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PACKAGE ARM CONTROL MECHANISM FOR WINDING MACHINES

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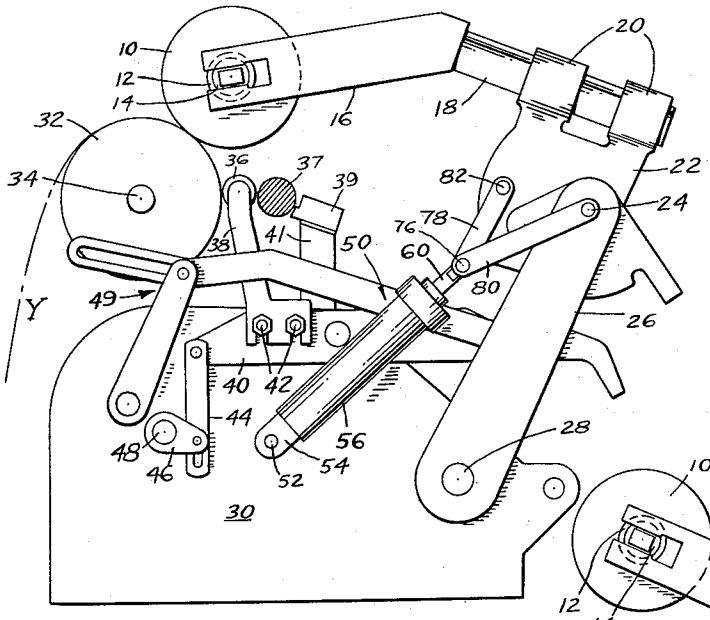


Fig. 1

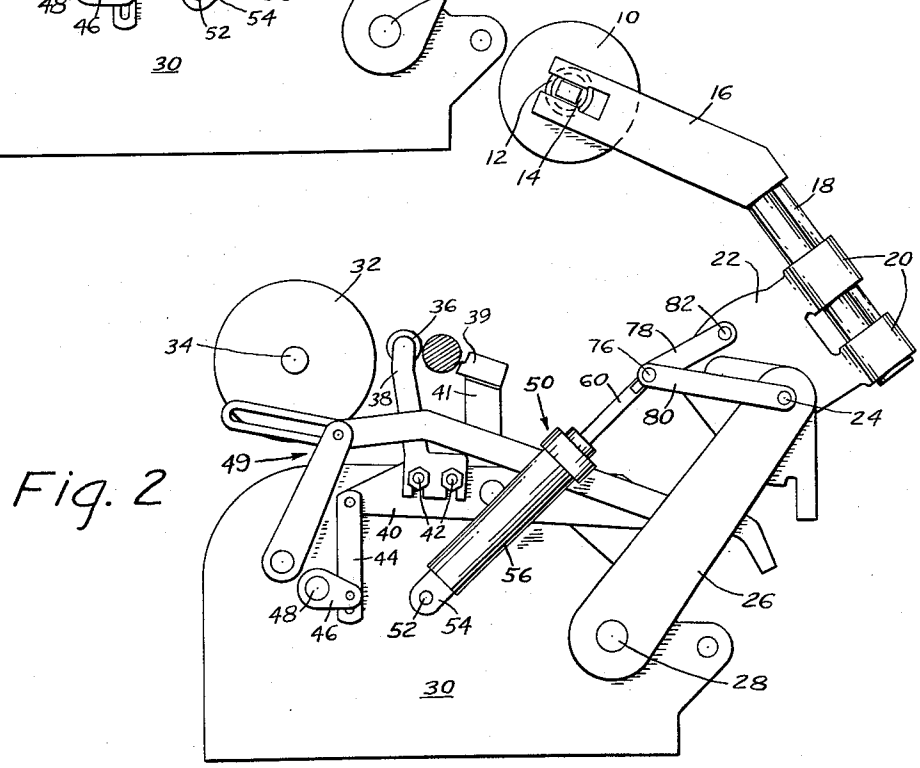


Fig. 2

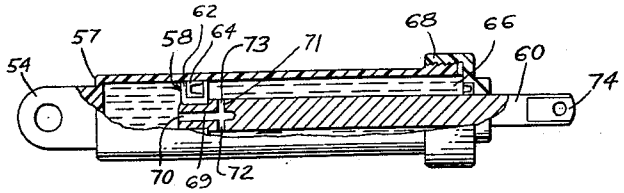


Fig. 3

INVENTOR.
PORTER I. BARNES, JR.

BY

Albert P. Davis

ATTORNEY

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PACKAGE ARM CONTROL MECHANISM FOR WINDING MACHINES

Porter I. Barnes, Jr., Johnston, R.I., assignor to Leesona Corporation, Cranston, R.I., a corporation of Massachusetts

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The present invention relates to a winding machine and more particularly to a package arm control mechanism for use with such machines.

In the following specification and claims the term yarn is employed in a general sense to apply to all kinds of strand material, either textile or otherwise, and the designation package is intended to mean the product of a winding or twisting machine, whatever its form.

In winding machines of the type disclosed in United States Patent No. 2,764,362, issued September 25, 1956, to W. V. Goodhue, et al. for "Winding Machine," which automatically repairs broken ends in the winding strand and tie in new supplies when the supply is exhausted, it is necessary that the winding package be moved from a winding position to one where the broken end on the package is found and retrieved and then moved back to winding position. It has been found that the package, or the winding machine traversing and retrieving mechanism can be damaged unless means are provided to cushion or snub the movement of said package while at the same time permitting the greatest possible speed of movement in the interest of machine efficiency.

It is therefore one object of the present invention to provide an improved package arm control mechanism for snubbing and effectively controlling the movement of a mandrel and winding package thereon.

Another object of the present invention is to provide an improved package arm control mechanism capable of applying a braking force to said package arm in the plane of movement of the package arm.

Another object of the present invention is to provide a package arm control mechanism capable of permitting convenient movement of the package arm without the necessity of preliminary releasing of other parts.

Another object of the present invention is to provide a package arm control mechanism capable of use on a wide range of textile machines.

Another object of the present invention is to provide a package arm control mechanism which is simple in operation, economical to manufacture, and durable and reliable in use.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the apparatus possessing the construction, combination of elements and arrangement of parts which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed disclosure taken in connection with the accompanying drawing wherein:

FIG. 1 is a side elevational view of a winding machine embodying the present invention and showing the position of the parts with the yarn package contacting the drive roll;

FIG. 2 is a view similar to FIG. 1 but showing the winding package separated from the drive roll; and

FIG. 3 is a detailed view partly in section of the energy absorbing mechanisms.

Referring now to the drawing wherein a preferred embodiment of the present invention is shown in connection with a winding machine of the type disclosed in United

States Patent No. 2,764,362 and the commonly assigned patent application, Serial No. 30,347 filed May 19, 1960, of Porter I. Barnes, Jr., and Thomas E. Pitts for "Delivery Package Control Mechanism for Winding Machines" filed concurrently herewith. Said machine is provided with a plurality of identical units as shown each of which is adapted to wind a package 10 on a core 12 which, in turn, is suitably mounted on a mandrel 14. Mandrel 14 is rotatably supported on a pivoted arm 16, connected to a rod 18 supported in bearings 20 of a bracket 22. Bracket 22 is mounted for pivotal movement on a stub shaft 24 journaled in the upper portion of an upstanding arm 26 which is also capable of pivotal movement. A shaft 28 extending through housing 30 mounts arm 28 on the outer end thereof. Shaft 28 extends within housing 30 and is connected to suitable mechanisms fully described in United States Patent No. 2,764,362 to rock said shaft to thereby pivot arm 26 to move package 10.

A yarn traversing and package driving roll 32 having helical grooves (not shown) in the periphery thereof is fixed to shaft 34 for rotation therewith. Shaft 34 extends longitudinally of housing 30 and is connected to any suitable power means such as an electric motor, not herein illustrated. As shown in FIG. 1 drive roll 32 serves to receive the surface of package 10 on its periphery and to frictionally rotate said package to wind a running strand of yarn Y thereon. It will be understood that mandrel 14 will be maintained in full driving contact with the surface of drive roll 12 as wraps of yarn are laid on said package by the rotation of rod 18 in bearings 20 to tilt or cant said mandrel 14. Further, as package 10 increases in diameter, mandrel 14 will be progressively moved away from drive roll 32 due to the increasing yarn mass on core 12 causing arm 16 and rod 18 to swing clockwise, as view in FIGS. 1 and 2, about shaft 24.

In the event a break occurs in yarn Y, or the yarn supply becomes exhausted, package 10 is transferred from contact with drive roll 32 to contact with a rest plate 36 supported on a bracket 38 attached to a bar 40 by screws 42. Rest plate 36 is described in detail in commonly assigned U.S. patent application filed on or about April 18, 1960 by Thomas E. Pitts, for Package Arresting Device. Briefly, its purpose is to stop the rotation of package 10 so that the free end of yarn thereon can be found and withdrawn.

In the manner fully disclosed in said United States patent application of Porter I. Barnes and Thomas E. Pitts package 10 is sequentially transferred from roll 32 to contact rest plate 36 and then into contact with a reverse roll shaft 37 by means including link 44 depending from bar 40 and finger 46 fixed on shaft 48 operable with linkage 49. Reverse roll shaft 37 is arranged rearwardly of rest plate 36, and extends the length of the winding machine parallel to shaft 34. The same power means used to rotate shaft 34 are utilized to continuously rotate reverse roll shaft 37 in a direction opposite to shaft 34. As shown in FIGS. 1 and 2 shaft 37 is disposed in generally the same horizontal plane as rest plate 36 to permit package 10 to be transferred into peripheral engagement therewith so that package 10 may be rotated in an unwinding direction. A stationary suction nozzle 39 is positioned closely adjacent to reverse roll shaft 37 and is connected to a suitable vacuum means through conduit 41 for maintaining a continuous suction thereto. Suction nozzle 39 operates to draw a loose yarn end off the periphery of package 10 and transfer it to means for uniting it with a supply end as described in United States Patent No. 2,764,362. Thereafter package 10 is shifted through a generally horizontal path to be returned to its winding position on drive roll 32.

The foregoing instrumentalities are presented herewith for purposes of clarity and do not form a part of the

present invention except in combination with the mechanism to be next described.

A hydraulic unit 50 is pivotally mounted adjacent housing 30 by means of a stud 52 fixed in a wall of said housing and passing through a flat tank 54 at the lower end of said unit. Hydraulic unit 50 comprises a hollow cylinder 56 having one closed end 57 to adapt the cylinder to contain a volume of hydraulic fluid.

A piston 58 is positioned to slide longitudinally within said cylinder 56 and has a piston rod 60 extending through and connected thereto. Piston 58 is a disc having a peripheral groove which carries suitable packing 64 such as a rubber ring to form a seal with the wall of cylinder 56. The end 66 of cylinder 56 is threaded to receive a cap 68 thereon. Cap 68 is bored centrally therethrough to afford a passage for piston rod 60 into cylinder 56. A recess is provided around the bore 68 to form a seat for a rubber seal 70 which prevents escape of fluid around rod 60. Piston rod 60 has an axial bore or hole 69 extending therethrough somewhat beyond the piston 58 and providing an orifice as at 70 in the end of rod 60. A hole 71 is bored transversely through rod 60 communicating with the bore 69 to thereby provide a pair of orifices at 72 and 73. From this it will be seen that a passageway if provided through piston rod 60 which will permit fluid contained within cylinder 56 to flow from one side of said piston to the other as said piston is slid longitudinally along cylinder 56. Further, it is obvious that any predetermined braking force may be established in hydraulic unit 50 by regulating the diameter of the passageway.

The upper end of piston rod 60 is milled to provide a flat surface 74 which is drilled through to receive a headed stud 76 which serves to connect one end of each of a pair of links 78 and 80 to said piston rod. The opposite end of link 78 is attached to the forward portion of bracket 22 by pin 82. The opposite end of link 80 is pivoted on the outer end of stub shaft 24.

The foregoing mechanism operates in the following manner. Helically grooved drive roll 32 is rotated by shaft 34 being driven from its power source. Core 12 mounted on mandrel 14 is frictionally engaged with the periphery of drive roll 32 to be rotated thereby. With a strand of yarn Y attached to core 12 the yarn will be traversed from end to end of said core to wind a package. As package 10 increases in diameter arm 16 and rod 18 will rock counterclockwise as viewed in FIGS. 1 and 2 to swing bracket 22 about shaft 24. Coincidently with this rocking motion piston 58 will be drawn upwardly within cylinder 56 by means of link 78 attached to bracket 22 which of course pivots upwardly with rod 18 thereby forcing fluid through orifices 72 and 73 and out orifice 70. Upon completion of the winding cycle mandrel 14 will normally be swung upwardly to the position shown in FIG. 2 whereupon the wound package may be easily doffed and a fresh cone donned on mandrel 14. As a part of this upward motion bracket 22 is pivoted clockwise carrying link 78 upwardly to thereby pull piston 58 upward in cylinder 56 and forcing the hydraulic fluid into the section of cylinder 56 below said piston. Thereafter as arm 16 is released to swing downwardly to the position of FIG. 1 the impact of the core 12 on drive roll 32 is braked due to the fact that the hydraulic fluid must be displaced through orifices 70, 72 and 73. It is to be noted that during the pivoting of bracket 22 about its shaft 24 hydraulic unit 50 is free to pivot about stud 52 to maintain piston rod 60 in the direction of force of link 78 to thereby prevent cramping of rod 60 against cap 68.

In the event a break occurs in the winding strand of yarn Y, or if the yarn supply becomes exhausted, means described in said application of Porter I. Barnes, Jr. and Thomas E. Pitts will shift package 10 off of drive roll 32 and into peripheral contact with rest plate 36 to stop its rotation. Thereafter, the package 10 will move to reverse roll shaft 37 where it will be rotated in an unwinding direction to permit suction nozzle 39 to draw off the loose end from the surface of the package. The package 10 is shifted thereafter sequentially to the rest plate 36 and onto drive roll 32 to resume the winding cycle. It will be obvious from the showing of FIGS. 1 and 2 that the movement to accomplish this shifting between drive roll 32 and rest plate 36 will be in a generally horizontal plane since rest plate 36 and reverse roll shaft 37 are in horizontal alignment generally with shaft 34 mounting drive roll 12 and the described movement is initiated by rocking of arm 26 about shaft 28. Link 80 extending from stub shaft 28 at the upper end of arm 26 and connected to piston rod 60 serves to actuate hydraulic unit 50 in response to horizontal movement of the package and mandrel 14 to force the hydraulic fluid within cylinder 56 from one side of piston 58 to the other and thereby provide a braking force.

It will be apparent that hydraulic unit 50 will be operable in any sector of movement through which package 10 and mandrel 14 may be shifted due to the fact that links 78 and 80 are capable of coacting to move piston 58 longitudinally of cylinder 56 and hydraulic unit 50 will pivot about stud 52 to align with the direction of force exerted on rod 60.

Since certain changes may be made in the above described apparatus without departing from the scope of the invention herein involved, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in the limiting sense.

What is claimed is:

1. In combination with a winding machine, a rotatable mandrel adapted to receive a core to wind a yarn thereon, driving means for rotating said mandrel, supporting means for said mandrel comprising a pair of arms, the first arm being adapted to support said mandrel for pivotal movement in a generally vertical direction and the second arm carrying said first arm and supporting it and said mandrel for pivotal movement in a generally horizontal direction, and means for applying a braking force to said first and second arms, said last-named means including an element adapted for movement in two opposite directions, means for applying to said element a predetermined force retarding movement thereof in either of said directions, and rigid means connecting said element to each of said arms whereby motion of said arms is transmitted to said element, the retarding force applied to said element being thereby effective to retard movement of said arms.

2. The combination of claim 1 wherein said element is elongated and adapted for longitudinal movement, said element having its longitudinal axis generally parallel to the longitudinal axis of said second arm and generally transversely of the longitudinal axis of said first arm; said element having one end thereof pivotally connected to each of said arms at a fixed point spaced from the pivotal axis thereof.

3. The combination of claim 2 wherein said element is mounted for pivotal movement about a fixed axis remote from the end thereof connected to said arms, said last-mentioned axis extending transversely of the longitudinal axis of the element and in spaced parallel relation to the pivotal axis of said second arm.

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