top of each spindle is formed with a smooth rim. This particular form simplifies the spindle design, facilitates threading due to the absence of the rings with travellers and tensioning devices, allows the increasing of the delivery of ready yarn and ensures all advantages inherent to the present method.

Moreover, for carrying out in practice the present method of doubling, during which the threading is done in a novel way, the proposed frame is supplied with a novel type of delivery means for allowing the simultaneous performance of two operations, namely, retraction of the pressure roller from the delivery cylinder and braking of the spindle, with said operations being necessary not only at threading but also at the elimination of the thread breakages. The pressure roller and braking means are provided with a common control which allows both operations to be effected simultaneously. An example of a possible form of common control is set forth below.

The pressure roller is mounted on a swinging bracket, having a handle with a lug, and when the roller is drawn away from the cylinder by the handle, the lug presses upon the lever of the brake means connected with a brake shoe cooperable with the spindle.

The swinging bracket has associated therewith a spring for fixing the pressure roller in the working or idle (retracted from the cylinder) positions, which will free the worker or operator from holding the spindle in the braked position.

One of the main objects of the present invention is to ensure a simultaneous production on one spinning and twisting frame of different counts of yarn from various fibers.

Another object of the invention is to provide for the increase of labor efficiency in the production of twisted yarn.

Yet still another object of the invention is a reduction in yarn breakage.

Another object of the invention is the lowering of the percentage of waste yarn.

Yet a further object of the invention is the development of a highly efficient spinning and twisting frame.

Among other objects of the invention, is the development of a spinning and twisting frame for allowing easy threading and the rapid elimination of breakages.

The invention also provides for the development of spindles of simple design which assure an increase in ready yarn production.

Further objects and advantages of the invention will become more readily apparent to one skilled in the art from the ensuing detailed description and annexed drawings, in which drawings:

FIG. 1 is a diagrammatic view illustrating the hollow spindle, the drafting means, the cylinder and pressure roller and the technique of producing the twisted yarn,

FIG. 2 is an elevational view of the spinning and twisting frame,

FIG. 3 is a fragmentary view partly in elevation and partly in cross section showing the cylinder and pressure roller in working position, and

FIG. 4 is a view similar to FIG. 3 showing the cylinder and pressure roller in idle position with the spindle braked.

As mentioned before, in accordance with the present invention for producing twisted yarn on a spinning and twisting frame, doubling and twisting of the yarns is effected by rotating the yarn coming from the cops on spindles, in relation to the spun yarn.

For rotating the yarn and unwinding the yarn from the cop, the present invention employs a rotating hollow spindle **1** (FIG. 1) having a bore **2** extending therethrough and a smooth annular rim **3** at the top or upper end of the spindle.

Roving or sliver **5** emerging from the drafting means **4** (rollers), is twisted and passes through a guide **6** and then enters the spindle bore **2**. At the top roving meets thread **7** unwound from rotating cop **11** on the spindle **1**.

The yarn **7** coming from the cop rotates together with the spindle taking with it the roving **5** and imparting thereto a right hand twist during clockwise rotation of the spindle **1** and vice versa.

Thus, in the section between the drafting means and the upper end of the spindle is effected the spinning process, while in the section between the point at which the roving **5** and yarn **7** meet and the delivery effected by cylinder **8** and pressure roller **9** is performed the simultaneous doubling and twisting of the roving and yarn.

The combined spinning and twisting frame for performing the above described process comprises a roving frame **10** (FIG. 2), the drafting means **4**, thread guides **6** and spindles **1** for accommodating cops **11** with previously prepared yarn.

For protecting the yarns unwound from adjacent cops against lashing, separators **12** attached to yarn guide straps **13** are mounted between the spindles.

Each spindle **1** is mounted on a spindle rail **14** to which is also attached spindle brake **15**.

Beneath the spindles are arranged the delivery means and each delivery means includes the fluted cylinder **8** and the pressure roller **9**. In FIG. 2, to the right, is illustrated the delivery means in working position and to the left in disengaged position.

Beneath each delivery means is disposed a winding means which comprises a winding roller **16** with a yarn guide **17** and a bobbin **18** onto which the ready twisted yarn is wound. The bobbin **18** is mounted on a lever **19** which presses the bobbin against the winding roller **16**. The lever **19** is provided with a counterweight **20**.

The sequence of operations for threading the frame is illustrated for one line of twisted yarn production.

One and a half or two meters of yarn **7** is unrolled from the cop **11**, folded in two and passed by any means through the spindle bore **2** to the winding means, passing between the fluted cylinder **8** and the pressure roller **9** of the delivery means.

The yarn **7** is attached at the point of bending to the bobbin **18** and the free end is pieced to the roving **5**. Then, the threaded yarn is clamped between the fluted cylinder **8** and pressure roller **9**, which is necessary for obtaining twisted yarn.

In case of yarn breakage while the frame is operating, threading is to be done in the same manner.

At threading, the retraction of the pressure roller **9** from the fluted cylinder **8** is effected simultaneously with the braking of spindle **1** by means of the brake **15**.

For moving the pressure roller **9** away from the fluted cylinder **8** and at the same time braking the spindle, the pressure roller is mounted on a swiveling bracket **21** (FIGS. 3 and 4) provided with a handle **22** with lug **23**.

When the roller **9** is moved away by the handle **22**, the bracket **21** is turned in relation to axle **24** and the lug **23** presses against brake lever **25**, as illustrated in FIG. 4. The lever **25** is connected with a brake-shoe **26** co-acting with the spindle **1**.

The spindle is attached to the spindle rail **14** by means of a bracket **28**. To release the operator from the necessity of holding the spindle in the braked condition, the swiveling bracket **21** is provided with a spring **29** for holding the pressure roller in the working and withdrawn positions. In FIGS. 2–4 is also illustrated a belt drive **30** for the spindles **1**.

The invention is not to be confined to any strict conformity to the showings in the drawings but changes or modifications may be made therein so long as such changes or modifications mark no material departure from the spirit and scope of the appended claims.

What I claim is:

1. In an apparatus of the type set forth, at least one rotatable spindle having a bore extending therethrough from the upper end to the lower end and through which bore yarn is adapted to pass, brake means for said spindle, delivery means disposed below said spindle, said delivery means including a cylinder and a pressure roller, means mounting said pressure roller for movement toward and away from said cylinder with the yarn being clamped between the cylinder and roller when the roller is moved towards the cylinder, operating means for said brake means, a control means for said mounting means, and means on said mounting means cooperable with said operating means when said control means is manipulated to move said pressure roller away from said cylinder for causing said operating means to apply the brake means to the spindle.

2. In an apparatus of the type set forth, at least one rotatable spindle having a bore extending therethrough from the upper end to the lower end and through which bore yarn is adapted to pass, brake means for the spindle, delivery means disposed below said spindle, said delivery means including a cylinder and a pressure roller, a swingable bracket in which said pressure roller is mounted whereby the pressure roller can be moved toward and away from the cylinder, a lever operably connected to the brake means for operating the brake means, said lever having a free end, a handle for said bracket for moving said bracket, and a lug on said bracket for engaging the free end of said lever when the handle is manipulated to move the bracket and the pressure roller away from the cylinder for applying the brake means to the spindle.

3. The apparatus as claimed in claim 2, further including spring means operably connected to said bracket for holding said bracket and pressure roller in operative relation to the cylinder and away from the cylinder.

4. In an apparatus of the type for effecting the operations of spinning, doubling and twisting yarns, a roving frame, drafting rolls for the roving, at least one rotatable spindle, guide means for the roving between the drafting rolls and the spindle, said spindle having upper and lower ends with said upper end defining a smooth rim and a bore extending through the spindle from the upper end to the lower end, a cop of spun yarn on said spindle, delivery means located below said spindle and including a cylinder and pressure roller between which the yarn is clamped, a winding roller below said delivery means, a yarn guide and a bobbin spaced from said yarn guide on which the twisted yarn is wound, the arrangement being such that

the roving is spun between the guide means and the upper end of the spindle, with the spun yarn from the cop being brought into engagement with the roving adjacent the smooth rim of the spindle and during passage through the bore of the spindle, the spun yarn imparting a twist to the roving in the direction of rotation of the spindle.

5. The apparatus as claimed in claim 4, including a lever on which said bobbin is mounted and a counterweight on said lever for urging the bobbin against the winding roller.

6. A method for producing twisted yarn, comprising the steps of drafting roving from a source of supply, spinning the roving, withdrawing a spun yarn from a source of supply, bringing the spun yarn into contact with the spun roving, passing the spun yarn and roving into a hollow rotating spindle so that during passage therethrough the spun yarn imparts a twist to the spun roving in the direction of rotation of the spindle, and winding the twisted yarn on a bobbin.

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MERVIN STEIN, *Primary Examiner.*