Dec. 11, 1962 H. VAN DREVEN ET AL 3,067,566

COLLECTIVE RING DEPRESSOR

Filed April 8, 1960

fig 1

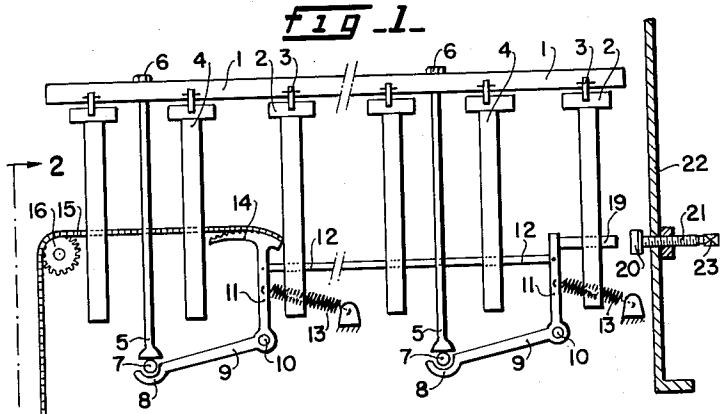


fig 2

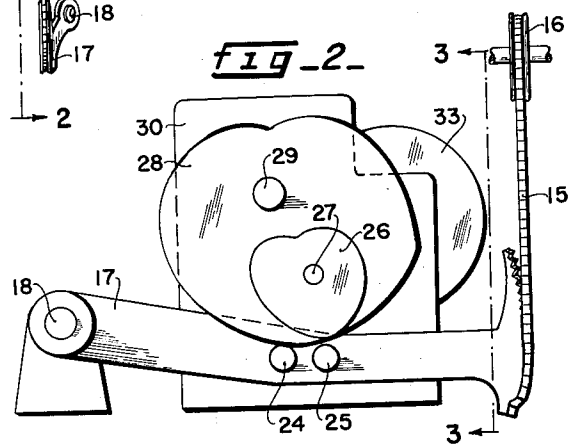
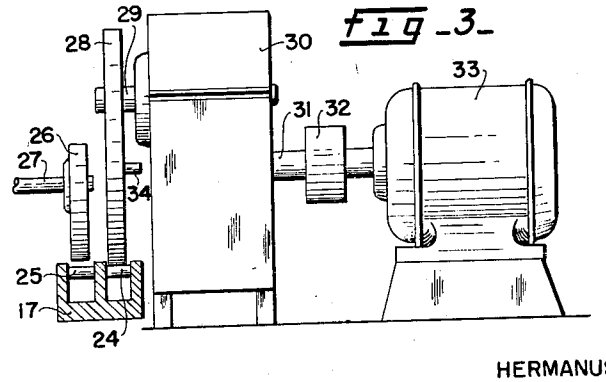


fig 3



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COLLECTIVE RING DEPRESSOR

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5 Claims. (Cl. 57—54)

This invention relates to a ring twisting machine in which the aligned traveller rings are coupled to a common ring beam or ring rail which in turn is coupled in operative relationship to a traversing mechanism wherein an auxiliary winding surface is provided between the drive and the tube holder of each twisting spindle.

Ring twisting machines of this type are well known and are usually used in combination with yarn drawing apparatus for the stretching and twisting of threads formed from linear polycondensation products, such as polyamides and polyesters. The starting of the drawing or stretching process, or the replacing of full tubes by empty ones, is done in such apparatus pointwise per twisting spindle.

For doffing purposes on a least one embodiment of the ring twisting machine of a well known type the holder of the traveller ring is connected to a tube system which encloses and slidably engages two rods extending parallel to the twisting spindle in a downward direction as viewed from the ring beam, and in which the tube system may be fixed by means of a locking mechanism on the rod system in a position of the traverse path where the traveller ring faces a tube arranged on the spindle, whereas in the decoupled position the traveller ring remains facing the auxiliary surface. See, for example, U.S. Patent No. 2,909,026 owned in common with the present application.

At the beginning of the stretching process or when replacing full tubes by empty ones, the tube system in the prior ring twisting machine is pointwise decoupled from the ring beam; consequently, the traveller ring remains facing the auxiliary surface notwithstanding the fact that the traversing beam continues to move up and down. Accordingly, undrawn thread or yarn supplied to the twisting machine at this stage of the process is wound on the auxiliary surface. This is continued until the thread at a following stage is wrapped around a drawing roller and the drawing process begins. Thereupon the traveller ring and tube system are raised and coupled to the ring beam so that yarn subsequently drawn will be collected on the twisting tube.

In performing the foregoing process, it is also possible to provide a so-called transfer tail on the twisting tube by temporarily interrupting the raising of the traveller ring at a level below the traversing path of the ring beam, as fully explained in said U.S. Patent No. 2,909,026. This transfer tail consists of a quantity of yarn which is wound a few turns on the free lower rim of the twisting tube and serves to connect the yarn on the twisting tube carrying the same to the starting end of a yarn package on another twisting tube. With a transfer tail it is possible, during further processing of the yarn packages, to have yarn running off an emptying package jump directly onto a full package, as is known to this art.

The ring twisting machines described hereinabove present various disadvantages. For example, pointwise threading-in of each empty twisting tube requires considerable work and, moreover, this operation should be carried out by highly skilled personnel. This is due to the fact that the entire machine must continue to operate when one point is threaded-in. The threading-in of yarn through the traveller, onto the auxiliary winding surface, and thereafter through and along the drawing zone must

in this care be carried out independently for each new empty tube on a running machine. As regards the operating personnel these manipulations at running machine speeds are not entirely free from danger. In addition, the provision of a transfer tail of a correct length and in the correct place on the twisting tube requires special skill. Finally, the quantity of waste yarn on the auxiliary winding surface depends on the time required by the operating personnel for threading-in the yarn on the machine. In general this means the loss of rather considerable amounts of yarn which, moreover, means that the auxiliary winding surface must be cleaned fairly regularly.

It is to be noted that the known method of operation described above may offer advantages if the yarn supply packages from which the undrawn yarn is fed to the draw twisting machine contain yarn quantities of unequal length. In order to be able to have these packages empty themselves completely the running times of the various twisting spindles on the machine necessarily should be different. On the other hand, this presents a serious drawback because the collecting tubes will also contain unequal quantities of yarn. This latter inherent result is most undesirable if wraps are formed from these twisting tubes. With modern winding machines, however, it has been found possible to wind packages of undrawn yarn in substantially equal lengths. Consequently, pointwise threading-in of the machine no longer presents a real advantage.

It is, accordingly, an important object of this invention to provide a ring twisting machine which is free from the foregoing and other disadvantages.

Another object of this invention is to provide in a ring twisting machine improved means for selectively operating the traversing mechanism of the ring beam without modifying the path of the yarn.

Still another object of this invention is the provision of means for interrupting the traverse pattern between the ring beam and the traversing mechanism of a ring twisting machine to place the traveller rings in predetermined position relative to the twisting tubes.

A further object of this invention is the provision of improved means in a ring twisting machine for providing a transfer tail on a twisting tube.

Other objects and advantages of this invention will appear from the following description.

In accordance with this invention, a system is provided in which driving relationship in the coupling between the ring beam and the traversing mechanism may be interrupted, and the ring beam may be moved into a position where the traveller rings face the auxiliary winding surfaces.

The invention will be better understood from the following description, taken in connection with the accompanying drawing in which the preferred embodiments have been shown for the purposes of illustration in the drawing.

In the drawings:

FIGURE 1 is a diagrammatic view of a ring twisting machine according to this invention showing an interrupting system which is manually operated,

FIGURE 2 is a view taken along line 2—2 in FIGURE 1 in the direction of the arrows, but with motor-driven means for operating the interrupting system, and

FIGURE 3 is a side elevational view taken along line 3—3 in FIGURE 2.

Like reference numerals indicate like parts throughout the several views of the drawing.

Referring now to the drawings, and particularly to FIGURE 1, there are shown diagrammatically only such elements of a draw or stretch-twisting machine which are necessary to describe the instant invention. Thus, only

the winding portion of the stretch-twisting machine is illustrated and the stretch portion is omitted. In FIGURE 1, the ring beam 1 of the ring twisting machine has coupled thereto along the entire length thereof a series of traveller rings. These couplings are of a known type of detachable locking and guiding systems, the lock of which is designated by reference numeral 3 and the guiding system by reference numeral 4. The traveller rings 2 are shown in locked position in which position they can follow the traversing movement of the ring beam 1. Twisting spindles and twisting tubes mounted thereon project through the rings 2. The twisting tubes have a primary yarn receiving surface over the major portion thereof and an auxiliary surface outside the primary surface on the lower end thereof. The spindle drive means is well known and has been omitted for purposes of clarity.

The traveller rings 2 may by means of the locks 3 be uncoupled from the ring beam 1 and thereafter pushed downwardly along the guiding system 4 into a position facing the auxiliary winding surfaces located below the twisting tubes on the twisting spindles.

The ring beam 1 is connected by means of nuts 6 to the push rods 5 of which only two are shown although several are provided. These push rods 5 are mounted on rollers 7 supported in blocks 8. The blocks 8 constitute part of the bellcrank levers which are pivoted on pivot shafts 10, said levers having arms 9 and 11.

Arms 11 are coupled together by connecting rods 12 and are biased towards the right by springs 13. Under the influence of springs 13 the ring beam 1 and the rings 2 will always be drawn to their uppermost position.

The traversing of the rings 2 along the twisting spindles is effected by the use of head 14, shaped like a circular rack segment and integral with arm 11 of the leftmost bellcrank lever. A chain 15 is fixed to and trained over the head 14 and is periodically drawn towards the left thereby operating the traversing mechanism. For this latter purpose the chain 15 is led around a guiding sprocket 16 and is fixed at its free end to a second rack segment which forms part of a pivot arm 17 pivotally supported on a pivot 18. The pivot arm 17 is adapted to be rocked about pivot 18 by suitable means such as a rotatable cam disc. The foregoing is a description of a known type machine.

In the first embodiment of this invention an abutment 19 is fixed to the arm 11 of the rightmost bellcrank lever. Facing the end of the abutment 19 there is provided a buffer plate 20 at the end of a screw jack 21 which is carried in the rear front plate 22 of the machine. The screw jack 21 is provided at its inner end with a square head 23 on which an operating key may be fitted.

By turning the screw jack 21 clockwise the buffer plate 20 and the abutment 19 are brought into contact with one another and by continuing the turning, the abutment is pushed away, i.e. towards the left. As a result the bellcrank levers are pivoted against the action of the springs 13 and the ring beam 1 is lowered. At the same time the chain 15 becomes slack so that the movement originating from the pivot arm 17 cannot be transferred to the ring beam 1.

When replacing the fully wound twisting tubes by empty ones, the procedure is as follows:

By moving abutment 19 with the screw jack 21 ring beam 1 is quickly lowered into a position in which the rings 2 face the auxiliary winding surfaces. Immediately thereafter the entire machine is stopped. Thereupon the fully wound twisting tubes are replaced by empty ones and the machine is started again. The screw jack 21 is quickly moved back to position where the ring beam is immediately below its normal traversing path. By leaving the screw jack in this position momentarily, transfer tails are wound on the twisting tubes below the traversing paths. Finally the screw jack is entirely moved back into a position in which the buffer plate 20 and the abutment 19 are entirely free from one another and remain that way during the twisting-winding operation.

FIGURES 2 and 3 show details of another embodiment of the machine of this invention with which it is possible to perform the above-described operations automatically for the greater part. With the exception of parts 19, 20, 21 and 23, those previously-mentioned and described are also provided in this embodiment. In FIGURE 2 the pivot arm 17, which is shown viewed from the left hand side, carries rollers 24 and 25 mounted in bearings. During normal operation the pattern disc 26, fixed to shaft 27 and rotated by the main drive of the machine, co-operates with the roller 25.

Together with other mechanisms not shown in the figures the pattern disc 26 forms part of the entire traversing mechanism which is capable of performing the desired traversing program during the normal operation of the machine.

An auxiliary pattern disc 28 is adapted to co-operate with the roller 24. This auxiliary pattern disc is mounted on a shaft 29, which shaft is rotated through worm gearing (not shown) in casing 30, intermediate shaft 31 and the coupling 32, by a motor 33.

The design of the auxiliary pattern disc 28 is such that during normal operation this disc when pointing with its smallest radius towards the roller 24 does not touch the roller but it takes the pivot arm 17 entirely out of reach of the normal traversing when pointing with its largest radius to the roller 24.

To the auxiliary pattern disc 28 there are fixed two cams or lugs 34, only one of which is shown in FIGURE 3. These cams 34 are adapted to come into contact with a disconnecting or limit switch (not shown) when the pattern disc assumes one of the two extreme positions. This limit switch interrupts the supply of current to the motor 33 so that the latter is stopped. The shape of the auxiliary pattern disc 28 is such that it enables movement of the pivot arm from its highest position quickly downwardly and slowly upwardly. As a result thereof the downward movement of the pivot arm 17 is 1.75 times as fast as that of the upward movement. The section of the auxiliary pattern disc 28 which gives the pivot arm 17 its upward movement comprises a portion which is concentric with the shaft 29 and extends over 18° of the circumference of the said auxiliary pattern disc, starting from 12° after passing the lowest point. The lowest point of the pivot arm 17 is maintained for a certain period of time by a portion of the auxiliary pattern disc 28 which is likewise concentric with the shaft 29. This concentric portion of the pattern disc extends over 18°.

In order to replace fully wound twisting tubes by empty ones in the ring twisting machine according to this embodiment one proceeds as follows:

The motor 33 which rotates the auxiliary pattern disc 28 is started by a hand-operated switch (not shown). This disc begins rotation from a position with its smallest radius pointing to the pivot arm 17 and rotates over about one third of a revolution, the pivot arm 17 being pushed into its lowest position. In this position of the auxiliary pattern disc 28 one of the cams 34 abuts against the limit switch so that the motor 33 and the disc 28 are stopped. In this position of the pivot arm 17 the yarn is led from the traveller rings 2 onto the auxiliary winding surfaces. Thereafter the entire stretch-twisting machine is brought to a standstill which makes it possible to replace the fully wound twisting tubes by empty ones, all threads in the machine remaining threaded-in. When the machine is again put into operation the yarn starts to wind again on the auxiliary winding surfaces.

As soon as this is the case the motor 33 is started again by means of the hand-operated switch so that the auxiliary pattern disc 28 commences to rotate again. First this rotation results into a slight rising of the ring beam 1, which rising brings the traveller rings into a position facing the twisting tubes below the traversing paths. The ring beam 1 remains in this position for a

few moments until a sufficient transfer tail is laid and thereafter rises again gradually. This rising of the ring beam continues until the roller 25 in the pivot arm 17 contacts the pattern disc 26. Thereafter, the ring beam follows the normal traversing and the auxiliary pattern disc 28 continues its rotation to its initial position in which its radius pointing to the pivot arm 17 is at a minimum. In this position the second cam 34 abuts against the disconnecting switch whereafter the motor 33 comes to a standstill.

As a consequence of the present invention, it is possible to proceed in the following manner when replacing fully wound twisting tubes with empty ones. At the moment when the twisting tubes become fully wound, the interrupting system is activated and such activation causes the ring beam, together with the traveller rings, to move downwardly into a position facing the auxiliary winding surfaces, whereupon the entire machine is stopped. Since the yarn at each twisting point is now threaded from the traveller to the auxiliary winding surface, the fully wound twisting tubes may be removed from the spindles and replaced by empty tubes without modifying the path of yarn.

In point of fact, the entire machine remains threaded-in and the yarn maintains its position in all points of the stretching path. If the machine is thereafter put into operation and interruption of the normal ring beam traversing movement is subsequently terminated, the drawing operation and the winding operation are again carried out at all points of the machine without change. The aforementioned manipulations may be performed very quickly by unskilled personnel, since it is not necessary to rethread the machine with yarn, and the said manipulations may be carried out when the machine is non-operative, which results in a quieter operation as well as reduced risk to operating personnel. Furthermore, since the situation at each twisting point is absolutely analogous, differences in length and location of the transfer tail on the twisting tube cannot occur.

During interruption of the traversing movement, the ring beam moves past the point where the transfer tail must be laid. According to the nature of this movement, the location and the length of the transfer tail may be determined in the same manner for all twisting points. Assuming that this requires a certain skill, the same clearly is not any greater than that which is necessary for pointwise provision of a transfer tail. Moreover, this skill is only required for one person, since a single operator may arrange the transfer tails on all twisting tubes.

It is also important to note that the quantity of waste yarn collected on the auxiliary winding surfaces when this system is operated is very small as compared with the quantities found to result when operating heretofore known machinery. This, of course, results from the fact that the yarn in the machine of this invention remains entirely in position and threaded-in. Consequently, the waste yarn is wound on the auxiliary winding surfaces only during the period of time elapsing between the starting of the drawing or twisting operation and the moment at which during the termination of the interruption of the traversing movement the yarn runs from the auxiliary winding surface onto the twisting tube.

In practice it is found that this quantity of waste yarn amounts to only a few meters per twisting point. This not only means a saving of waste yarn in the machine of this invention but, moreover, the auxiliary winding surfaces are filled less rapidly than in the case of prior machines. This also means a saving as regards the activities of the operating personnel for fewer cleanings of the auxiliary winding surfaces are required.

The foregoing advantages of the ring twisting machine of this invention have been discussed in connection with the replacing of fully wound twisting tubes by empty ones. The greater part of these advantages will be apparent when starting the machine with new packages of undrawn yarn. It is true that in that case the yarn is pointwise arranged and threaded-in but this is done when the machine is at a standstill so that consequently the advantages referred to are still maintained.

The interrupting system may be constructed for hand operation and in its simplest form it is such that the lowest position of the ring beam and the position in which the transfer tails are arranged are adjusted visually. Moreover, the residence time during which the ring beam is left in the position in which the transfer tails are arranged is determined by the operator each time that the interrupting system is operated. Although this embodiment may lead to good results if the person operating the interrupting system is highly skilled in this respect, there are nevertheless objections to this embodiment. It has been found that operation by hand of the interrupting system is burdensome and the high degree of accuracy with which this operation has to be effected makes great demands upon the personnel. Accordingly, it is desirable to provide automatic means for working the interrupting system.

Thus, in the second embodiment of this invention, automation may be realized in a fairly simple way by constructing the ring twisting machine so that the interrupting system comprises a driving mechanism including a motor, said driving mechanism effecting the interruption of the normal ring beam movement according to a predetermined pattern. This pattern may be introduced in several ways into the ring beam movement, for example, electrically or by means of rod systems. However, a preferred method has been found, according to this invenion, whereby the interrupting movement takes place according to a schedule which is derived from the shape of a pattern disc, said shape being such that the ring rail may be quickly moved to the position in which the traveller rings face the auxiliary winding surfaces, whereby the ring rail may be raised less quickly into the normal traversing path, with a short interruption just below said traversing path, and whereby cutting out mechanisms are provided for automatically stopping the interrupting system in the extreme positions of the pattern disc.

Depending on the type of the ring twisting machine employed, the construction of the interrupting system may vary and also the method of cooperation of this system with the ring beam. In a ring twisting machine in which the coupling between the ring beam and the traversing mechanism comprises a draw chain as driving connecting element, a preferred embodiment according to this invention is the use of an interrupting system wherein during the interrupting movement the draw chain is permitted to slacken.

In another type of ring twisting machine in which the traversing mechanism of the ring beam includes a pattern disc which transmits its movement via a pivot arm to the ring beam, it is found that a very simple and efficient interrupting system is preferably used. In this latter case, an interrupting system employing an auxiliary pattern disc is adapted to cooperate with the same pivot arm, the largest and smallest deflections which the pivot arm may derive from the auxiliary pattern disc of the interrupting system being larger or smaller, respectively, than those which may be derived from the traversing mechanism. Even if the latter type of ring twisting machine also employs a draw chain as driving connecting element, the latter construction is to be preferred. In fact, where a draw chain is employed, the chain always remains taut which favorably affects the accuracy of the traversing movement of the ring beam. This is stressed by the fact that a chain which is repeatedly tensioned and subsequently becomes slack usually produces a varying free movement when being tensioned, said free movement being eliminated from the chain by jerks. This causes jolts in the machine which in turn results in the packages being irregularly built up. These irregularities

are avoided when using the interrupting expedient of this this invention.

An additional advantage of the preferred embodiment of this invention is that it is of more compact design. This results from the fact that the entire mechanism of the interrupting system may be arranged near the driving and traversing mechanisms of the machine.

This invention may be employed in a ring twisting machine wherein the coupling of each traveller ring at the ring beam comprises a detachable locking and guiding system in which the lock when closed fixedly couples the traveller ring to the ring beam and when opened renders the traveller ring displaceable in a vertical direction relative to the ring beam in such a manner that the traveller ring may be brought independently of the traversing movement of the ring beam into a position facing the auxiliary winding surfaces. During normal operation of the machine, it will not be necessary to use these detachable locking and guiding systems. However, in the event of a thread rupture at one or more points of the machine these systems are found to be particularly useful. It will then be possible to thread-in the yarn at these points without the necessity of stopping the rest of the machine.

For this purpose, the traveller ring is moved into the position facing the auxiliary winding surface. Thereafter the yarn is threaded-in with the traveller ring in this position, after which the traveller ring is locked to the ring beam. While it is true that detachable locking and guiding system for the pointwise locking and guiding of traveller rings to or relative to the ring beam are known, it is emphasized, however, that in combination with the system for interrupting the ring beam traversing these systems are novel and serve another purpose in this connection, all as explained hereinabove.

It is to be understood that the description of the above embodiments is for the purpose of illustration only and is not intended to limit the scope of this invention except to the extent defined in the claims.

What is claimed is:

1. A ring twisting machine having a plurality of twisting spindles and tube holders carried thereby, a traversing ring beam mounted on said machine for reciprocation relative thereto and for supporting a plurality of traveller rings, there being one traveller ring for each twisting spindle, each of said tube holders having an auxiliary winding surface thereon, a traversing mechanism connected to said ring beam for reciprocating the same, in a normal traversing path a motor, a pattern disc driven by said motor for connecting the same to said traversing mechanism and for interrupting the reciprocating movement thereof in accordance with a predetermined schedule, said pattern disc having a contour such that the ring beam may be moved quickly to a position where the traveller rings face the auxiliary winding surface on corresponding tube holders and held there for a predetermined length of time, after which the ring beam may be raised more slowly into the normal traversing path.

2. A ring twisting machine according to claim 1 wherein means are provided for automatically stopping the pattern disc in the extreme positions of said pattern disc.

3. A ring twisting machine according to claim 1 wherein means are provided on said pattern disc for automatically stopping the motor and thereby the pattern disc in the extreme positions of said pattern disc.

4. A ring twisting machine according to claim 1 wherein the traversing mechanism includes a pivoted lever and a chain connecting said lever to said ring beam, and the pattern disc cooperates with said lever to interrupt the reciprocating movement of said ring beam.

5. A ring twisting machine according to claim 1 wherein the traversing mechanism includes a positively moved pivoted lever and a chain connecting said lever to said ring beam, and the pattern disc cooperates with said lever to interrupt the reciprocating movement of said ring beam.

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CERTIFICATE OF CORRECTION

Patent No. 3,067,566 December 11, 1962

Hermanus van Dreven et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 8, line 5, after "same" strike out the comma and insert the same after "path" in line 6, same column 8.

Signed and sealed this 18th day of June 1963.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents