Dec. 13, 1966 R. V. TATA 3,291,407

WINDING MACHINE

Filed July 1, 1964

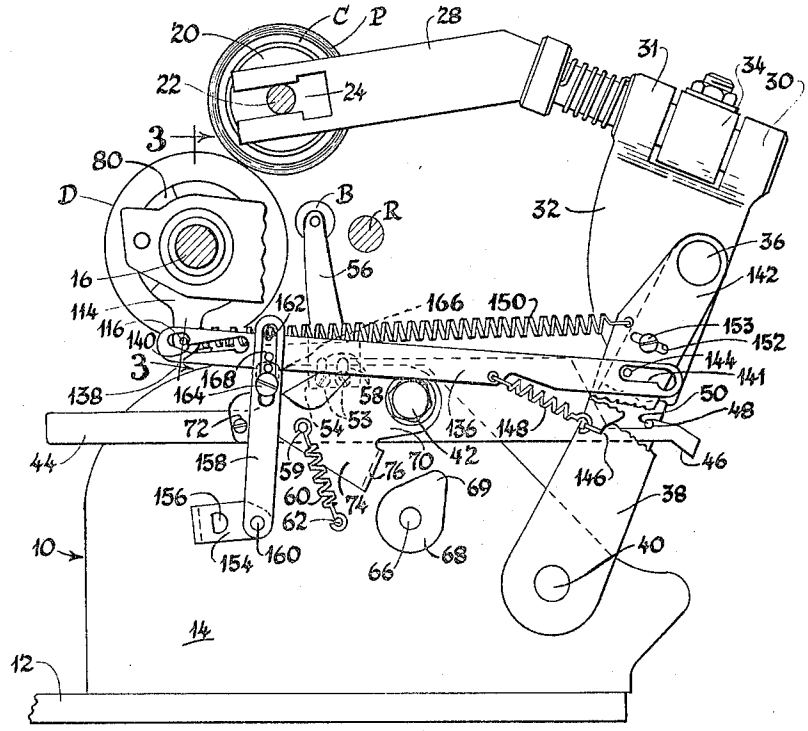

Fig. 1

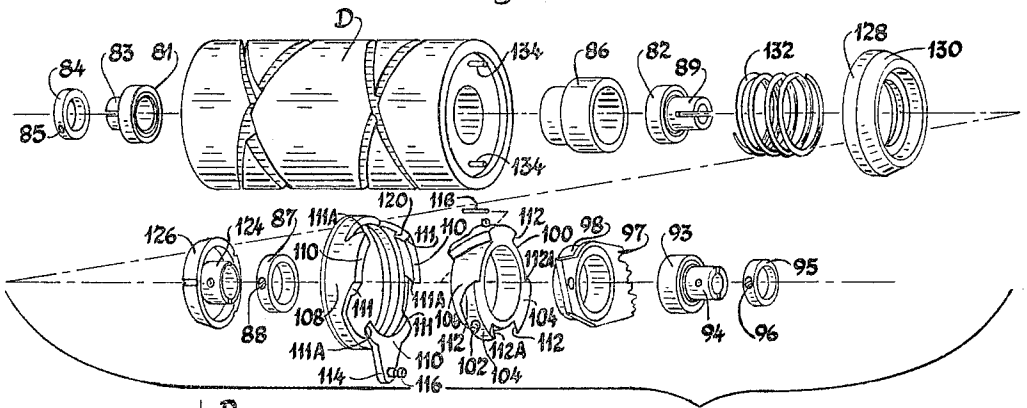

Fig. 2

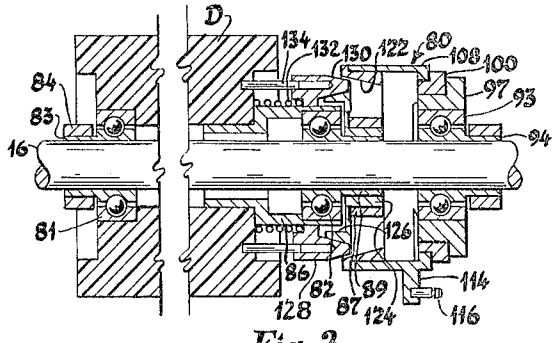

Fig. 3

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WINDING MACHINE

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The present invention relates to a winding machine for winding yarn or like strandular material into cops, cones, and other forms of packages and is concerned, more particularly, with mechanism for controlling the package rotating and yarn traversing means of the winding machine.

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 machine whatever its form.

In U.S. Patent 2,764,362 to Goodhue et al. entitled "Winding Machine" issued September 25, 1956 there is disclosed and claimed a fully automatic winding machine for winding yarn upon a rotating package wherein the package is rotated by frictional contact with a drive roll, the package being supported on an arm for movement to and from an operative position with the package laying in peripheral contact with said drive roll. U.S. Patent 3,081,046 to Barnes et al. entitled "Package Control Mechanism for Winding Machines," issued March 12, 1963 discloses and claims improvements in the winding and control section of the winding machine of the above-cited Goodhue et al. patent.

It is contemplated in the machine of U.S. Patent 2,764,362 that, during operation thereof, the winding package will be disposed in a normal winding position in peripheral contact with the drive roll. Further, it is contemplated that a main package support arm will be operable, when the supply of yarn to the package breaks or is otherwise interrupted, to remove the package from the drive roll to a braking position to allow the rotating package to be brought to a halt, and then to a reverse rotation position where the package is rotated in a direction opposite to that of normal winding to enable the free yarn end to be extricated from the convolutions of the package for reuniting with the supply yarn. After a dwell at the reverse roll position the main package support arm is moved in a direction to bring the package first to the braking position to halt its reverse rotation, at which time the package end is reunited with the supply end, and then to bring the package to its normal winding position in peripheral contact with the drive roll. In accordance with the improvements disclosed in U.S. Patent 3,081,046 the main package support arm is positively latched to maintain the package in contact with the drive roll, and means are provided to effect delatching of the arm upon interruption of the supply yarn.

During the sequence of steps just recited the drive roll rotates continuously at its normal speed. Thus, as the package is lifted off the drive roll the package is rotating at a rather high speed commensurate with the rotation imparted thereto by said drive roll. It follows that when the package is carried to the braking position it is brought to a rather abrupt stop by frictional engagement of the package surface against a stationary rest or braking member of the types described in the two prior cited patents. Moreover, when the package is transferred

from the braking position to the rotating drive roll after the yarn ends have been reunited the coils of yarn at and close to the surface of the package are again subjected to rather significant frictional forces as the package is abruptly rotated once again. The frictional forces resulting from the motions just related, acting on the outer layers of yarn on the package have been found to affect the yarn adversely. For example, if the yarn is of the synthetic type the heat generated by the friction may be sufficient to cause adjacent strands of yarn on the package to melt and unite together. Moreover, the ends of yarn on the package may be broken by the friction caused by abrupt starting and stopping of the yarn package as it is moved between the rotating drive roll and the adjacent braking member.

From the foregoing considerations, it will be apparent immediately that it is highly desirable for the drive roll to be brought to a stop with the package of yarn laying in peripheral contact therewith. The package of yarn can, thereupon, be transferred off the drive roll in a non-rotating condition. Furthermore, deceleration of the yarn package is in accordance with the deceleration of the drive roll so that no significant amount of slipping occurs as the yarn package is brought to a stop. Additionally, the yarn package can be returned to the non-rotating drive roll after the end-finding cycle is completed and the drive roll thereafter accelerated. The acceleration of the yarn package is thereupon, in accordance with the acceleration of the drive roll so that, here again, virtually no slippage occurs between the drive roll and package.

It is therefore one object of the present invention to provide a drive roll for rotating a package of yarn by peripheral contact therewith wherein said drive roll is stopped prior to removal of the package of yarn therefrom, and wherein said drive roll remains stopped until the package of yarn is returned to peripheral contact therewith for rotation thereby.

Another object of the present invention is to provide a winding machine having a package arm capable of limited movement to remove a package of yarn from an operative position in driving contact with the drive roll to an inoperative position away from contact with said drive roll, said winding machine having means for stopping the drive roll prior to removal of the yarn package therefrom and having means for rotating said drive roll after the yarn package has been placed in peripheral contact from said drive roll.

Yet, a further object of the present invention is to provide a winding machine having a rotatable drive roll, means being provided for rotating the drive roll when a package of yarn is placed in peripheral contact therewith and means for stopping the rotation of said drive roll prior to removal of the yarn package therefrom, and braking means for arresting rotation of the drive roll.

Still another object of the present invention is to provide a winding machine having a rotatable drive roll for rotating a yarn package by peripheral contact therewith, said drive roll having a positive driving connection therefor, and means for disengaging said positive driving connection to cease rotation of the drive roll prior to removal of the yarn package therefrom, and means for reengaging said positive driving connection after said yarn package has been returned into peripheral contact therewith.

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

The invention accordingly comprises the apparatus pos-

sessing 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 present invention, reference should be had to the following detailed description taken in connection with the accompanying drawing wherein:

FIG. 1 is a side elevational view of the control section of an automatic winding machine embodying the improvements of the present invention, the components of the section being shown in normal winding position;

FIG. 2 is an exploded view showing the components of the present invention and illustrating, for purposes of clarity, the drive roll and a portion of the machine frame for mounting certain of the components; and

FIG. 3 is a cross-sectional view taken generally along lines 3—3 of FIG. 1.

Before proceeding with the detailed description of the invention, it should perhaps be explained that the improvements of the present invention are confined essentially to the winding section of the winding machine of the prior cited U.S. Patent 2,764,362. As the other sections of the machine form no part of the invention, they will neither be described nor illustrated herein. Similarly, some of the elements normally forming a part of the winding section of the patented machine have no real relationship to the details of the invention and have likewise been omitted. Thus, for an over-all understanding of the complete operating machine, reference should be made to U.S. Patent 2,764,362 taken in conjunction with the improvements therein disclosed and claimed in U.S. Patent 3,081,046. It will be understood that the parts of the patented machines which are absent from this description in the accompanying drawings will ordinarily be present in a complete working machine and may be the same as shown and described in U.S. Patents 2,764,362 and 3,081,046.

Briefly, the present invention contemplates the provision of a winding machine having a rotatable drive roll, said drive roll being provided with oppositely disposed helical yarn receiving grooves, a supply yarn is adapted to be laid in the groove of the traverse roll and to be traversed axially to and fro in the grooves relative to the package to thereby distribute yarn along said package. The package is supported on a movable arm which is controlled by means fully disclosed in U.S. Patent 3,081,046, said arm being mounted for pivotal movement on one side of the control section of the machine and adjacent to the rear end thereof, the arm being moved by cam control means. The arm is normally movable between a normal winding position through a braking position and then to a reverse rotation position where the package is rotated in an opposite direction. At the completion of the operations to the package at the reverse rotation position the arm is actuated to advance the package in the course of its returning movement to the drive roll being carried through said braking position to arrest the reverse rotation of the drive roll preliminary to its being deposited in peripheral contact with the traverse roll. In accordance with the present invention, the package need not dwell at the braking position as it travels from its winding position to the reverse rotation position because the package has already assumed a halted or non-rotative condition prior to removal from the drive roll. However, it is intended that, as the package moves from the reverse rotation position back to the drive roll, the brake means will be employed to stop the reverse rotation of the package imparted by the reverse roll.

Turning now to a detailed description of the drawing with initial reference to FIG. 1, the numeral **10** designates a U-shaped frame of the control section of the winding machine, which frame comprises a generally rectangular base **12** and a pair of sidewalls upstanding from the opposite side edges of the base, one of the sidewalls being indicated at **14**. A package drive roll D is arranged on a horizontal shaft **16** which extends longitudinally of the gang and is driven through a clutch mechanism, to be described in detail hereafter, by power transmission means in the end casing of the machine, such power means not being illustrated herein. As seen in FIG. 1, package drive roll D is located above the front section of frame **10**. A reverse roll R is located rearwardly of drive roll D, on support means yet to be described, and a braking member B is arranged between rolls D and R. The support means for roll R has not been illustrated but it will be appreciated that suitable bearing means would be provided to mount said reverse roll for rotation in a sense opposite to the rotative direction of drive roll D.

As illustrated, the machine is set up to wind a conical package or cop P upon a conical tapered tabular core C held on a winding mandrel or cop holder **20**, which is likewise conical, although other shapes of mandrels and tubes could be substituted. Winding mandrel **20** is rotatably mounted on a winding spindle (not visible in the drawing) which is, in turn, supported on a transversely extending arm **22** capable of pivotal movement at its end about a substantially vertical axis. The inner end of this arm is fitted within a socket **24** provided for that purpose at the free outer end of an extension arm **28** disposed in approximate vertical alignment with frame side **14**. The end of extension arm **28** remote from socket **24** is rotatably held in spaced apart bearings **30, 31** formed as an integral part of an irregularly shaped joint member **32**. A clamp collar **34** is provided to clamp said remote end of the arm between bearings **30, 31**. At its lower end, the member **32** is pivoted on a stud shaft **36** extending horizontally and inwardly of the upper end of a massively constructed elongated link or "main package support arm" **38**. It will be seen that, in effect, joint member **32** functions as a kind of universal joint permitting package extension arm **28** to pivot with respect to both the horizontal axis of stud shaft **36** and upwardly and forwardly inclined to the axis of the bearing **30**, whereby the winding spindle and mandrel can swing upwardly as a unit about shaft **36** away from drive roll D as well as to pivot backwardly and forwardly with respect to the socket **24** and to cant upwardly with respect to bearing **30**. In this way, the winding spindle is adapted to recede from the drive roll in a manner suitable for building of a conically shaped package.

Main package support arm **38** is pivoted at its lower end adjacent the upper rear corner of frame side **14** on the exterior end of a shaft **40** extending transversely the full width of frame **10** and journalled in suitable bearings in the frame sides. Located adjacent the upper edge of frame side **14** intermediate the ends thereof is an outwardly projecting stud **42** on which is pivoted an elongated plate or positioning latch **44** extending parallel to side **14** and adjacent the inside face of arm **38**. At its extreme rear end positioning latch **44** terminates in a tail **46**. Slightly forward of tail **46**, the upper edge of positioning latch **44** is formed with a shoulder **48** adapted to be engaged by a pin **50** rigidly embedded in main package support arm **38** at a point thereon intermediate stud shaft **36** and shaft **40**.

The portion of positioning latch **44** forwardly of pivot stud **42**, i.e., to the left of stud **42** in FIG. 1, is provided with two spaced-apart clamping bolts **53** which engage and clamp the foot portion **54** of a generally upwardly projecting support arm **56**, the lower edge of foot portion **54** being correspondingly slotted, as at **58**, to slip over bolts **53** when loosened. The free upper end of support arm **56** rigidly holds one end of package braking member B. Below the front end of the foot portion **54** of the braking member support, the positioning latch **44** has a post **59** embedded therein which is connected with one end of a tension spring **60**. The other end of spring **60** is fastened to a post **62** projecting laterally from the out-

side of frame side 14. As seen in FIG. 1, spring 60 exerts constant counterclockwise bias on positioning latch 44 to urge the rear end thereof upwardly into engagement with pin 50 on main package support arm 38.

From the mechanism thus far described it will be appreciated that, assuming the components to be in their normal operating position as shown in FIG. 1 with shoulder 48 on positioning latch 44 engaged with pin 50 on main package support arm 38 to hold the arm in a forward position with package P in frictional contact with drive roll D, and assuming drive roll D to be rotating, supply yarn directed over the drive roll D will be wound on core C to build package P.

When the supply yarn to drive roll D is interrupted instrumentalities are operated to disengage shoulder 48 from pin 50, thereby releasing package arm 38 for rearward pivotal movement. In the disclosed embodiment these motions are accomplished in the following manner. There is provided a main control shaft 66 of the type fully described in the earlier cited U.S. Patent 3,081,046, rotatable on bearings supported in side walls 14. Main control shaft 66 protrudes outwardly beyond the end of side wall 14 and has a peripheral cam 68 affixed on this exterior part of the shaft for rotation therewith. Cam 68 is formed to have a lobe 69 radially protruding therefrom for purposes to become clear shortly.

Positioning latch 44 has a rather irregularly shaped member 70 fastened thereon, said latch being suitably pierced through to slide over post 59. One end of member 70 is secured against the side of positioning latch 44 by means of stud 42. The opposite end of member 70 is bored through to receive a screw 72 which threadedly engages in the side of positioning latch 44. The lower edge of member 70 has a rearwardly and downwardly inclined leg 74, the outermost end of which is folded to provide an ear or anvil 76 which lays in the rotary path of movement of cam lobe 69 to be actuated thereby. Thus, it will be seen that as main control shaft 66 is rotated by means described in U.S. Patent 3,081,046 cam lobe 69 strikes anvil 76 to drive the forward end of positioning latch upwardly, thereby rocking the latch clockwise about pivot stud 42, as viewed in FIG. 1, to release pin 50 from shoulder 48 and allow package P to fall backwardly off drive roll D under the control of package arm 38.

As has already been stated in the introduction, it is highly desirable that the drive roll D be stopped from rotating before package P is removed therefrom and that the drive roll be maintained in a stopped position until the package is once again returned to peripheral contact with the drive roll. To this end a clutching-braking mechanism, generally indicated at 80, is provided for controlling the drive from shaft 16 to drive roll D. Viewing FIG. 3, it will be seen that drive roll D is not mounted directly on shaft 16, but, rather, is supported on a pair of anti-friction bearings 81, 82 fitted on shaft 16. Anti-friction bearing 81 is pressed into the left-hand end of the central bore of the drive roll (see FIG. 3), said anti-friction bearing 81 being provided with split elongated shank 83. A collar 84 having a set screw 85 threadedly engaged in its side engages tightly on the outside diameter of shank 83, set screw 85 being drawn against shank 83 to secure bearing 81 fast on shaft 16. At the opposite or right-hand end of the drive roll a stepped bushing 86 is pressed into the bore of drive roll D and protrudes outwardly therefrom in spaced apart relationship to shaft 16. Anti-friction bearing 82 is press-fitted into the outer enlarged end of bushing 86. A collar 87 having a binding screw 88 therein acting through an additional component yet to be described encircles the shank 89 of bearing 82 and exerts a force thereon to thereby fix said bearing 82 fast on said shaft 16.

As has already been mentioned, shaft 16 extends the full length of the gang machine and in order that the shaft may be arranged for rotation it is supported on a series of aligned, spaced apart anti-friction bearings, one of which is illustrated at 93, provided with a split shank 94, a clamp ring 95 engages about shank 94 with a screw 96 threaded therein to bind on said shank and hold bearing 93 in position. Said bearings 93, in turn, are seated in suitable, aligned bores through each of a series of horizontal frame sections, one of which is illustrated at 97. These frame sections 97 are spaced along the full length of the machine and supported from base 12 on ribs which, for clarity, has been omitted from the views herein.

Frame section 97 has a hub 98 formed integrally therewith. An annular member 100 is fastened to said hub by a plurality of set screws 102 which enter in a radial path through member 100 and bear on hub 98. As best seen in FIG. 2 annular member 100 has a plurality of lugs 104 disposed equidistantly around and upstanding from the rather wide periphery 106 thereof. A shell-like control member 108 is slidably supported on annular member 100 by means of a plurality of dogs or teeth 110 formed in one rim of said member 108 and projecting laterally to overlay and loosely engage periphery 106. Each tooth 110 has a pair of inclined camming surfaces 111, 111A along its opposite forward and rearward edges which are communicable with companion guide surfaces 112, 112A, respectively, on the forward and rearward edges of each lug 104. A lever 114 depends from control member 108 and has a pin 116 embedded in the side thereof to afford means for rotating control member 108 relative to annular member 100. Surfaces 112, 112A are helical relative the axis of annular member 100, and surfaces 111, 111A are helically disposed relative to the axis of member 108. Thus, it will be apparent that if finger 114 is rocked counterclockwise (FIG. 1) control member 108 will shift laterally away from annular member 100 by virtue of the camming action of camming surfaces 112 cooperating with surfaces 111 to guide the control member 108 axially of shaft 16 and to the left as viewed in FIG. 3. Similarly, it will be appreciated that clockwise motion of finger 114, viewing FIG. 1, will urge cam surface 111A of each tooth 110 into engagement with its companion surface 112A of lug 104 until control member 108 lays closely beside annular member 100 as shown in FIG. 3. A roll pin 118 is fixed in the side of annular member 100 and protrudes laterally therefrom to engage against a shoulder 120 formed in the side of an adjacent one of the teeth 110 of control member 108, the roll pin 118 thus acting to limit the extent of disengagement of teeth 110 with lugs 104 by controlling the limits of counterclockwise rotation of control member 108. As best seen in FIG. 3 the side of control member 108 remote from teeth 110 has a tapered metal brake ring 122 pressed tightly therein. The purpose of brake ring 122 will be explained hereafter.

It has already been related that shank 89 of bearing 82 is fast on shaft 16. The outer diameter of shank 89 has the split sleeve 124 of a driving clutch member 126 secured tightly thereon. Collar 87 fits on sleeve 124 and binding screw 88 bears tightly on the periphery of said sleeve to secure the sleeve to shank 89 and, in turn, to bind shank 89 to shaft 16. A mating driven clutch member 128 is slidably supported on bushing 86 in position to engage with and be driven by clutch member 126. The outer diameter of clutch member 128 is tapered or inclined at 130 to afford a surface for receiving the tapered surface of brake ring 122 when control member 108 is shifted laterally away from annular member 100. A spring 132 surrounds shaft 16 and is compressed between one side of drive roll D and a wall of clutch member 128 and acts to bias this last mentioned clutch member into driving engagement with clutch member 126. Clutch member 128 is connected with drive roll D by means of a pair of driving pins 134 which are fixed at diametrical points in the side of said drive roll and

which extend to slidably seat in suitable blind holes in the clutch member.

It will be recalled that control member **108** has been described as provided with a lever **114** and pin **116**. A bar **136** is supported at its forward end on pin **116**, the pin passing through an elongated slot **138** in the forward section of the bar. A shoulder **140** is formed in the wall of slot **138** for normally seating pin **116**. A plate **142** is carried on stud shaft **36** outwardly of arm **38** and lays against the side of said arm. Said plate **142** extends downwardly therefrom and terminates approximately midway along the length of arm **38**. A stud **144** is fastened into the side of plate **142** and projects laterally therefrom through slot **141**. Bar **136** is thus disposed in a generally horizontal position parallel to main latch **44**. The lower terminal end of plate **142** is folded to form an ear **146** adapted to receive one end of an extension spring **148**. The opposite end of spring **148** is engaged in the lower edge of the central region of bar **136** and thereby urges this bar downwardly and rearwardly toward arm **38**. Plate **142** also serves as the fastening means for one end of an elongated spring **150**. The opposite end of spring **150** is connected to pin **116** to thereby bias finger **114** and pin **116** in a counterclockwise direction as viewed in FIG. 1. An arcuate, extended slot **152** is formed in the side of plate **142**. A clamping screw **153** projects through slot **152** and holds the plate **142** snugly in place against arm **38**, the slot affording limited pivotal movement of plate **142** relative to arm **38** to thereby permit adjustment of stud **144**.

Pin **116** has been described as normally seated against a shoulder **140** in slot **138** of bar **136**. This position is assumed by the pin **116** when drive roll D is operative to rotate package P as shown in FIG. 1. In order to release the drive from shaft **16** to drive roll D it is necessary that pin **116** be disengaged from shoulder **140**. To this end a crank **154** is fixed to the exterior end of a shaft **156**. A vertically arranged link **158** is connected at its lower end by means of a pivot pin **160** to crank **154**. The upper end of link **158** is slotted at **162** to slidably accommodate a cap screw **164** therein. Cap screw **164** is threadedly engaged in the side of a tab **166**. A pin **168** extends out from the side of bar **136** through slot **162** upwardly of tab **166**. It will thus be seen that rocking motion of shaft **156** in a counterclockwise direction (FIG. 1) will raise link **158** thereby causing tab **166** to push pin **168** to elevate bar **136**. In consequence thereof shoulder **140** is lifted from behind pin **116** permitting spring **150** to rock finger **114** and control member **108** rearwardly or counterclockwise as viewed in FIG. 1.

It will be understood that when the winding machine is set to actively wind yarn pin **116** is engaged with shoulder **140** to locate lever **114** in its forward position and arm **38** is likewise in its forward position, all as shown in FIG. 1. As earlier explained, with lever **114** so positioned control member **108** will be pulled into engagement with annular member **100**, thereby displacing brake ring **122** from surface **130** of clutch member **128** and permitting spring **132** to bias said clutch member **128** into engagement with its mating clutch member **126** all as shown in FIG. 3. Since clutch member **126** is mounted for rotation with the constantly rotating shaft **16**, the drive will thereby be transmitted through clutch member **128** and pins **134** to rotate drive roll D. With core C in peripheral contact with drive roll D yarn is delivered from a supply source to the core while being engaged in the grooves of drive roll D so that the yarn during delivery, is traversed to and fro of the core C to build package P. As explained in the Barnes et al. patent, earlier cited, when the yarn flowing from the supply source to the package is interrupted instrumentalities within control section **10** are actuated to actuate shafts **66** and **156**. Thus, shaft **66** is rotated through one full revolution as an incident of the yarn end-finding cycle while shaft **156** is rocked partially around its axis, both the rotating motion of shaft **66** and the rocking motion of shaft **156** being in a counterclockwise direction as viewed in FIG. 1. These motions are advantageously utilized to operate the clutching-braking mechanism **80** of the instant invention in the following manner.

In the event the yarn breaks to institute an end-finding cycle, shafts **66** and **156** move counterclockwise, as just described. In consequence of rocking of shaft **156**, link **158** is driven upward. This causes tab **166** to contact pin **168** thereby raising the forward end of bar **136** to lift shoulder **140** out of its restraining position behind pin **116**. Spring **150** thereupon is operable to pull lever **114** to the rear or counterclockwise (FIG. 1). This results in control member **108** shifting laterally away from fixed annular member **100** as cam surfaces **111** of the control member slide over guide surface **112** of the annular member. Viewing FIG. 3, it will be seen that the lateral or leftward movement of control member **108** away from annular member **100** will cause brake ring **122** to engage against surface **130** and push driven clutch member **128** out of contact with its mating driving clutch member **126**. Advantageously brake ring **122** also serves to rapidly brake or halt the rotation of clutch member **128** and, consequently, drive roll D. Hence, substantially contemporaneously with the disengagement of members **126** and **128**, package P is brought to a stop. It will be appreciated that the disengagement of clutch members **126** and **128** and the braking of member **128** are achieved in a very short span of time. During the time consumed by the foregoing motions to disengage the drive to drive roll D and to halt rotation of said drive roll cam **68** is rotated to bring lobe **69** into engagement with anvil **76**. Continued rotation of cam **68** causes positioning latch **44** to be rocked clockwise about stud **42** thereby releasing pin **50** from shoulder **48**, the pin **50** being deposited on the upper end of tail **46**. In consequence thereof arm **38** is released to fall rearwardly or clockwise about shaft **40** (FIG. 1), the package passing over braking member B and coming to rest on reverse roll R for the end-finding operation as described in the cited patent. Rearward movement of arm **38** causes bar **136** to shift to the rear or right as viewed in FIG. 1 under the force of spring **148** whereby the side walls of slot **138** slide past pin **116** which, as has already been stated, has assumed a rearward position disengaged from shoulder **140**. In response to the rearward shifting of bar **136** as just described shoulder **140** again seats behind and engages pin **116**, spring **148** acting to pull bar **136** downward to insure engagement of said shoulder **140** behind pin **116**. This reengagement of pin **116** with shoulder **140** occurs as follows. At approximately the point where arm **38** has fallen rearwardly sufficiently to place the axis of package P directly over braking member B bar **136** is moved rearwardly to a point where shoulder **140** engages pin **116**. Further rearward movement of arm **38** causes pin **116** to contact the forward edge of slot **138**. At this time further rearward movement of bar **136** is prevented. Thus, stud **144** slides along slot **141** as spring **148** is extended. Thereafter, when main package arm **38** moves to return package P to drive roll D, as described in U.S. Patent 3,081,046, stud **144** is advanced along slot **141**, eventually contacting the forward edge thereof to move bar **136** forwardly whereby to engage shoulder **140** with pin **116** to move lever **114** clockwise (FIG. 1) to rock control member **108** into tight engagement with annular member **100**. This motion releases brake ring **122** from contact with surface **130** whereupon clutch member **128** is thrust into engagement with clutch member **126** under the biasing force of spring **132** to reinstitute the drive from shaft **16** to drive roll D. The winding unit is thus arranged once again to rotate package P to wind yarn thereon. In the course of the forward movement of arm **38** to return package P to peripheral engagement with drive roll D, pin **50** rides forwardly along the upper edge of tail **46**

and, in so doing, rocks positioning latch **44** clockwise about stud **42** whereby brake B is held in an elevated position aligned to engage package P during its forward movement and arrest the rotation of the package. Thus, package P is in a non-rotating condition as it is brought into contact with drive roll D. As pin drops into engagement with shoulder **48**, brake B is lowered to its inactive position as shown in FIG. 1. Adjustment of the position of stud **144** is achieved by rocking plate **142** on shaft **36** and locking the plate in position with screw **153** to thereby control the motion of lever **114** to the end that package P will be in peripheral contact with drive roll D prior to the release of ring **122** from surface **130** of clutch member **128**.

Since certain changes may be made in the above 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 only and not in a limiting sense.

What is claimed is:

1. A winding machine for winding supply yarn onto a rotating package comprising, a rotatable drive roll, an arm for supporting said package, said arm being adapted for movement between an operative position with said package in driving contact with said roll to rotate the package and wind the supply yarn thereon and an inoperative position with said package removed from driving contact with said drive roll upon interruption of the supply yarn, drive means for rotating said roll, connecting means arranged to normally engage said roll with said drive means, a control member movable between a retracted position spaced apart from said connecting means and a projected position engaging said connecting means to thereby disengage said roll from said drive means, a spring for biasing said control member to its projected position, detent means adapted to yieldably hold said control member in its retracted position when supply yarn is being wound on said package, trip means operable in response to an interruption in the supply yarn to trip said detent means and release said control member for movement to said projected position, and cam means operative to initiate movement of said arm to its inoperative position when said control means is in its projected position.

2. A winding machine for winding yarn onto a rotating package comprising, a rotatable drive roll, an arm for supporting said package, said arm being adapted for movement between an operative position with said package in driving contact with said roll to rotate the package and wind the supply yarn thereon and an inoperative position with said package removed from driving contact with said roll upon interruption of the supply yarn, drive means for rotating said roll, connecting means arranged to normally engage said roll with said drive means, a control member movable between a retracted position spaced apart from said connecting means and a projected position engaging said connection means to thereby disengage said roll from said drive means, a spring for biasing said control member to its projected position, detent means adapted to yieldably hold said control member in said retracted position when supply yarn is being wound on said package, trip means operable in response to an interruption in the supply yarn to trip said detent means and release said control member for movement to said projected position, brake means connected with said control member to arrest rotation of said drive roll when said control member moves to its projected position, and cam means operative to initiate movement of said arm to its inoperative position when said control means is in its projected position.

3. A winding machine for winding yarn from a supply onto a rotating package comprising, a rotatable drive roll, an arm for supporting said package, said arm being adapted for movement between an operative position with said package in driving contact with said roll to rotate the package and wind yarn thereon and an inoperative position with said package separated from said roll upon interruption of the supply yarn, a drive shaft for rotating said roll, a first clutch member slidably connected with said drive roll, a second member secured to said shaft and arranged to engage with said first clutch member to rotate said roll, an annular member, a control member supported on said annular member for axial movement relative thereto between a retracted position spaced apart from said first clutch member and a projected position biasing said first clutch member away from engagement with said second clutch member, a latch for holding said arm in its operative position, an elongated bar connected between said control member and said arm, said bar having detent means to engage and maintain said control member in its retracted position when said arm is in its operative position, a link operable to disengage said detent means to permit said control member to move it to said projected position upon an interruption in the supply yarn, and a cam for disengaging said latch to permit said arm to move to its said inoperative position and when said control member moves to its projected position.

4. A winding machine for winding yarn from a supply onto a rotating package comprising, a rotatable drive roll, an arm for supporting said package, said arm being adapted for movement between an operative position with said package in driving contact with said roll to rotate the package and wind yarn thereon and an inoperative position with said package separated from said roll upon interruption of the supply yarn, a drive shaft for rotating said drive roll, a first clutch member slidably connected with said drive roll, a second clutch member secured to said drive shaft and arranged to engage with said first clutch member to rotate said roll, an annular member, a control member supported on said annular member for axial movement relative thereto between a retracted position spaced apart from said first clutch member and a projected position biasing said first clutch member away from engagement with said second clutch member, a latch for holding said arm in its inoperative position, an elongated bar connected between said control member and said arm, said bar having detent means to engage and maintain said control member in its retracted position when said arm is in its operative position, a link operable to disengage said detent means to permit said control member to move to said projected position upon an interruption in the supply yarn, brake means connected with said control member to arrest rotation of said drive roll when said control member moves to its projected position, and a cam for disengaging said latch to permit said arm to move to its inoperative position when said control member moves to its projected position.

5. A winding machine for winding yarn from a supply onto a rotating package comprising, a rotatable drive roll, an arm for supporting said package, said arm being adapted for movement between an operative position with said package in driving contact with said roll to rotate the package and wind yarn thereon and an inoperative position with said package separated from said roll upon interruption of the supply yarn, a drive shaft for rotating said roll, a first clutch member slidably connected with said drive roll, a second clutch member secured to said drive shaft and arranged to engage with said first clutch member to rotate said roll, an annular member, a control member supported on said annular member for axial movement relative thereto between a retracted position spaced apart from said first clutch member and a projected position biasing said first clutch member away from engagement with said second clutch member, a latch for holding said arm in its operative position, an elongated bar connected between said control member and said arm, said bar having detent means to engage and maintain said control member in its retracted position when said arm is in its operative position, a link operable to disengage said detent means to permit said control

member to move to said projected position upon an interruption in the supply yarn, a cam for disengaging said latch to permit said arm to move to its inoperative position when said control member moves to its projected position, and means associated with said arm to reengage said detent means with said control member when said arm moves to its inoperative position to thereby return said control member to its retracted position when said arm recycles to its operative position.

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