

May 28, 1968

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3,385,532

YARN WINDING APPARATUS

Filed Dec. 21, 1966

3 Sheets-Sheet 2

FIG. 2

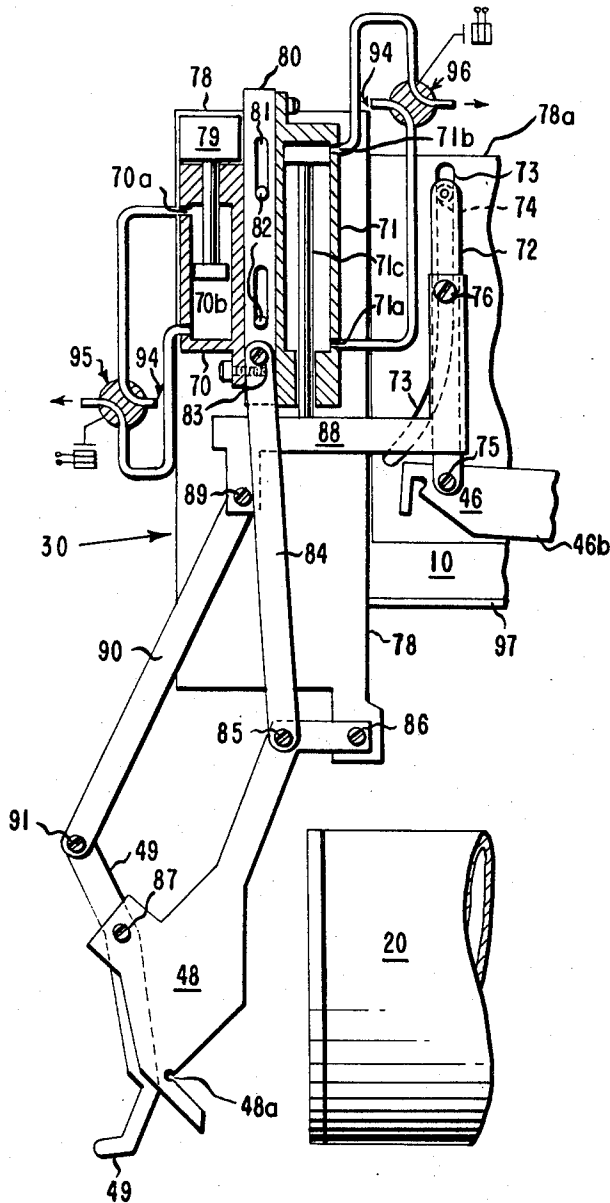
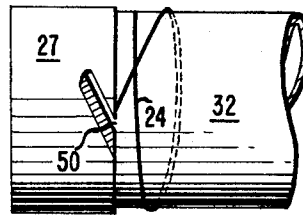


FIG. 4



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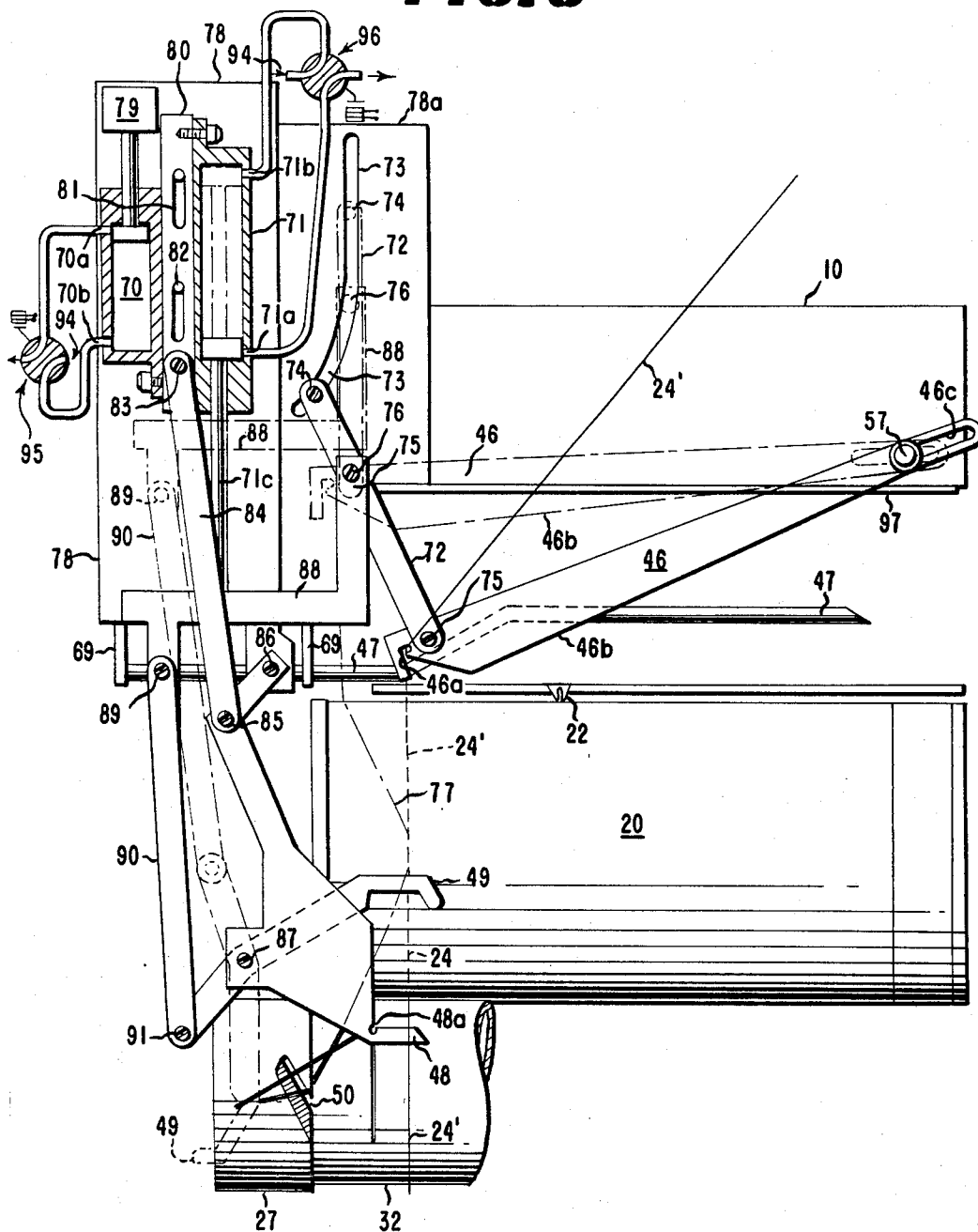
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FIG. 3



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1

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YARN WINDING APPARATUS

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6 Claims. (Cl. 242-18)

ABSTRACT OF THE DISCLOSURE

An apparatus having a movable bar with various guides for engaging the yarn type winding apparatus and moving the yarn to a yarn severing means at the end of a rotatable windup chuck and for guiding the yarn so as to wind a transfer tail over the severed end of the yarn. The bar and guides are operated by air cylinder means which are actuated by a switch means which is in turn actuated by the support of the completed yarn package.

This invention relates generally to a winding apparatus and, more particularly, to the equipment with which yarn, advancing continuously from a source is wound on successive packages.

Windups which include a print or drive roll to which yarn advances from a reciprocating traverse guide and from which yarn is deposited on a surface driven package are widely used. To avoid waste during doffing such windups have been provided with a pair of rotatable chucks alternately movable into surface driven engagement with the drive roll and auxiliary equipment for accomplishing transfer of the yarn from a full to an empty support.

It is also known in the art to include a transfer tail in the initial length of yarn wound on a support. The purpose in providing a transfer tail on the yarn package is to enable an uninterrupted flow of yarn from a creel in textile processes by providing an end length of yarn that is freely available for tying to the leading end of an adjacent package.

Equipment is available for winding yarn with transfer tails on package supports. The winding operation may be initiated by snagging the running yarn in a surface groove on the support to secure the transfer tail thereto. In situations where the support is not provided with a stringup groove various other means are used for securing the transfer tail. For example, the free end may be secured to the support by cement, tape or mechanical clips.

Although the known techniques are effective for holding the starting end of yarn securely in position on a yarn support the transfer tail is not readily accessible when the time comes for tying the end of one package to another package. Modifying a package support to include a stringup groove increases the cost of the support and loosening a transfer tail that has been cemented or taped is time consuming considering this operation requires both manual application and removal of the cement or tape. Both the modified package support and taping the yarn to the package are costly and it is highly desirable to eliminate the need for either.

With this in mind, it is the primary objective of this invention to provide an apparatus which in combination with a windup of the type described will automatically secure a transfer tail to a support in a manner to overcome the above deficiencies. A more particular objective is to provide an apparatus which, in combination with a windup of the type described, will automatically bring the yarn into engagement with severing elements on a driven chuck while the yarn is still advancing to a full

2

package on the other chuck and initiate a wrap of yarn on the driven empty support which will overlap the initial severed length of yarn adjacent its end.

The above objectives are achieved by providing an elongated bar positioned above the traverse guide and extending transversely behind the yarn. The bar has a yarn engaging slot in one end and is normally positioned so that the slot is in approximate alignment with the severing element on the driven chuck. A hook normally positioned outboard of and above the severing element on the driven chuck is connected to the bar by a driven linkage that imparts simultaneous oscillatory movement to the hook and to the bar to and from a yarn engaging position. The driven linkage is operative at a predetermined time during the alternate movement of the chucks into and away from driven engagement with the drive roll.

Other objectives and advantages will be apparent from the following descriptions in which reference is made to the following drawings wherein:

FIGURE 1 is a partial schematic side view showing the bar and hook with respect to a windup;

FIG. 2 is a partial top view of FIG. 1 including a sectional schematic of the drive for the linkage;

FIG. 3 is a partial top view of FIG. 1 showing the operative position of the bar and hook; and

FIG. 4 is a partial view of the end of a package support showing a severed length of yarn secured by an overlapping yarn wrap.

Referring to FIG. 1, it will be seen that the windup chosen for purposes of illustration includes generally as components thereof a frame 10, a pair of arms 12, 14 mounted for relative movement about a common pivot, rotatable chucks 16, 18 at the extremities of arms 12, 14, a drive roll 20, a reciprocating traverse guide 22 through which yarn 24 advances under drive roll 20 to a package 26 on chuck 18, and a yarn transfer mechanism 30. Package 26 is normally in surface contact with roll 20. A fanning guide 28 positions yarn 24 above traverse guide 22.

Immediately following the timed completion of package 26, arms 12, 14 are rotated and as they approach the position shown in FIG. 1 transfer mechanism 30 is actuated initiating a new package on support 32.

Referring now to FIGS. 2 and 3, the yarn transfer mechanism 30 generally comprises an elongated bar 46, a hook 49 and a guide 48 interconnected by linkages and air cylinders 70, 71 mounted to the frame 10 above drive roll 20. Air cylinders 70, 71 are actuated in a timed sequence by means of solenoid valves 95 and 96 which in turn may be conveniently actuated by a conventional clock timer 92 (FIG. 1). A micro switch 93 when engaged by either arm 12 or 14 initiates operation of the timer. In FIG. 2, the yarn transfer mechanism 30 is shown in its normal or non-operative position. The entire movable part of the mechanism 30 is held in the rest position by means of air cylinder 70 the piston rod of which is secured to a fixed block 79 which in turn is attached to a plate 78 which is secured to the frame 10. The body of the cylinder 70 is maintained in the position shown in FIGURE 2 by the application of pressurized air to port 70a, via solenoid operated, four-way valve 95 from a supply source 94. If the valve 95 is turned 90°, air will be exhausted from the port 70a and pressure will be applied to the port 70b, thus causing the body of the cylinder 70 to move downward.

Secured to the body of the cylinder 70 is a sliding block 80 which is provided with elongated slots 81 which are engaged by fixed dowels 82 secured to the plate 78. The block 80 is thus adapted to slide with the body of the cylinder 70. On the opposite side of the block 80 and

secured thereto is the body of a cylinder 71 which is connected to a four-way solenoid operated valve 96. This valve is positioned to supply pressurized air to port 71a of the cylinder 71. If the valve 96 is turned 90°, air will be exhausted from port 71a and supplied to port 71b thus driving the piston rod 71c of the cylinder 71 downward. Secured to the end of the rod 71c is an L shaped actuating bar 88 the lower surface of which is in sliding engagement with the upper surface of the plate 78. The actuating bar 88 may be moved by either or both of the cylinders 70, 71. Secured to actuating bar 88 are a drive pin 76 and a pin 89 the function of which will be described hereinafter.

Yarn guide 48 is pivotally mounted to plate 78 at pivot 86. The yarn guide 48 carries an elbow pin 85 engaging a link 84 which is coupled to sliding block 80 by means of an anchor pin 83 all of the pinned joints being capable of relative rotation. From the foregoing it will be seen that downward movement of the cylinder 70 and the block 80 will cause the yarn guide 48 to swing counter clockwise (C.C.W.) about the fixed pivot 86. When the transfer mechanism is operated the guide 48 reaches the (solid-line) position shown in FIG. 3.

Yarn hook 49 is pivotally mounted to guide 48 at pin 87. The yarn hook 49 is coupled to actuating bar 88 by means of a link 90 and pins 89 and 91, and normally occupies the position shown in FIG. 2. When valve 96 is rotated to admit air to the port 71b of cylinder 71 the yarn hook 49 will be rotated C.C.W. about 90° (in respect to the yarn guide 48) and will then occupy the (solid-line) position shown in FIG. 3.

Situated generally parallel to the plate 78 and secured to frame 10 is a smaller plate 78a in which is machined a cam slot 73. The upper part of slot 73 is substantially parallel to and the lower part is curved toward the longitudinal axes of cylinders 70, 71. Cam slot 73 is engaged by a cam follower 74 which is secured to the upper end of a link 72. Link 72 is pivotally joined intermediate its ends to actuating bar 88 by means of drive pin 76. From this it will be seen that actuation of the cylinder 71, while causing the actuating bar 88 to move up or down will also cause the lever 72 to move, thus driving the cam follower pin 74 along the cam slot 73 with the further effect of causing the lever 72 to pivot about the drive pin 76 when the cam follower pin 74 travels in the curved portion of the cam slot.

The lever 72 extends beyond the drive pin 76, and at its lower end is pivotally joined by pivot 75 to a yarn cam plate 46. When it is in the normal (dotted line) position shown in FIG. 3 the yarn-engaging edge 46b of the yarn cam plate 46 is substantially parallel to the axis of drive roll 20 (but is out of contact with any yarn) and is coextensive with the path of yarn traverse. Cam plate 46 has a slot 46c in its one end where it is pivotally joined to the frame 10 by means of a pin 57 as shown in FIG. 3. Slot 46c enables the plate 46 to move endwise when the lever 72 pivots. In the end of cam plate 46, a yarn engaging slot 46a interrupts edge 46b.

As may be seen in FIG. 3 with both of the cylinders at the limit of their downward positions; the yarn cam plate 46 occupies a position in which the yarn-engaging edge 46b of the plate is at an angle of about 20° in respect to the axis of the drive roll 20 and extends across and above a fixed guide 47 positioned above the yarn traverse guide 22. At its unsupported end the guide 47 almost touches the yarn 24 and is parallel to the plane swept out by the traversing yarn for a distance equal to about two-thirds of the traverse distance (or package length) at which point the guide 47 angles away from the yarn for a short length beyond which it is again parallel to the plane swept by the traversing yarn. The guide 47 is supported by fixed brackets 69 which are secured to the underside of the plate 78. An elongated guide 97 is positioned on frame 10 between guide 47 and cam bar

46. Guide 97 extends transversely behind yarn 24 and is substantially parallel to drive roll 20.

In operation, as arm 14 approaches the position shown in FIG. 1 it operates switch 93 which initiates operation of the timer 92. The timer in turn energizes solenoid valves 95, 96 admitting air to ports 70b and 71b of air cylinders 70, 71 which then drive the parts of the yarn transfer mechanism to the (solid line) position shown in FIG. 3. Although yarn guide 48 and yarn hook 49 reach the position shown in FIG. 3, they do not initially contact the yarn.

As the cam plate 46 swings into its operative position, edge 46b engages the traversing yarn 24. If the yarn 24 is in the right hand portion of its traverse stroke, it will be confined by guide 47 until it progresses to the angled intermediate length of guide 47 where it is lifted out of engagement with the traverse guide 22 by the intrusion of edge 46b. The yarn then follows edge 46b into slot 46a and follows new yarn path 24'.

Next air cylinder 71 is reversed by timed actuation of solenoid valve 96 admitting air to port 71a driving actuating bar 88 to the dotted line position shown in FIG. 3. This also results in a simultaneous change to the positions of yarn hook 49 and cam plate 46. As cam plate 46 is withdrawn to the dotted line position the yarn strikes guide 97 and is lifted free of slot 46a. As yarn hook 49 swings clockwise with respect to guide 48, it engages yarn 24' beneath guide 48 carrying it into notch 48a and into the path of the pointed tooth which defines slot 50 in chuck 27. The yarn is engaged by the pointed tooth and quickly severed by virtue of chuck rotation. At substantially the same time the yarn is carried into slot 50 for severing, it is still in slot 46a and the simultaneous leftward movement of cam bar 46 causes the yarn to be deposited on the underside of drive roll 20 in a helical path represented by the broken line 77 of FIG. 3. As shown in FIG. 4 this results in the printing of a warp of yarn 24 on the support 32 which overlies the first wrap very close to the point at which the yarn was severed. The net effect is to bind the terminal end of the yarn to the support while still leaving it easily removable for purposes previously described. It is also to be understood that when the yarn is released from slot 46a it resumes its substantially vertical path shown in FIG. 1 and is picked up by traverse guide 22 whereupon normal winding of a package begins.

After cylinder 71 has reached its normal position, timer 92 actuates solenoid 95 admitting air to port 70a of air cylinder 70 this results in the withdrawal of the movable parts of the transfer mechanism 30 to the normal position shown in FIG. 2.

Changes and modifications will occur to those skilled in the art without departure from the spirit of the invention which accordingly is intended to be limited only by the scope of the appended claims.

What is claimed is:

1. In a winding apparatus of the type which includes a drive roll, a pair of rotatable chucks and supports alternately movable into surface driven engagement with the drive roll, each chuck having a yarn snaring and severing element thereon, and a traverse guide through which yarn normally advances around the drive roll to a package support on the driven chuck, a device for initiating a wrap of yarn on the driven empty support which overlaps a severed length adjacent its end, said device comprising;

- (a) an elongated bar normally positioned above said traverse guide and extending longitudinally of said support but spaced from said yarn normally advancing through the traverse guide, said bar having a yarn engaging slot on one end, said slot being in proximal alignment with said element;
- (b) means mounting said bar for movement to and from a position engaging and guiding said yarn to said slot; and
- (c) motive means coupled to said mounting means for imparting said movement, said motive means being

5

operative at a predetermined time during said alternate movement of said chucks.

2. The apparatus of claim 1 wherein is provided an elongated guide positioned between said traverse guide and said bar, said guide extending transversely in front of said yarn in proximal relationship thereto.

3. The apparatus of claim 2 where said elongated guide has an intermediate length angularly disposed toward said yarn.

4. In a winding apparatus of the type which includes a drive roll, a pair of rotatable chucks alternately movable into surface driven engagement with the drive roll, each chuck having a yarn snaring and severing element adjacent the support thereon and a traverse guide through which yarn normally advances around the drive roll to a package support on the driven chuck, a device for automatically bringing the yarn into engagement with said element on the driven chuck for severing while it is still advancing to a full package on the other chuck and initiating a wrap of yarn on the driven empty support which overlaps the severed length adjacent its end, said device comprising:

(a) an elongated bar normally positioned above said traverse guide and extending transversely behind said yarn in proximal relationship thereto, said bar extending longitudinally with said support and having a yarn engaging slot on one end, said slot being in proximal alignment with said element;

(b) a hook normally positioned outwardly from and above said element in proximal relationship thereto;

(c) a linkage mechanism mounting said bar and said hook for simultaneous oscillatory movement of said

6

bar and said hook to and from a yarn engaging position; and

(d) motive means coupled to said linkage mechanism for imparting said oscillatory movement, said motive means being operative at a predetermined time during said alternate movement of said chucks.

5. The apparatus of claim 4 including a guide pivotally mounted to said hook and coupled to said linkage mechanism for simultaneous oscillatory movement with said bar and said hook, said guide having a yarn engaging notch.

6. The apparatus of claim 4 wherein there is provided an elongated guide positioned between said traverse guide and said bar, said guide extending transversely in front of said yarn in proximal relationship thereto and having an intermediate length angularly disposed toward said yarn.

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