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RING-TWIST MACHINE MECHANISM CAPABLE OF FORMING A TRANSFER TAIL

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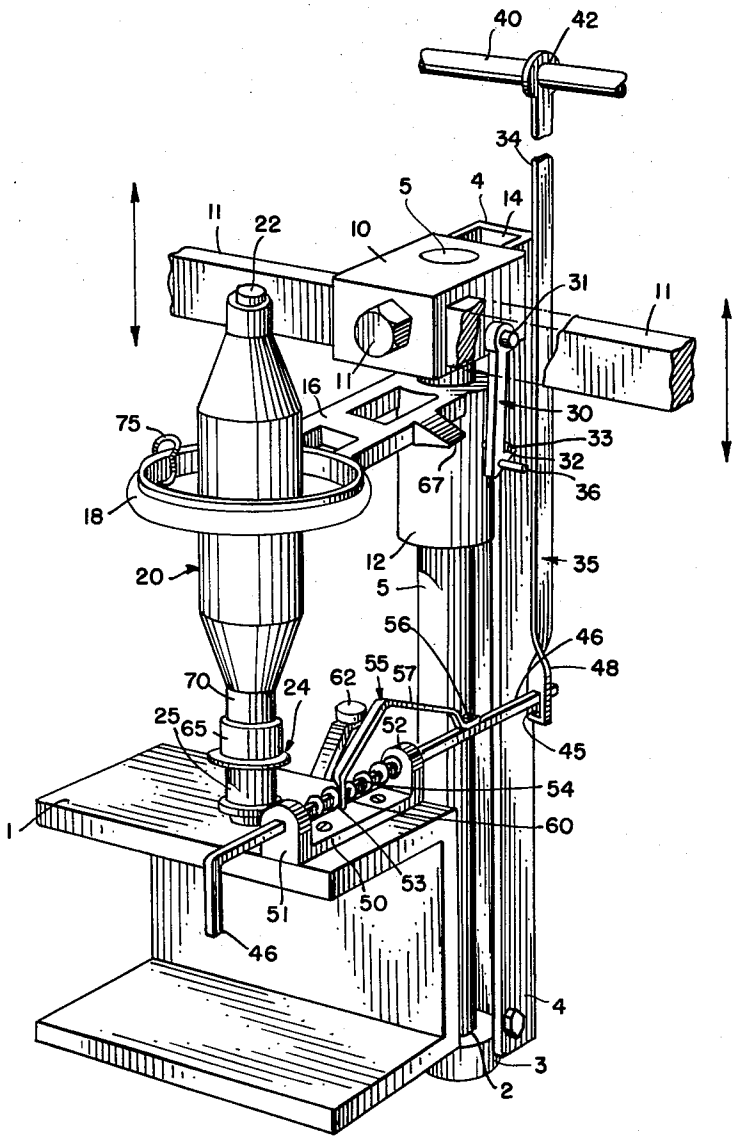

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RING-TWIST MACHINE MECHANISM CAPABLE OF FORMING A TRANSFER TAIL

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This invention relates to a device for controlling the operation of a ring carrier during filament repair or bobbin replacement on ring-twist machines.

More particularly, this invention relates to means for detachably connecting a ring carrier on ring-twist machines from the reciprocating means energizing a plurality of ring carriers on ring-twist machines. This detachment is achieved without de-activating other units operated from the same reciprocating source by a means of individual controls associated with each of the units. Upon movement of the control in one direction the connection between the reciprocating means and the ring carrier is disconnected and upon motion in a contrary direction the disconnected ring carrier is elevated through a certain distance upward along the path of oscillation to position the connecting means between the ring carrier and the source of reciprocating motion at a point where automatic reconnection of the described elements occurs.

Briefly stated, the invention provides a means of deactivation of the ring carrier from its usual oscillation in a concentric position about a bobbin being wound with filamentary material to a position below the bottom terminal of the bobbin and concentric with a ring which functions as a sleeve about the bobbin-receiving driven socket and about the lower portion of the bobbin. When the ring carrier is in this position filament continuously fed to the unit is wrapped about the ring which forms the upper sleeve of the bobbin-receiving socket while the filled bobbin is removed and a new bobbin placed in the socket. Meanwhile, the oncoming thread or filament is continuously wound about the sleeve. After bobbin replacement, by operation of the control rod which forms a part of this invention, the ring carrier may be slowly elevated manually for some slight distance while the tension in the filament is restoring itself to normal but the filament is still being wound about the rotating sleeve of the bobbin-receiving socket. As the ring carrier is raised through an additional increment of distance a display thread or transfer tail is laid down upon the lower terminal area of the bobbin and during the final upward motion of the ring carrier as manually controlled by a cam associated with the control rod, re-engagement is caused to occur between the reciprocating means and the ring carrier through a catch or hook designed to accommodate automatic reconnection between the two correlated elements. Thereafter the ring carrier reciprocates upwardly and downwardly as is standard in the prior art with machines of the class identified.

In the prior art, in order to provide for replacement of the bobbin or to repair a broken filament or thread during the winding of the bobbin, one general practice is to provide a pad about the base of the rotating bobbin-receiving socket to act as a brake lining, and a braking means is provided operable against the pad to hold the bobbin and the bobbin-receiving socket from rotation while slipping the belt about the whorl of the bobbin-receiving socket against which the driving belt normally operates to cause rotation of the spindle shaft and bobbin-receiving socket. While the unit is arrested by means of the brake, the bobbin is replaced or the break in the thread being processed is repaired. Thus, the prior art provides no means of control so that the display thread may be accurately positioned at one end or the other of the bobbin itself. Release of the brake in the prior art method and apparatus provides no exact control over the initial tension in the filament being wound and thus a portion of the collected thread wound on the bobbin has not been stretched on an associated stretching unit and twisted to the same degree as the rest of the thread, and a portion of the thread which is substandard in quality is wound on the bobbin subsequent to the replacement of a bobbin or repair in a thread break. The portion of substandard thread thus incorporated in the bobbin is highly objectionable and is a source of complaint in subsequent textile processing.

Another prior art practice has been to provide manually separable detachable coupling means between the source of reciprocating movement and the twist ring, thus permitting the twist ring to be independent of the up and down reciprocating motion of the machine itself. While the twist ring is stilled, and after the bobbin change in ring-twist machines, the waste is wound, or in normal ring-twist machines, the display thread end is wound at the bobbin base. Thereafter, reconnection of the twist ring with the reciprocating member is accomplished by a very quick hand motion, properly timed with the reciprocating movement of the machine. Obviously, in so doing there is danger to operating personnel who must watch for the right moment for manually "snapping in" of the coupling members. In accomplishing the reconnection, the operator ordinarily is required to use both hands for the purpose. In so doing, there is no control over the elevation of the twist ring either at the beginning of, or during the continuation of, the winding process either in taking off the waste end in the ring-twist machine case, or in formation of the display thread end in the ring-twist machine in the other case. In each machine the twist ring must be manually positioned by the operator until the winding is brought to the required height on the bobbin.

Thus, the principal object of this invention is to provide a means whereby synthetic threads and monofilaments may be continuously fed to thread-stretching units used in conjunction with a ring-twist machine while a filled bobbin is being replaced without danger of including lengths of filaments which are substandard in twist or orientation due to uncontrolled stretching between the stretch rollers.

A further object of the invention is to provide a means of laying down an initial display thread or transfer tail which is readily observable, is of standard stretch and twist, and readily attached to the end thread of a partially used bobbin during textile manufacturing operations.

A further object is to overcome the danger of injury to operating personnel in meeting production problems in ring-twisting machines.

A still further object of the invention is to provide means for disengaging the ring carrier of ring-twist machines to facilitate the repair of a break in the thread during the winding of a bobbin or replacement of a bobbin maintaining the waste thread, the display thread end and the winding proper in separate spaced relation to one another.

Still other objects will be apparent from the more complete description of the invention which follows when read in conjunction with the drawings.

Referring in particular to the drawings, a horizontal spindle rail is supported by suitable framework and is designed to accommodate a plurality of units essentially

duplicates of the unit specifically illustrated. A horizontal bearing 2 in a mounting base plate 3 is attached to the lower rearward portion of the spindle rail 1, and to the rearward portion of the base plate 3 is attached a vertical channel element 4 which provides support and guidance for the reciprocating vertical shaft 5 which is adapted to reciprocal motion within the bearing 2 and vertically guided by the channel 4. The shaft 5 is operatively connected to the source of oscillatory or reciprocating motion represented by the horizontal bar 11 which is removably attached to shaft 5 by means of block 10 and mounting bolt 11 which serves to provide positive linkage between the source of reciprocating motion or bar 11 and vertical oscillating shaft 5.

A sliding sleeve or hub 12 is adapted to fit loosely about shaft 5 and is disposed rearwardly in a shoulder which serves to guide and to align hub 12 within the interior 14 of the U defining the section of channel-shaped member 4. Extending forwardly from hub 12 and preferably integral with hub 12, is supporting framework 16 adapted to hold the ring carrier 18 concentrically about bobbin 20 which is vertically journaled and adapted to fit about the vertical spindle shaft 22 forming a center of the bobbin and of the bobbin-receiving socket base 24. It is general that the lower terminus of the bobbin be provided with a keyway or transverse slot across the diameter of the lower portion of the bobbin. Correspondingly, a transverse bar or key is provided within the bobbin-receiving socket base 24, adapted to fit within the keyway. As this is standard it is not shown. Thus, when the bobbin is in place there is positive rotary action upon the bobbin as the spindle or bobbin-receiving socket base 24 is rotated by means of a belt passing around whorl 25 of the socket base 24.

The crux of the invention resides in provision of means to detachably connect vertical reciprocating bar 11 to the sleeve or hub 12 which elements 5, 10, 11 and 12 operate for the most part as though they were an integral unit. In the drawings a simple rest latch or hook 30 is illustrated providing the detachable connection between reciprocating bar means 11 and hub 12 which hub is, in many cases, an integral part of the structure 16 horizontally supporting ring carrier 18. A pin 31 provides a supporting center for the downwardly depending rest latch or hook 30 pivoted about said pin at its upper end and terminating at its lower end in a hook 32 adapted to engage and disengage the pintle 33 extending outwardly from and normal to the wall of hub 12. At the base of rest latch 30 a second horizontally disposed disengaging pin 36 extends outwardly from the lower terminus of the latch 30 a sufficient distance to contact the forward face 34 disengaging lever 35 which is pivotally supported by horizontal rod 40 which extends, in one application, the entire length of the plurality of ring-twisting units making up the machine. A loosely fitting bearing 42 is adapted to engagement about the horizontal rod 40 to support depending disengaging lever 35. The lower end 48 of disengaging lever 35 is provided with a rectangular slot 45 designed to accommodate horizontal shift rod or control rod 46, which is of rectangular cross-section as shown but obviously may be designed in any one of a number of ways to provide means of positive movement of the depending end of the disengaging lever 35. The horizontal control or shift rod 46 is shown mounted on the top face of spindle rail 1 in a control rod supporting bracket 50 which is of a generally elongated U-shape. The terminal ends 51 and 52 thereof are adapted to accommodate forward and reverse motion of control rod 46 and are provided intermediately therebetween with one or more spring elements 53 and 54 which are adapted to hold the shift rod 46 when free from outside influence in a normal or inoperative position as shown. Normal or inoperative positioning may be accomplished by the use of a stirrup-shaped cam 55 which is fastened at its rearward end 56 directly to the horizontal control or shift rod 46 and which extends forwardly and upwardly therefrom in gradually increasing elevation 57 to form a smooth section giving rise to a cam action in certain use. The forward terminus of cam 55 is provided by downwardly extending forward end 60 of the bar forming cam 55 through a vertical hole through shift rod 46. The cam-forming rod 55 extends sufficiently far through the other side of the shift rod to provide a stop means 60 holding the springs 53 and 54 in slight compression within supporting bracket 50. Thus, when outside pressures are released from control rod 46 it is brought into an integral or nonoperative position as shown.

If the operator wishes to disengage ring carrier 18 to replace the bobbin or to repair a break in the thread being wound on the bobbin, forward motion of control or shift rod 46 causes disengaging lever 35 to engage disengaging pin 36 at the lower end of rest latch 30, the pressure upon disengaging pin 36 by disengaging lever 35 causing hook 32 of rest latch 30 to disengage from pintle 33. The weight of the assembly of hub 12, supporting member 16, and ring carrier 18 causes the unit to slide downward on shaft 5 to be arrested by stop 62. This motion results in ring carrier 18 being positioned about sleeve 65 of bobbin-receiving base socket 24 which continues to rotate. Monofilament or thread continues to be wound about sleeve 65 of the rotated bobbin-receiving socket base 24 and thread is built up, somewhat disordered, about ring sleeve 65. Upon completing thread repair or replacement of bobbin 20, shift control rod 46 is reversed in direction or moved rearwardly, cam 55 engaging protruding stop 67 of supporting element 16 causing the ring 18 to be elevated slowly through a relatively short distance as stop 67 is elevated along face 57 of cam 55. Tension on the thread is readjusting itself during this period and waste filamentary material collected, collects about ring sleeve 65 from which it is later removed. As the thread is started upwardly over the periphery of the bobbin at the lower extremity, along the area 70 of bobbin 20, a display thread or transfer tail is laid down, which is of normal twist, normal tension, and is of standard quality with the rest of the thread later laid and wound upon bobbin 20.

As the highest point of elevation of cam 55 is reached, rest latch 30 as it is brought downward through the standard oscillating motion of reciprocating bar 11 passes hook 32 underneath pintle 33 of now positioned hub 12 causing re-engagement of latch 30 and pintle 33 or of the two elements, namely, hub 12 and the reciprocating bar 11. Uniform winding, tension and twist is then restored to the filament as it is laid down upon the bobbin and is wound by threads passing from their source through ring thread guide 75 as it spins about the ring carrier 18.

By the term "display thread end" is meant the part of the fully stretched thread which is applied to one of the terminal ends of the bobbin, usually the base or lower end, as it is received in the ring-twist machine, which length of thread or filament serves the purpose of attachment to the extreme thread end of a partially used bobbin before the partially used bobbin has been fully run off. The display thread end is essential to achieve continuous operation as, for example, in the weaving of fabrics from the bobbin-wound thread. The difficulties which occur in the formation of such a display thread end lie in the achievement of standard twist in this particular length of material on the completed bobbin. The "display thread end" as used herein applies to that length of filament or fiber which is first wound on the bobbin and when accomplished by the unit as herein described provides twisted thread of the same quality as that later wound upon the bobbin during normal operation of the machine.

By the term "waste end" is meant that portion of the moving filament wound on the top ring of the bobbin receiving socket which is later cut away and does not

become a part of the completed product of the ring-twist machine.

In the foregoing, an explanation and description has been made of a modification in ring-twist machines which provides for an orderly control of each individual unit in a plurality of units making up the machine. The mechanical control thus provided makes possible ordered and controlled bobbin changes, or repairs of broken threads during the operation of the machine without danger to operating personnel and without relying on blocking a particular unit from rotation during essential process changes. Further, the modification in the machines as disclosed above permits the initial laying down of a display end thread which is fully stretched, fully twisted and under the normal tension which is desired in the completed cone or roll of monofilament, fiber or thread, as the case may be.

Having thus described my invention, I claim:

1. In filament-winding, ring-twisting machines comprising a plurality of units; individual bobbin-switching devices integral with each unit which comprise means adapted to effect vertical reciprocating motion in a ring carrier, a ring carrier vertically and slidably supported on vertical supporting means in cooperative spaced relation with said reciprocating means, means to detachably connect said reciprocating means to said ring carrier, means to control disconnection and connection of said detachable connection means, said connection means comprising means to control elevation of said ring carrier when disconnected through a certain vertical distance upward along said vertical supporting means to dispose said connecting means in automatic reconnecting relation between said reciprocating means and said ring carrier.

2. In filament-winding, ring-twisting machines comprising a plurality of units; individual bobbin-switching devices integral with each unit which comprise means adapted to effect vertical reciprocating motion in a ring carrier, a ring carrier vertically and slidably supported on vertical supporting means in cooperative spaced relation with said reciprocating means, means to detachably connect said reciprocating means to said ring carrier, lever means to detach the detachable connection between said reciprocating means and said ring carrier, horizontal rod means to control said lever disconnection means, and cam means associated with said horizontal control rod means to control elevation of said disconnected ring carrier through a certain vertical distance upward along said vertical supporting means to automatically reconnect said reciprocating means and said ring carrier.

3. In filament-winding, ring-twisting machines comprising a plurality of ring-twisting-bobbin winding units; associated with each unit a horizontal supporting rail, a vertically disposed bobbin spinning socket unit rotatably mounted on said rail, a horizontal shifting control rod adapted to forward and rearward sliding motion adjacent said bobbin spinning unit in a control rod support bracket attached to said rail, means within said control rod support bracket to return said control rod to a neutral and inoperative position when released, bearing means supported by said rail adapted to receive a vertical reciprocating shaft, a vertical reciprocating shaft terminating upwardly in operative connection with means to provide vertical reciprocating motion to said shaft, a hub slidably mounted on said vertical shaft below said reciprocating means horizontally supporting as an operative part of said hub a ring carrier concentrically mounted about the vertically disposed bobbin spinning socket unit, means to detachably connect said reciprocating means to said hub and ring carrier, a vertically disposed upwardly pivoted lever means in cooperative association at its lower terminus with said control rod means, said lever means adapted to control disconnection of said detachable connection means upon movement in one direction of said shifting rod, cam means operatively connected with said shifting control rod adapted to engage a projection from said hub and ring carrier when said connection means is disengaged from said reciprocating means upon movement in a second direction of said control rod, said cam means adapted upon such movement to elevate said disconnected hub and ring carrier vertically upwards to automatically reconnect the detachable connection means between said reciprocating means and said ring carrier.

4. In a device for winding threads to produce a winding having a transfer tail, a ring carrier vertically and slidably supported on a vertical supporting means, reciprocating means operable in a vertical plane and adapted to impart vertical reciprocating motion to said ring carrier, releasable lock means on said reciprocating means adapted to be automatically connected with a cooperating member on said ring carrier when the lock means is brought into locking proximity with said member during the movement of said reciprocating means to provide for reciprocation of said carrier with said reciprocating means, said ring carrier being slidably supported on said vertical supporting means with a rest position wherein said lock means and said member are out of range of locking proximity during reciprocating movement of said reciprocating means, and actuating means for shifting said ring carrier from said rest position to a position wherein said lock means and said member come into automatic locking engagement during reciprocating travel of said reciprocating means.

5. The machine as described in claim 3 wherein said means within the control rod supporting bracket to return said control rod to its neutral and inoperative position is compression spring means operable against means for transmitting the compressive force of said compression spring means to said control rod.

6. A machine as described in claim 3 wherein said cam means is a stirrup-formed strip with the rearward end of said strip secured on the top side of said control rod and with the forward end of said strip passing through an aperture in said control rod at a central point within said control rod support bracket, and said means to return said control rod to its neutral and inoperative position is a pair of coil compressive springs mounted about said control rod, each spring having one end bearing on said forward end of said strip and the other end bearing on said control rod supporting bracket.

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