United States Patent [19]

Swinehart

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[54] WINDING APPARATUS

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[73] Assignee: **Leesona Corporation,** Warwick, R.I.

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[52] **U.S. Cl.** .....**242/18 R,** 242/46.4

[51] **Int. Cl.** **B65h 54/02,** B65h 67/04

[58] **Field of Search** .....242/18 R, 18 DD, 46.2, 46.4, 242/30, 41, 25

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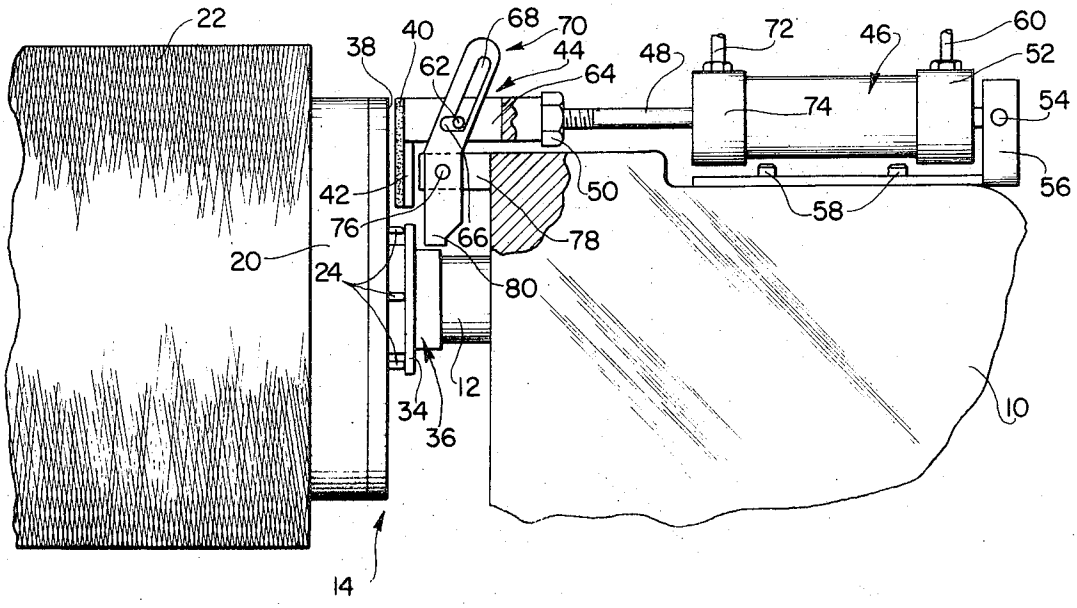
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[57] **ABSTRACT**

A winder, such as a Model 959 take-up, manufactured by Leesona Corporation, Warwick, Rhode Island, has a rotary chuck mounted on a winder base and has chuck members resiliently urged into gripping engagement with a package core removably telescoped on the chuck. A lever is pivoted to the winder base and is operated in one direction by a fluid motor to release the chuck members from gripping engagement with the core. A brake member is pivotally connected with the lever in such a manner that operation of the motor in an opposite direction brakes the chuck and maintains the lever out of operating engagement with the chuck. The motor is controlled by a valve system which vents one side of the motor into the other side for positioning both the brake member and the lever out of engagement with the chuck.

6 Claims, 7 Drawing Figures



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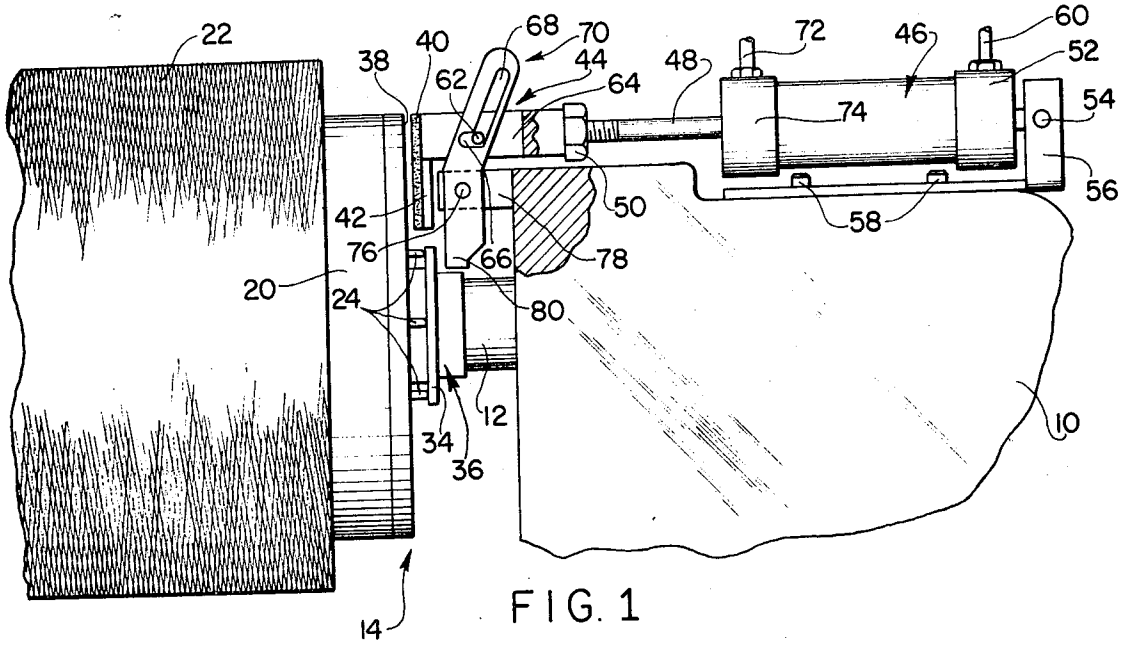


FIG. 1

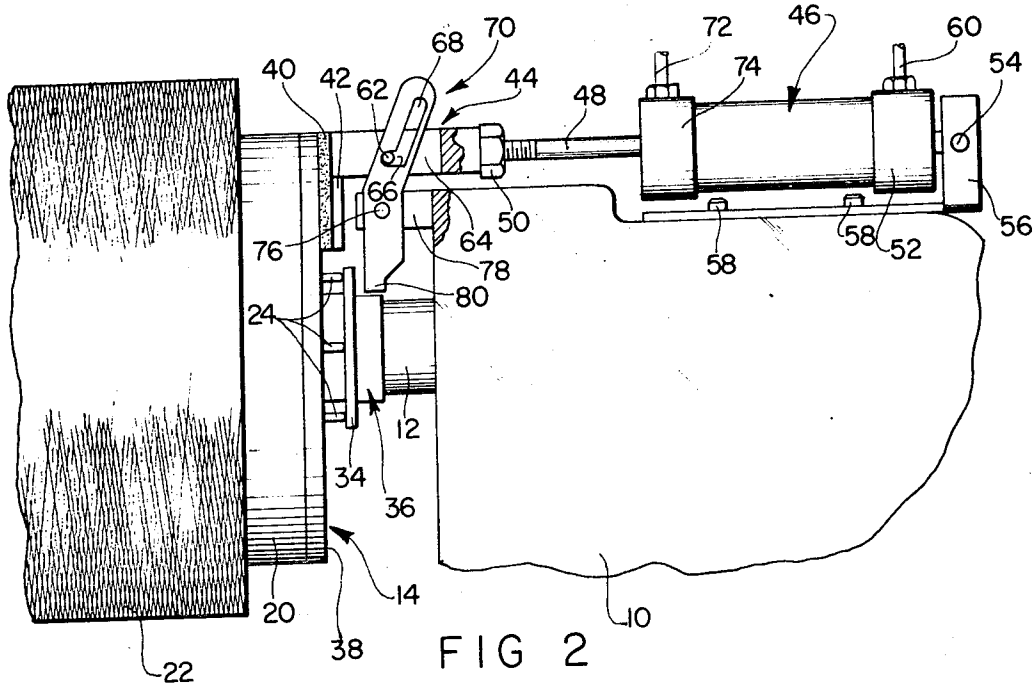


FIG 2

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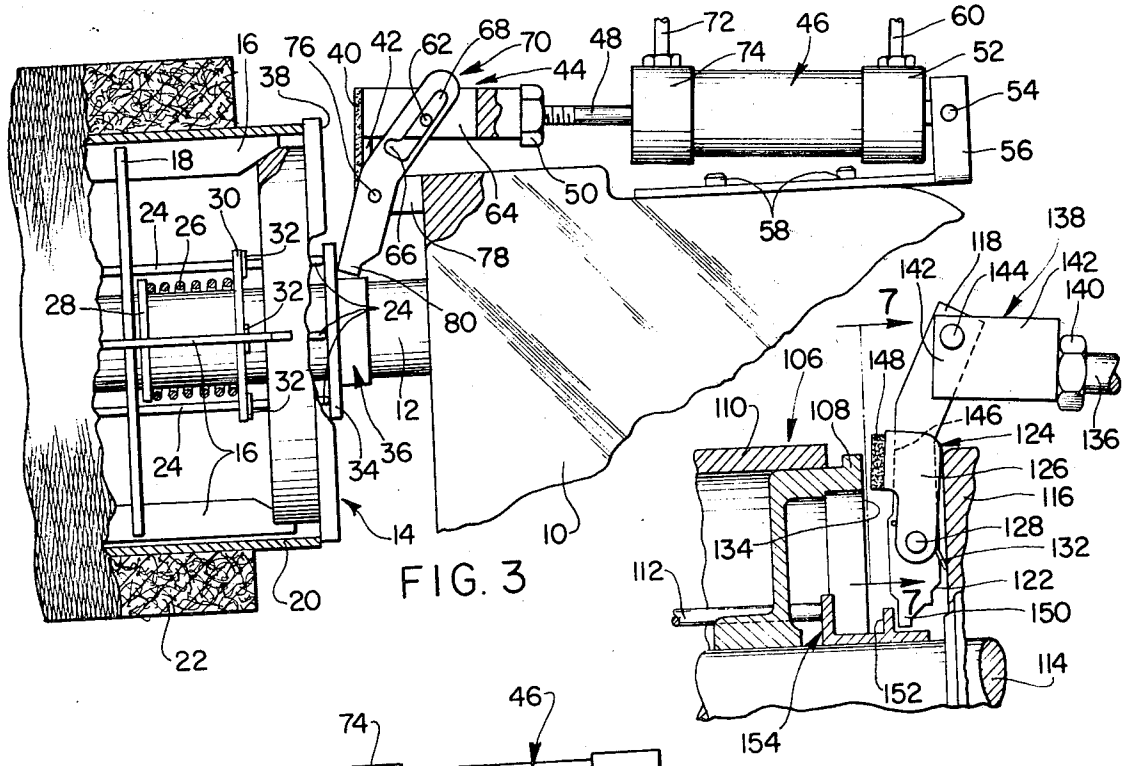


FIG. 3

FIG. 6

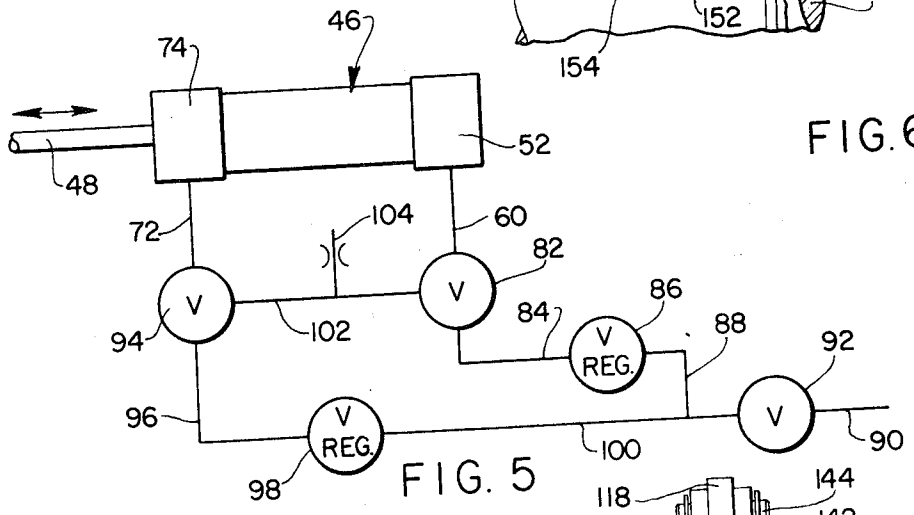


FIG. 5

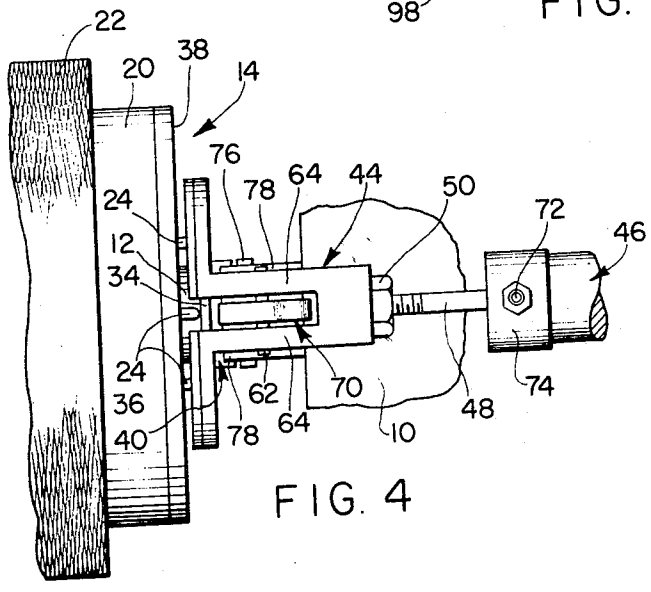


FIG. 4

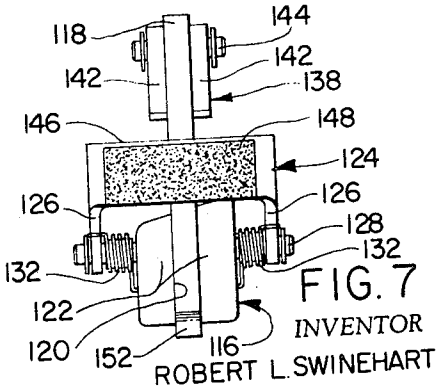


FIG. 7

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WINDING APPARATUS

This invention relates to a winding and, more particularly, to a rotary chuck winder.

It has been common practice to provide winder chucks with manually operated chuck brakes and other mechanism for operating the chuck to grip and release a package core. Such apparatus is often inconvenient to use and requires a degree of skill for proper operation.

It is, therefore, a primary object of this invention to provide a new and useful winder.

A more specific object is provision of a new and useful winder which is automatically operable for braking a rotating chuck and for operating the chuck to grip and release a package core.

The invention, in brief, is directed to a winder having a rotary chuck for releasably engaging a package core. Automatically operable mechanism brakes rotation of the chuck and releases the chuck from gripping engagement with the core. A manually operable valve system controls operation of a fluid motor of the mechanism for braking rotation of the chuck, releasing the chuck from gripping engagement with the core, and then positioning the mechanism out of engagement with the chuck for free rotation of the chuck.

Additional objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which:

FIG. 1 is a fragmentary, schematic side view of a winder with a chuck braking member and a chuck operating member in a neutral position, and with parts broken away and removed for clearer illustration;

FIG. 2 is a view similar to FIG. 1 but with the braking member in braking engagement with the chuck and the operating member out of engagement with the chuck;

FIG. 3 is a view similar to FIGS. 1 and 2, but with the braking member released from braking engagement with the chuck and the operating member in engagement with the chuck;

FIG. 4 is a fragmentary, schematic top view of the apparatus as shown in FIG. 1, with parts omitted for clearer illustration;

FIG. 5 is a diagram of a control system for the apparatus;

FIG. 6 is a fragmentary, schematic side view of another embodiment of a winder with braking and operating members in a neutral position, and with parts broken away and removed for clearer illustration; and

FIG. 7 is a fragmentary, schematic elevational view taken generally along the line 7—7 in FIG. 6, with parts omitted for clearer illustration.

Referring generally to FIGS. 1–4 of the drawings, a typical winder has a base 10 on which a spindle shaft 12 of a rotary chuck 14 is journalled. As may best be seen in FIG. 3, the chuck 14 has a plurality of axially disposed and radially spaced chuck members 16 mounted in supports 18 (only one shown) fixed to the spindle shaft 12 for releasably gripping the inner cylindrical surface of a core 20 which is telescoped onto the chuck 14 for winding a yarn package 22 thereon. The chuck members 16 are resiliently urged into gripping engagement with the core 20 by a suitable spring system (not shown), and are released from gripping engagement with the core 20 by movement to the left of actuating rods 24. These rods 24 are normally urged to the right by a spiral compression spring 26 telescoped on the spindle shaft 12 and seated between a collar 28 fixedly secured to the spindle shaft and a collar 30 telescoped on the spindle shaft and seated against suitable stops 32 on the rods 24. Ends of the rods 24 are seated against an annular actuating flange 34 of a sleeve 36 telescoped on the spindle shaft 12.

An annular braking surface 38 of the chuck 14 extends outwardly about the actuating rods 24, as shown in FIG. 1. As shown in FIG. 2, the chuck braking surface 38 is engaged by brake lining pads 40 on brake shoes 42 of a rigid braking member 44. A reversible fluid motor, here in the form of a double acting fluid operating cylinder 46 has the free end of its piston rod 48 fixed to the braking member 44 for adjustment generally axially of the longitudinal axis of the chuck 14 by means of a threaded connection and is retained in adjusted position by a lock nut 50.

A first or right end 52 of the cylinder 46 is pivotally connected by a pin 54 to an L-shaped bracket 56 which, in turn, is fixedly connected to the base 10 as by a pair of bolts 58. The right end 52 of the cylinder 46 has a passageway (not visible) communicating with a conduit 60 to a control system (FIG. 5) for passage of an operating fluid, preferably air, at a suitable pressure, for example 45 psi gauge, into the cylinder to move the piston rod 48 to the left. This forces the brake pads 40 into braking engagement (FIG. 2) with the brake surface 38 of the chuck 14. As the braking member 44 moves into its braking position, a pin 62 fixed to opposed legs 64 of the braking member moves into a generally axially extending notch 66 at the bottom of an elongated slot 68 in a chuck operating member 70 to hold the braking member 44 against radial movement on the chuck brake surface 38, which might otherwise occur because of the pivotal mounting of the right end of the cylinder 46 on the base 10.

After rotation of the chuck 14 has been stopped, the operating fluid may be shut-off and vented from the right end 52 of the cylinder 46. Operating fluid at a suitable pressure, for example 85 psi gauge, is passed from the control system (FIG. 5) through a conduit 72 communicating with a passageway (not visible) opening into a second or left end 74 of the cylinder 46, to retract the piston rod 48. This causes the pivot pin 62 on the braking member 44 to move upwardly through the elongated slot 68 toward the upper end of the operating member 70 which is pivoted intermediate its ends on a pin 76. In turn, pin 76 is seated between a pair of tabs 78 (FIG. 4) integral with the base 10 of the winder. The elongated slot 68 permits greater pivotal movement of the operating lever 70 with less axial movement of the braking member 44, to accommodate clearance limitations.

As the operating lever 70 is pivoted from the position shown in FIG. 2 to the position shown in FIG. 3, its lower end 80 engages the annular actuating flange 34 to move the actuating rods 24 of the chuck 14 to the left against the force of the compression spring 26, thereby releasing the chuck members 16 from gripping engagement with the core 20, whereupon the core and the yarn wound thereon may be slid off of the chuck 14. An empty core 20 may now be placed onto the chuck 14, the operating fluid shut-off and vented from the left end 74 of the cylinder 46, whereupon the braking member 44 and operating lever 70 are returned

toward their neutral position (FIG. 1) responsive to the force of the spring **26** urging the actuating rods **24** and thereby actuating flange **34** to the right. The vented operating fluid from the left end **74** of the cylinder **46** is passed to the right end **52** of the cylinder, as will be described next with reference to the valve system shown in FIG. **5**, to complete movement of the operating lever **70** to its neutral position without causing braking member **44** to engage the chuck braking surface **38**.

Referring to FIG. **5**, the control system includes a braking valve **82** which is a vented shut-off valve having its outlet connected through the conduit **60** with the right end **52** of the cylinder **46** and its inlet connected through a conduit **84** with a pressure regulating valve **86** which, in turn is connected through a conduit **88** with supply conduit **90** having a master shut-off valve **92**, so that the cylinder's right end **52** receives operating fluid at a pressure of about 45 psi gauge, for example. The left end **74** of the cylinder **46** has its conduit **72** connected with the outlet of a chuck operating valve **94**, which is also a vented shut-off valve. The valve **94** has its inlet connected through a conduit **96** with a pressure regulating valve **98** which, in turn, is connected through a conduit **100** with the supply conduit **90**, so that the cylinder's left end **74** receives operating fluid at a pressure of approximately 85 psi gauge, for example. The vents of the braking valve **82** and the operating valve **94** are interconnected by a conduit **102** having a restricted vent orifice **104**.

During normal winding both valves **82** and **94** are closed. To stop the chuck **14**, the braking valve **82** is opened for passage of operating fluid into the right end **52** of the operating cylinder **46**, thereby actuating the braking member **44** so that its pads **40** brakingly engage the brake surface **38** on the chuck, as previously described. At this time the vent of the braking valve **82** is closed. After the chuck **14** is stopped, the braking valve **82** may be shut, thereby opening its vent to pass the operating fluid into the vent conduit **102** and through the orifice **104** with no consequential effect on the left end **74** of the cylinder **46** for moving the piston rod.

The chuck operating valve **94** may now be opened to apply the higher operating pressure (85 psi) into the left end **74** of the cylinder **46**, thus completely releasing the brake member **44** from braking engagement with the chuck **14** and pivoting the lower end **80** of the operating lever **70** into engagement with the annular actuating flange **34** of the chuck, to release the chuck members **16** from gripping engagement with the core **20**, as previously described. The package **22** may now be doffed and an empty core **20** donned onto the chuck **14**.

When the operating valve **94** is shut it vents the operating fluid from the left end **74** of the cylinder **46** and into the conduit **102**. The chuck members **16** return to their gripping position as the compression spring **26** urges the actuating rods **24** and therefore the annular actuating flange **34** to the right, thus pivoting the operating lever **70** counterclockwise. However, the lower end **80** of the operating lever **70** would still be in engagement with the actuating flange **34** of the chuck. But, the operating fluid is vented through the vent conduit **102** from piston rod end of the cylinder to the unobstructed end **52** to move the piston rod **48** just slightly to the left, thus taking the lower end **80** of the operating lever **70** out of engagement with the actuating flange **34** of the chuck **14**. The restricted orifice **104** in the vent conduit **102** is sized so that insufficient pressure is applied through the braking valve vent to the right end **52** of the cylinder **46** to move the braking member pads **40** into engagement with the brake surface **38** of the chuck **14**.

Another apparatus for braking the chuck **14** and releasing the chuck members **16** from gripping engagement with a core **20** is shown in FIGS. **6** and **7**. Herein, a chuck **106** has a bushing **108** receiving an end of a core **110** which is releasably held on the chuck by chuck member (not shown), with rods **112** (only one shown) for releasing the chuck members, all as previously described. The chuck is mounted on a spindle shaft **114** journalled on a base **116** and an cylinder (not shown) is mounted on the base **116** and is operated by a control system as shown in FIG. **5**, all as previously described with reference to FIGS. **1–5**.

However, in the apparatus shown in FIGS. **6** and **7**, an operating member, again in the form of a lever **118**, is received in a notch **120** (FIG. **7**) in a boss **122** on the winder base **116**. A braking member **124** has a pair of depending and opposed mounting arms **126** embracing opposite sides of the boss **122**, and a pivot pin **128** extends through the arms **126**, the boss **122** and the operating lever **118**. Spacer sleeves are provided between each of the braking member arms **126** and the boss **122**, and torsion springs **132** are telescoped on the sleeves with opposite ends of each spring seated against the boss **122** and the braking member **124** for urging the braking member out of braking engagement with an annular braking surface **134** (FIG. **6**) of the chuck **106**.

A reversible fluid motor, again in the form of a double acting cylinder (not shown) as previously described, has its piston rod **136** adjustably connected with a U-shaped bracket **138** by a threaded connection and lock nut **140**, and this bracket has opposite legs **142** receiving the top end of the operating lever **118** therebetween, with a pivot pin **144** pivotally connecting the bracket and the lever. Upon applying operating fluid at a pressure of 45 psi gauge, for example, from the braking valve **82** of the control system, as described with reference to FIG. **5**, to the first or right end of the operating cylinder (not shown), the piston rod **136** is moved outwardly to pivot the operating lever **118** counterclockwise so that it engages a bight **146** of the braking member **124** to urge a brake lining pad **148** against the braking surface **134** of the chuck **106**, thereby stopping the chuck.

The braking valve **82** is now shut, thereby venting the right end of the cylinder. The operating valve **94** (FIG. **5**) may now be opened, thereby applying operating fluid at a pressure of 85 psi gauge, for example, to the second or left end of the cylinder to swing the operating lever **118** clockwise, thereby urging a lower end **150** of the lever into engagement with an annular actuating flange **152** on a sleeve **154** telescoped on a spindle shaft **114** of the chuck to urge actuating rods **112** to the left to release chuck members (not shown) from gripping engagement with a core, as previously described. During this operation, the torsion springs **132** move the braking member **124** out of braking engagement with

the chuck **106**. Upon shutting off the operating valve **94**, the operating fluid is vented from the left end of the cylinder into the right end of the cylinder for moving the lower end **150** of the operating lever **118** out of engagement with the actuating flange **152** of the chuck while maintaining the braking member **124** out of engagement with the chuck, as previously described.

While this invention has been described with reference to particular embodiments in a particular environment, various changes may be apparent to one skilled in the art and the invention is therefore not to be limited to such embodiments or environment except as set forth in the appended claims.

What is claimed is:

1. Apparatus for winding a strand to form a package comprising, a rotatable chuck for supporting a core on which said strand is wound, resilient means for urging said chuck to a gripping position to hold said core during rotation of the chuck, braking means operable to engage the chuck to stop rotation thereof, drive means operable to move said braking means to a first position to engage and brake said chuck to a stop and to a second position to release said braking means from engagement with said chuck, chuck releasing means movable in a first direction to engage said chuck to remove the chuck from said gripping position and movable in a second direction to disengage said chuck releasing means from said chuck, means on said drive means for moving said chuck releasing means in its first and second directions; and power means for operating said drive means to sequentially shift said braking means to said first position, move said chuck releasing means in said first direction while moving said braking means to said second position and thereafter shifting said chuck releasing means in said second direction.

2. Apparatus as set forth in claim **1** wherein said chuck releasing means comprises a lever having a slot therein, and a pivot for pivoting said lever into engagement with said chuck to release said chuck.

3. Apparatus as set forth in claim **2** wherein said means on said drive means comprises a cam follower slideably engaging said slot to move said braking means to said first and said second positions.

4. Apparatus as set forth in claim **3** wherein said drive means comprises a cylinder, a piston slidable relative to said cylinder and connected to said braking means, said power means comprising a source of operating fluid connected to the cylinder to operate said piston to move said braking means to said first and said second positions and said chuck releasing means in said first and said second directions.

5. Apparatus as set forth in claim **4** including valve means for controlling passage of said fluid to said cylinder to operate said braking means to move said braking means to said first and said second positions and to move said chuck releasing means in said first and said second directions.

6. Apparatus as set forth in claim **5** wherein said slot includes a portion arranged to receive said cam follower, said cam follower when arranged in said portion acting to position said braking means in a position intermediate said first and said second positions.

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