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TWISTING AND WINDING APPARATUS FOR TRANSFER TAIL

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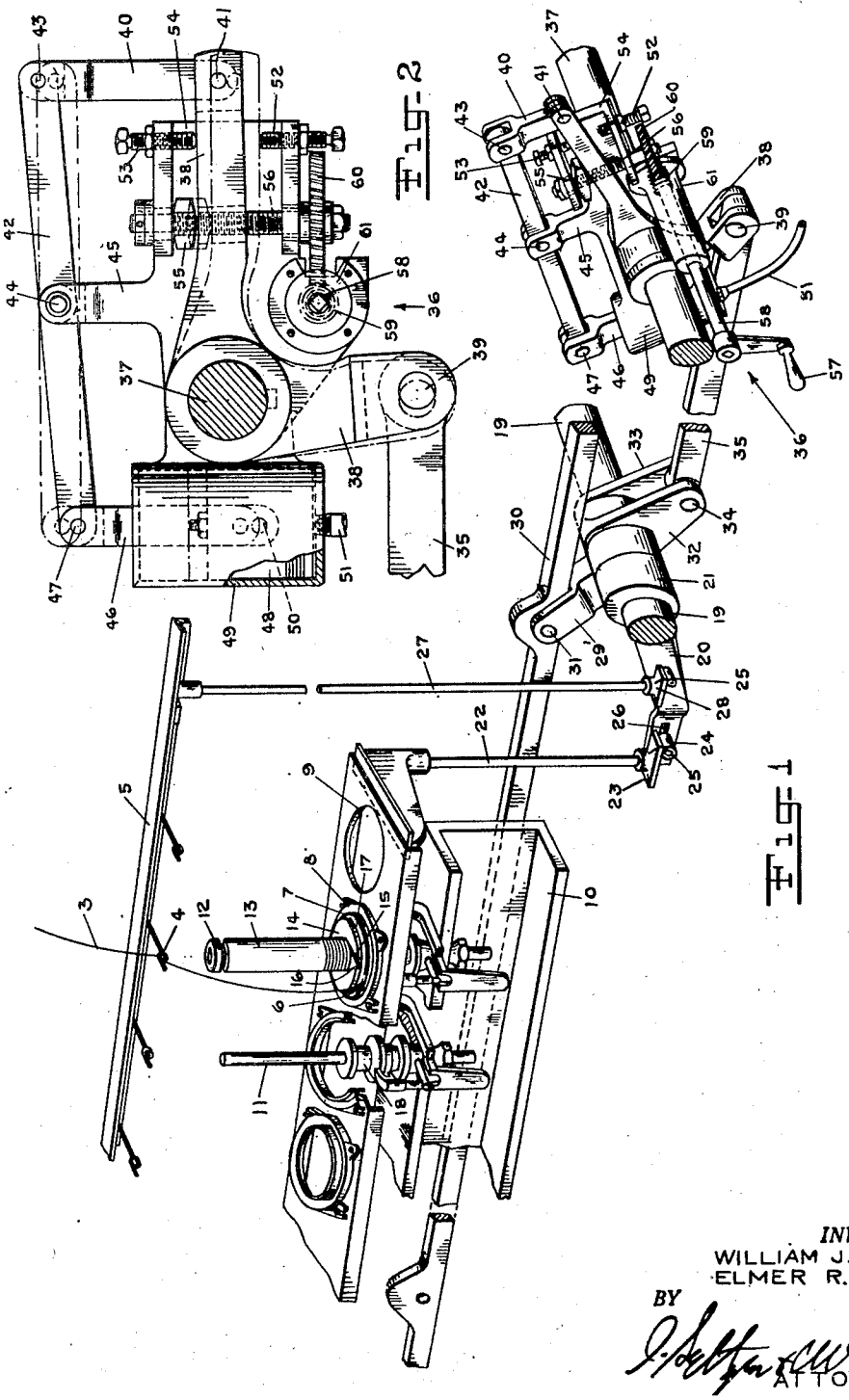


FIG. 2

FIG. 1

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TWISTING AND WINDING APPARATUS FOR TRANSFER TAIL

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This invention relates to an improved mechanism adapted to be employed in connection with yarn twisting and winding apparatus whereby a magazine wrap or transfer tail may be applied to yarn packages, such as bobbins and the like, during yarn twisting and winding operations.

As commonly understood in the textile art, a magazine wrap or transfer tail is a portion of the inner end of the first yarn wound on the yarn support, which is so disposed as to be positively secured during the winding of the remainder of the yarn package, yet freely available for tying directly to the outer end of the yarn on another yarn package. The purpose of providing a magazine wrap or transfer tail is to enable an uninterrupted flow of yarn to be maintained from a depleted yarn package to a full package adjacent thereto, as in a creel or other yarn package holder on which both yarn packages are supported.

An object of this invention is the provision of means, cooperating with ring twisting and winding devices whereby yarns are wound on to yarn package supports, for varying the traverse stroke of said twisting and winding devices so that a magazine wrap or transfer tail may be applied on said yarn package supports.

Another object of this invention is to provide means for automatically applying a magazine wrap or transfer tail simultaneously to each of a series or bank of yarn package supports, while said yarn package supports are revolving at high speed.

A further object of this invention is the provision of means forming an integral part of the traverse mechanism of a twisting and winding device, which means is adapted to vary the traverse stroke of said device without interfering with the normal operation thereof so that a magazine wrap or transfer tail will be applied to yarn packages being wound thereon.

Other objects of this invention will appear from the following detailed description and the accompanying drawing.

In the accompanying drawing, wherein the preferred embodiments of our invention are shown,

Fig. 1 is a perspective view of a portion of a yarn winding device showing a pair of spindle units, a yarn support or bobbin on one of them, the traversing ring rail and the traverse adjusting mechanism of our invention cooperating therewith, and

Fig. 2 is a side-elevational view of an enlarged detail of a portion of said traverse adjusting mechanism.

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

Referring now to the drawing and more particularly to Fig. 1, a yarn 3 passing through a

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pigtail yarn guide 4 set in a bar 5 and coming from any suitable source of supply, such as a metier or spinning cabinet (not shown), passes downward and is threaded through a traveler 6 mounted on a spinning ring 7 set in a ring holder 8, the latter being mounted on a vertically reciprocable ring rail 9. Ring rail 9 carries a plurality of said spinning rings suitably spaced thereon so that multiple winding operations may be carried on. Beneath ring rail 9 is a stationary channel 10 on which is mounted a series of spindles 11, each of which supports a bobbin (only one being shown for the sake of clarity) set thereon and in frictional engagement therewith. Bobbin 12 comprises a barrel 13 and a base flange 14, the upper plane surface of the latter being provided with tangential slots 15 and 16 which communicate with a peripheral groove 17 cut in said base flange 14, which peripheral groove is adapted to receive and retain the desired magazine wrap or transfer tail. The bobbin 12 may be of the type shown in Patent No. 2,298,357 to Elvin et al. Spindles 11 are rotated at high speed by suitable driving means (not shown) which engage the whorl 18 of said spindles in the normal manner well understood in the art.

The rotation of spindles 11 and yarn package support 12 causes yarn 3 to be wound thereon. The yarn windings are suitably distributed along the barrel 14 of yarn package support 12 to form a yarn package of the desired shape by a vertical reciprocating traverse and builder motion which is imparted to ring rail 9. The traverse motion of said ring rail 9 is produced through the reciprocating angular rotation of a shaft 19 which actuates a lifter arm 20 integral with a collar 21 suitably fixed to shaft 19 for angular movement therewith. The angular rotational reciprocation of shaft 19 is produced by suitable means, hereinafter described and this reciprocation causes lifter arm 20 to be raised and lowered. The rising and falling action of lifter arm 20 thus produced causes ring rail 9 to be raised and lowered through rod 22 having mounted thereon a foot 23 which rests on a roller 24 journaled on a pin 25 fitted into a slot 26 at the end of arm 20. The bar 5 carrying yarn guides 4 is also raised and lowered through the action of rod 27 having foot 28 which rests on a roller 29 carried by arm 20, thus maintaining constant the degree of ballooning of the yarn.

A lever 29' is also fixed to said shaft 19, the free end of which lever is pivotally attached to the main horizontal traverse bar 30 by means of a pin 31 so that the reciprocation of lever 29' caused by the angular movement of shaft 19 effects the horizontal reciprocation or traverse of said traverse bar. A lever 32, also fixed to shaft 19, has a bifurcated free end forming fingers 33. A pin 34 is carried between said fingers and has

journaled thereon a connector bar 35 the use of which will hereinafter be set forth. To make the vertical traverse of bar 5 and ring rail 9 smooth and even, the traverse bar 30 extends along substantially the entire length of the winding machine and actuates one or more additional ring rail traversing or lifter units (not shown) of a construction similar to that shown suitably disposed along the length of the winding machine and cooperating with said ring rail 9 through a plurality of levers 29' and lifter arms 20 acting on a plurality of lifting rods such as 22 and 27.

The connector bar 35 is connected to a pneumatic mechanism, generally indicated by reference numeral 36, which is, in part, keyed to the main traverse shaft 37, and, in part, freely rotatable thereon, as will be more fully described hereinafter. The pneumatic mechanism 36 controls the extent of the vertical traverse of ring rail 9 and guide bar 5 by enabling the relative angular position of reciprocating shaft 19 and the main traverse shaft 37 to be changed. Thus, the pneumatic control mechanism, at the start of the winding of the yarn 3 on the yarn package support 12, has no air supplied thereto thus permitting the lowering of the ring rail to a position where the yarn will wind in the peripheral groove 17 of the base flange 14 of the yarn support to provide a transfer tail or magazine wrap. The pneumatic control mechanism, after air is supplied thereto, permits a so-called normal reciprocation of the ring rail 9 and causes the yarn 3 to be wound on and satisfactorily disposed along barrel 13 of the yarn package support.

The control mechanism 36 is mounted on main traverse shaft 37 and is adapted, in part, to be rocked with said shaft and thus to reciprocate connector bar 35. The horizontal reciprocating motion of connector bar 35 is effected by the action of a bell crank lever arm 38, which is pivotally mounted on shaft 37 and connected to said bar 35 by a pin 39. The other end of said bell crank lever arm is attached to a link 40 by means of a pin 41. The upper or bifurcated end of link 40 is connected to one end of a rocker arm 42 by means of a pin 43, said rocker arm 42 pivoting on a pin 44 set in a bracket 45. The opposite end of said rocker arm 42 is pivotally mounted in the upper end of a piston connecting rod 46 by means of a pin 47, the lower end of said piston rod 46 being attached to a piston 48, contained in an air cylinder 49, by a wrist pin 50. Movement of the piston 48 in cylinder 49 is effected by introducing air under pressure from a suitable source of supply into cylinder 49 through a tube 51. The distance through which the bell crank lever arm 38 may be moved by the action of the compressed air entering cylinder 49 and acting on piston 48, rocker arm 42 and link 40 may be controlled by means of adjustable set screws 52 and 53 which are threaded into a U-shaped bracket 54. Bracket 54 is integral with bracket 45 and with air cylinder 49, the whole being keyed to main traverse shaft 37 so as to rock therewith as a single unit.

During the regular running of the winding device, the entire weight or load of the ring rail 9 and the traverse assembly is supported by the air under pressure acting on piston 48 in cylinder 49, said load being transmitted to the piston, as indicated above, through the combined action of connector bar 35, bell crank lever arm 38, link 40, rocker arm 42 and piston connecting rod 46. When air pressure of a degree sufficient to counteract fully this load is maintained in cylinder 49, rocker arm 42 will act to force the upper fork of bell crank lever arm 38 down as far as it will go thus causing it to be maintained in contact with the surface of set screw 52, as shown in dot-dash line in Fig. 2. In this position the maximum downward traverse stroke of ring rail 9 is limited by the horizontal distance that bell crank lever arm 38 permits connector bar 35 to be moved due to the restraining force of the air under pressure in cylinder 49. Thus, when air under pressure is in cylinder 49, the yarn 3 will wind only on to the barrel 13 of yarn package support 12.

When it is desired to place a magazine wrap or transfer tail in the peripheral groove 17 of flange 14, the air pressure in cylinder 49 is released on the downward traverse stroke of ring rail 9, suitable valve release means (not shown) being provided. Since the pneumatic force balancing the weight of ring rail 9 and limiting the maximum length of the downward traverse stroke is no longer operative, bell crank lever arm 38 rotates on main traverse shaft 37 in a counter clockwise direction until the upper fork is in contact with set screw 53, as shown in the drawing. With bell crank lever arm 38 in this position, the downward traverse stroke is increased a short distance. At the lowermost position of ring rail 9 during the resulting increased traverse stroke, the traveler 6 and ring 7 are brought into the same plane as flange 14. This action causes yarn 3, winding on to yarn package support 12, to enter tangential slot 15 and to be guided into the peripheral groove 17, where the desired magazine wrap or transfer tail is applied. The stroke of ring rail 9 is then reversed by main traverse shaft 37 and, when ring rail 9 is on the upward stroke following application of the magazine wrap, yarn 3 leaves peripheral groove 17, enters tangential slot 16 and is then taken up on the barrel 13 of yarn package support 12. Simultaneously, air under pressure is again caused to enter cylinder 49. The air pressure forces the piston 48 up and rocker arm 42 acting on bell crank lever arm 38 again presses it down against set screw 52 to shorten the traverse stroke. The entire traverse mechanism thus assumes its normal running position which is maintained until the package is filled.

In the event of air leakage or failure at cylinder 49, there is provided a lock nut 55 threaded on to a rod 56 set in bracket 54. Lock nut 55 may be moved by rotating hand crank 57 in the proper direction thus rotating shaft 58 carrying a helical gear 59 mounted on one end thereof. Helical gear 59 meshes with a helical gear 60 keyed to rod 56 causing the latter to rotate in bearing 61 and to move lock nut 55 up or down, as the case may be. Lock nut 55 limits the freedom of bell crank lever arm 38 to pivot and, depending upon the position which it is caused to assume by the rotation of crank handle 57, may be effectively employed to limit or control the traverse stroke of ring rail 9 without the use of compressed air acting on piston 48 in cylinder 49.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention what we desire to secure by Letters Patent is:

1. In a spinning device for producing yarn packages having a transfer tail, the combination with means including a ring rail having at

least one spinning ring and traveler mounted thereon for winding yarn on a rotating yarn support, of means including a shaft for traversing the ring rail and means operatively connected to said shaft for increasing the length of the downward traverse stroke of said ring rail beyond the normal traverse stroke thereof, so as to cause the winding of a relatively small amount of yarn on the yarn support at a point spaced from the main body of yarn, said small amount of yarn being available for use as a transfer tail.

2. In a spinning device for producing yarn packages having a transfer tail, the combination with means including a ring rail having at least one spinning ring and traveller mounted thereon for winding yarn on a rotating yarn support, of an angularly reciprocating traverse shaft, means including a rotatably mounted shaft reciprocating with said traverse shaft, a lever arm operatively connected to said rotatably mounted shaft for traversing the ring rail, and means, cooperating with said rotatably mounted shaft and said lever arm for increasing the length of the downward traverse stroke of said ring rail beyond the normal traverse thereof, so as to cause the winding of a relatively small amount of yarn on the yarn support at a point spaced from the main body of yarn, said small amount of yarn being available for use as a transfer tail.

3. In a spinning device for producing yarn packages having a transfer tail, the combination with means including a ring rail having at least one spinning ring and traveller mounted thereon for winding yarn on a rotating yarn support, of an angularly reciprocating traverse shaft operatively connected to a rotatable shaft so as to reciprocate said shaft uniformly therewith, a lever arm keyed to said rotatable shaft and reciprocating therewith, a vertical rod depending from said ring rail and resting on said reciprocating lever arm for traversing the ring rail, and means, cooperating with the angularly reciprocating traverse shaft and the rotatable shaft, for increasing the length of the downward traverse stroke of said lever arm, so as to cause the winding of a relatively small amount of yarn on the yarn support at a point spaced from the main body of yarn, said small amount of yarn being available for use as a transfer tail.

4. In a spinning device for producing yarn packages having a transfer tail, the combination with means including a ring rail having at least one spinning ring and traveller mounted thereon for winding yarn on a rotating yarn support, of an angularly reciprocating traverse shaft operatively connected to a rotatable shaft so as to reciprocate said shaft uniformly therewith, a lever arm keyed to said rotatable shaft and reciprocating therewith, a vertical rod depending from said ring rail and resting on said reciprocating lever arm for traversing the ring rail, and means, including a bell crank lever mounted on the angularly reciprocating traverse shaft and cooperating with the lever arm and the rotatable shaft, for varying the angular rotation of said rotatable shaft relative to the angularly reciprocating traverse shaft and increasing the length of the downward traverse stroke of the reciprocating lever arm and the ring rail beyond the normal traverse stroke, so as to cause the winding of a relatively small amount of yarn on the yarn support at a point spaced from the main body of yarn, said small amount of yarn being available for use as a transfer tail.

5. In a spinning device for producing yarn packages having a transfer tail, the combination with means including a ring rail having at least one spinning ring and traveller mounted thereon for winding yarn on a rotating yarn support, of an angularly reciprocating traverse shaft operatively connected to a rotatable shaft so as to reciprocate said shaft uniformly therewith, a lever arm keyed to said rotatable shaft and reciprocating therewith, a vertical rod depending from said ring rail and resting on said reciprocating lever arm for traversing the ring rail, and pneumatically operated traverse control release means, including a bell crank lever pivotally mounted on the angularly reciprocating traverse shaft and cooperating with the lever arm and the rotatable shaft, for varying the angular rotation of said rotatable shaft relative to the angularly reciprocating traverse shaft and increasing the length of the downward traverse stroke of the reciprocating lever arm and the ring rail beyond the normal traverse stroke thereof, so as to cause the winding of a relatively small amount of yarn on the yarn support at a point spaced from the main body of yarn, said small amount of yarn being available for use as a transfer tail.

6. In a spinning device for producing yarn packages having a transfer tail, the combination with means including a ring rail having at least one spinning ring and traveller mounted thereon for winding yarn on a rotating yarn support, of an angularly reciprocating traverse shaft operatively connected to a rotatable shaft so as to reciprocate said shaft uniformly therewith, a lever arm keyed to said rotatable shaft and reciprocating therewith, a vertical rod depending from said ring rail and resting on said reciprocating lever arm for traversing the ring rail, and traverse control release means including a bell crank lever pivotally mounted on the angularly reciprocating traverse shaft, a rod connected at one end to said reciprocating lever arm and at the other end to one fork of said pivotally mounted bell crank lever, a rocker arm attached to the other fork of said bell crank lever, and control means for allowing said rocker arm, bell crank lever, rod and reciprocating lever arm to move through a predetermined angle and increase the angular rotation of the rotatable shaft relative to the angularly reciprocating traverse shaft, whereby the length of the downward traverse stroke of the reciprocating lever arm and the ring rail is increased beyond the normal traverse stroke thereof, so as to cause the winding of a relatively small amount of yarn on the yarn support at a point spaced from the main body of yarn, said small amount of yarn being available for use as a transfer tail.

7. In a spinning device for producing yarn packages having a transfer tail, the combination with means including a ring rail having at least one spinning ring and traveller mounted thereon for winding yarn on a rotating yarn support, of an angularly reciprocating traverse shaft operatively connected to a rotatable shaft so as to reciprocate said shaft uniformly therewith, a lever arm keyed to said rotatable shaft and reciprocating therewith, a vertical rod depending from said ring rail and resting on said reciprocating lever arm for traversing the ring rail, and pneumatically operated traverse control release means including a bell crank lever pivotally mounted on the angularly reciprocating traverse shaft, a rod connected at one end to said reciprocating lever arm and at the other end to one fork of said

pivotally mounted bell crank lever, a rocker arm attached to the other fork of said bell crank lever and pneumatic control means for allowing said rocker arm, bell crank lever, rod and reciprocating lever arm to move through a predetermined angle and increase the angular rotation of the rotatable shaft relative to the angularly reciprocating traverse shaft, whereby the length of the downward traverse stroke of the reciprocating lever arm and the ring rail is increased beyond the normal traverse stroke thereof, so as to cause the winding of a relatively small amount of yarn on the yarn support at a point spaced from the main body of yarn, said small amount of yarn being available for use as a transfer tail.

8. In a spinning device for producing yarn packages having a transfer tail, the combination with means including a ring rail having at least one spinning ring and traveller mounted thereon for winding yarn on a rotating yarn support, of an angularly reciprocating traverse shaft operatively connected to a rotatable shaft so as to reciprocate said shaft uniformly therewith, a lever arm keyed to said rotatable shaft and reciprocating therewith, a vertical rod depending from said ring rail and resting on said reciprocating arm for traversing the ring rail, and pneumatically operated traverse control release means including a bell crank lever pivotally mounted on the angularly reciprocating traverse shaft, a rod connected at one end to said reciprocating lever arm and at the other end to one fork of said pivotally mounted bell crank lever, a rocker arm attached to the other fork of said bell crank lever, an air cylinder, a piston in said air cylinder maintained in fixed position by air under pressure, and a piston rod attached to said piston and to said rocker arm, the release of the air under pressure allowing said rocker arm, bell crank lever, rod and reciprocating lever arm to move through a predetermined angle and increase the angular rotation of the rotatable shaft relative to the angularly reciprocating traverse shaft, whereby the length of the downward traverse stroke of the reciprocating lever arm and the ring rail is increased beyond the normal traverse stroke thereof, so as to cause the winding of a relatively small amount of yarn on the yarn support at a point spaced from the main body of yarn, said small amount of yarn being available for use as a transfer tail.

9. In a spinning device for producing yarn packages having a transfer tail, the combination with means including a ring rail having at least one spinning ring and traveller mounted thereon for winding yarn on a rotating yarn support, of an angularly reciprocating traverse shaft operatively connected to a rotatable shaft so as to reciprocate said shaft uniformly therewith, a lever arm keyed to said rotatable shaft and reciprocating therewith, a vertical rod depending from said ring rail and resting on said reciprocating arm for traversing the ring rail, and pneumatically operated traverse control release means including a bell crank lever pivotally mounted on the angularly reciprocating traverse shaft, a rod connected at one end to said reciprocating lever arm and at the other end to one fork of said pivotally mounted bell crank lever, a rocker arm attached to the other fork of said bell crank lever, adjustable stop means defining the limit of the pivotal movement of said bell crank lever and rocker arm, an air cylinder, a piston in said cylinder maintained in fixed position by air under pressure, and a piston rod attached to said piston and to said rocker arm, the release of the air under pressure allowing said rocker arm, bell crank lever, rod and reciprocating lever arm to move through a predetermined angle and increase the angular rotation of the rotatable shaft relative to the angularly reciprocating traverse shaft, whereby the length of the downward traverse stroke of the reciprocating lever arm and the ring rail is increased beyond the normal traverse stroke thereof, so as to cause the winding of a relatively small amount of yarn on the yarn support at a point spaced from the main body of yarn, said small amount of yarn being available for use as a transfer tail.

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