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2,870,971

WINDING MACHINE AND METHOD OF DOFFING AND THREAD-IN

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3 Sheets-Sheet 1

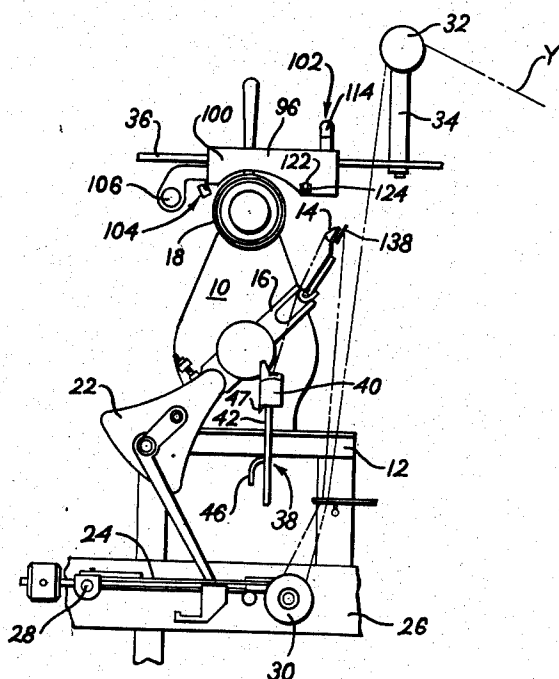


Fig. 1

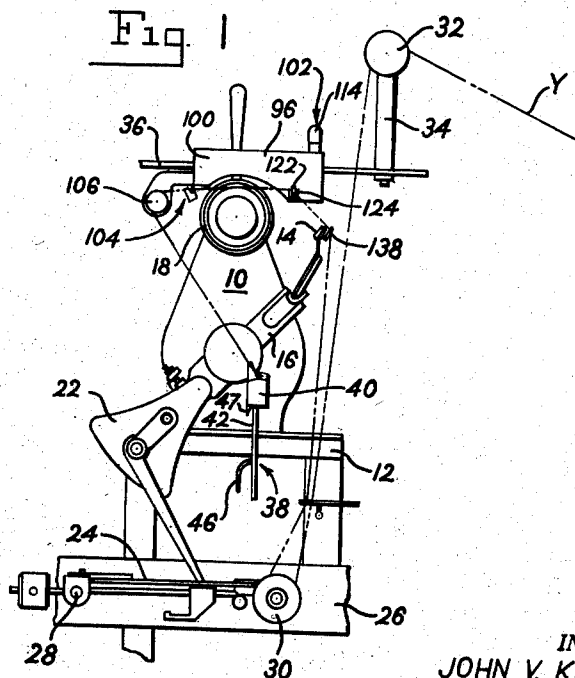


Fig. 2

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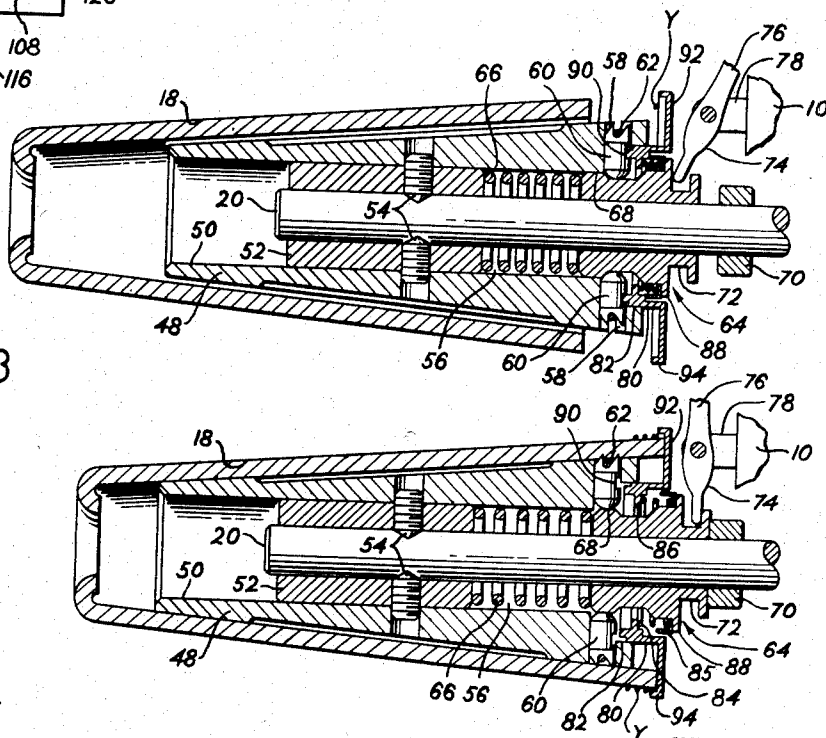
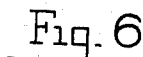
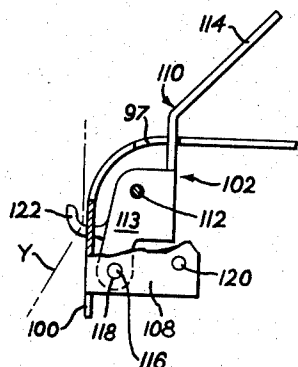
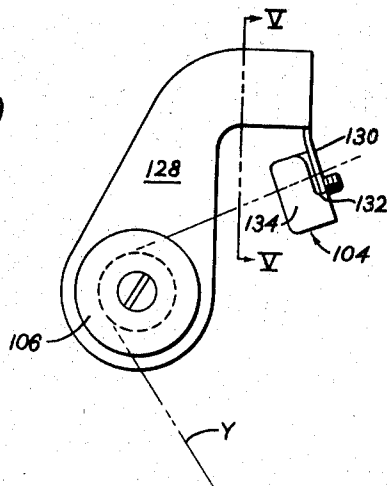
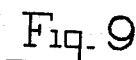
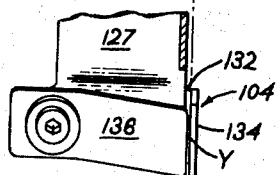
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WINDING MACHINE AND METHOD OF DOFFING AND THREAD-IN

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3 Sheets-Sheet 2



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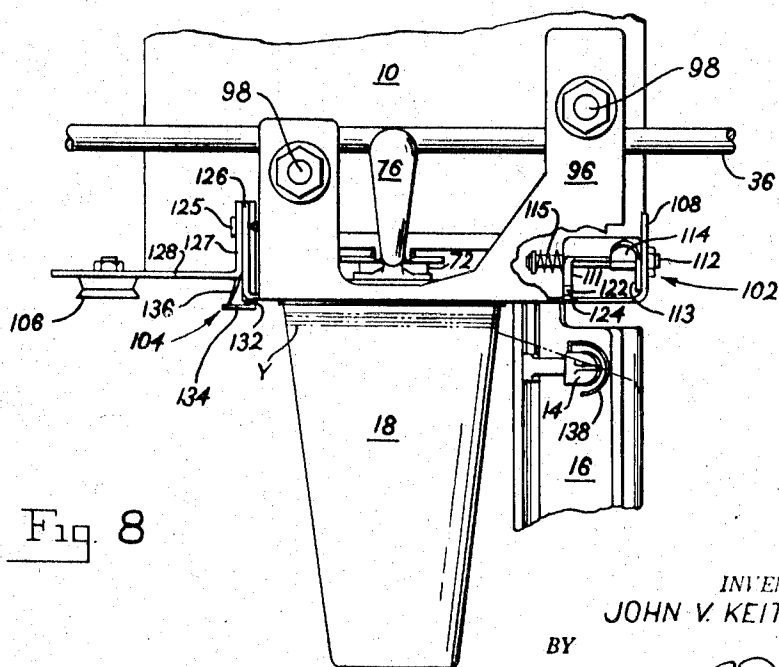
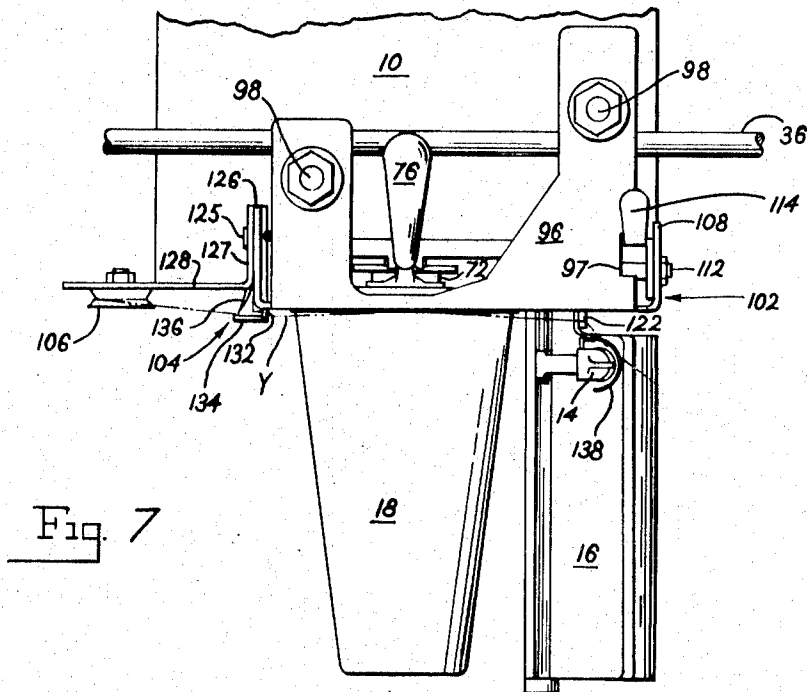
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WINDING MACHINE AND METHOD OF DOFFING AND THREAD-IN

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3 Sheets-Sheet 3



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2,870,971

WINDING MACHINE AND METHOD OF DOFFING AND THREAD-IN

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Application January 15, 1953, Serial No. 331,358

4 Claims. (Cl. 242—18)

The present invention relates to a machine for winding yarn and more particularly relates to such a machine incorporating means for initiating the winding of a continuously advancing strand of yarn.

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

In the manufacture of yarn and more particularly in the manufacture of synthetic yarn the output of the spinning machine is a strand of yarn which is continuously advancing at a high rate of speed. One of the problems of synthetic yarn manufacture is to catch this running strand of yarn, secure it to the spindle of a winding machine that is to serve as the takeup of the strand, and place the winding machine in operation to wind the strand at the same rate that it is advanced by the spinning machine all while the strand is continuously running or advancing. All of this must be accomplished without permitting any slack or excess yarn to accumulate between the winding machine spindle and the spinning machine.

It is also desirable in winding the output of the synthetic yarn spinning machine into a package to precede the winding of the package by winding a few turns of yarn on the base of the core upon which the package is to be wound to form a transfer tail to permit the trailing end of the yarn on one package to be tied to the leading end of the yarn on a second package, in a manner well-known in the art, so that the yarn can be supplied to subsequent operations without interruptions due to the exhaustion of the supply package.

Heretofore the threading of the takeup winder employed with synthetic yarn spinning machines, and the winding of transfer tails prior to winding the takeup package has been very difficult to accomplish, has required great dexterity and skill by the takeup machine operator and has resulted in considerable waste yarn on every occasion when the threading up operation was improperly performed.

It is accordingly one object of the present invention to provide a winding machine having means for securing a continuously advancing strand of yarn to the spindle thereof.

Another object of the present invention is to provide a winding machine having means for automatically securing a continuously advancing strand of yarn to the spindle thereof.

Another object of the present invention is to provide a winding machine having means for attaching a continuously advancing strand of yarn to the spindle thereof

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and having means for winding a transfer tail prior to winding a package on said spindle.

Another object of the present invention is to provide a winding machine having means for attaching a continuously advancing strand of yarn to the spindle thereof, severing the waste end of said strand adjacent said spindle and winding a transfer tail prior to winding a package on said spindle.

Another object of the present invention is to provide a winding machine for winding a continuously advancing strand of yarn and having means for severing the yarn and disposing of the continuously advancing strand to permit doffing said winding machine upon the completion of winding a package thereon.

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 description taken in connection with the accompanying drawings wherein:

Figure 1 is a front elevation of a winding machine incorporating the present invention after a full package has been removed therefrom and before the running strand of yarn has been positioned to commence winding of a new package;

Fig. 2 is a view similar to Fig. 1 but showing the running strand of yarn positioned to commence winding of a new package;

Fig. 3 is a sectional view showing the spindle of the winding machine and the package holder thereon immediately prior to the release of said package holder to grip a package core;

Fig. 4 is a view similar to Fig. 3 but showing the package holder gripping the package core;

Fig. 5 is a fragmentary side view taken on the line V—V of Fig. 9 showing the mechanism for cutting the waste end of the strand of yarn;

Fig. 6 is a fragmentary view with parts broken away showing the mechanism for winding a transfer tail;

Fig. 7 is a fragmentary plan view of the winding machine showing the position of the running strand of yarn and the relation of the various parts at the instant said running strand is secured to the winding spindle;

Fig. 8 is a view similar to Fig. 7 but showing the winding machine of the present invention after the winding of the transfer tail has been completed; and

Fig. 9 illustrates the yarn cutting mechanism and guide wheel.

The present invention comprises a winding machine of the type described in United States Patent 2,608,355, issued August 26, 1952, to Charles C. Bell et al. provided with a mechanism for continuously disposing of a running strand of yarn prior to its being attached to the spindle of the winding machine. The winding machine of the present invention is also provided with means for guiding the running strand of yarn adjacent one end of a quick acting package holder carried by the winding spindle to make it possible for said running strand to be pinched between said package holder and the package support to thereby secure said strand to the winding spindle. One portion of the strand guiding means insures the passage of the strand of yarn to a yarn cutting or severing device which is adapted to cut the waste end of the running strand upon said strand being secured to the winding spindle. Another element of the guiding means functions to guide the running strand of yarn onto the

base of the package support to wind a transfer tail thereon and which is manipulatable to release the strand of yarn to permit the yarn traversing mechanism of the winding machine to build a package of yarn adjacent said transfer tail.

The drawing discloses one unit of a gang or multiple head winding machine of the type described and claimed in the above mentioned United States Patent 2,608,355 equipped with the mechanism of the present invention for attaching a running strand of yarn to the winding spindle thereof and for winding a transfer tail prior to winding a package of yarn. Inasmuch as the winding unit per se is completely disclosed in said United States Patent 2,608,355, only so much of it as is necessary for a complete understanding of the present invention will be described herein.

The winding unit comprises a housing member 10 adapted to be mounted on a table or base 12 and provided with suitable bearings for the various rotating elements. Housing member 10 contains a cam member, not shown but which may be of any usual construction well known to those versed in the art, for reciprocating a yarn guide 14 carried by traverse frame 16. Traverse frame 16 is pivotally mounted on housing member 10 in the manner common to precision winding machines whereby yarn guide 14 is adapted to reciprocate along the length of a package core 18, rotatably carried by spindle 20, to lay yarn Y on said core in a precision wind, and to be moved away from said core 18 as the yarn Y builds up thereon. Traverse frame 16 carries a counter-balancing weight 22 on the opposite side of its pivotal connection to housing member 10 for the purpose of continuously urging guide 14 against package core 18 or the periphery of the package being wound thereon. Spindle 20 is journaled in the upper end of housing member 10 and has one end extending from the front of said housing and provided with suitable means, to be explained more in detail hereinafter, for removably securing package core 18 thereon. The other end of spindle 20 projects from the rear of housing member 10 and has a brake drum and clutch member associated therewith, not shown but described in detail in the above mentioned United States Patent 2,608,355, by means of which the speed of spindle 20 is controlled by the tension of the strand of yarn being wound, all in the manner specifically described in said United States Patent 2,608,355.

A generally horizontal arm 24, located beneath the winding unit, is pivotally carried at one of its ends by shaft 28 journaled in a pair of rails 26. A roller 30 is rotatably carried by the other end of arm 24 and is adapted to be engaged by a loop formed in the running strand of yarn Y whereby fluctuations in the tension of said yarn will pivot arm 24 and thereby rock shaft 28. Shaft 28 is connected by suitable linkages, not shown, to the brake carried by spindle 20 in such a fashion that an increase in the tension in strand of yarn Y, caused by spindle 20 winding said strand faster than it is being supplied, will raise arm 24 to apply the brake and to thereby slow the speed of spindle 18 until it winds the yarn at the speed at which it is being advanced. In the event spindle 20 is not winding the strand of yarn Y at a fast enough rate whereby the tension in said strand decreases arm 24 will be lowered to release the brake thereby permitting the speed of spindle 20 to increase. A second yarn engaging wheel or roller 32 is suitably mounted by means of a bracket 34 above yarn engaging roller 30. Bracket 34 is carried by a rod 36 suitably mounted on top of housing member 10 and adjacent the front thereof.

An aspirator 38 comprising a suction nozzle 40 carried by suction tube 42 is secured to base 12 with said nozzle 40 located beneath, and slightly to one side of, spindle 20 and below the level of yarn guide 14. Aspirator 38 is powered by a stream of compressed air, in the conventional manner, introduced into suction tube 42 by means of air tube 46. Nozzle 40 is provided with a

suitably guarded downwardly extending knife blade 47 for use in severing the strand of yarn and permitting its introduction into said nozzle when it is desired to remove a winding package of yarn from spindle 20.

The forward end of spindle 20 carries a quick acting package core holder adapted to snap from its disengaged position into its core holding or locking position when said core is thrust thereupon to its normal running position. The core holder is also adapted to pinch the running strand of yarn between a portion thereof and the end of the package core when said core is in its normal running position to thereby attach said strand to the spindle to commence the winding operation. Referring now to Figs. 3 and 4 wherein there is disclosed one embodiment of the quick acting package core holder of the present invention. The package core 18 disclosed in Figs. 3 and 4 is the conventionally used paper or fiber cone; however, it will be appreciated by those skilled in the art that the invention disclosed therein can be employed to secure other types of package cores to a spindle. The core holder of the present invention comprises a member 48 which is a frustum of a cone the taper of which is substantially the same as the taper of the bore of package core 18. Conical member 48 has a cylindrical bore 50 extending axially therethrough, said bore having a diameter greater than the diameter of the spindle 20. Conical member 48 is fixedly secured concentric with spindle 20 by means of a spacing bushing 52 and set screws 54. Bushing 52 is shorter than conical member 48 and, therefore, provides an annular space or recess 56 in the base of said conical member. A plurality of equally spaced radial holes 58 extend through conical member 48 adjacent the base thereof and into recess 56, and each of said radial holes has slidably journaled therein a core engaging finger 60. The outermost ends of fingers 60 are provided with a transverse slot to provide said ends with a pair of sharpened core engaging prongs and to provide a groove in the outer ends of said fingers which is engaged by a spring ring 62 which functions to hold said fingers 60 in the radial holes 58 and to normally maintain them in a retracted position with their core engaging prongs below or flush with the surface of conical member 48. A collar 64 is slidably carried by spindle 20 in annular recess 56. Collar 64 is spring urged to the right, as viewed in Figs. 3 and 4, by means of compression spring 66 also located in recess 56 and having one of its ends abut against bushing 52 and its other end abut against the innermost end of collar 64. A circumferential ridge 68 is formed on the periphery of collar 64 adjacent its innermost end and functions as a cam to force fingers 60 radially outwardly to engage core 18 as said collar is moved axially out of recess 56 under the influence of spring 66. A stop collar 70 is fixedly secured to spindle 20 adjacent the base of conical member 48 and functions as a stop to hold collar 64 against outward movement past the point where fingers 60 have been moved outwardly to engage core 18. The outer end of finger operating collar 64 is provided with a circumferential groove 72 which receives the lowermost end 74 of a lever 76 pivotally mounted on lug 78 projecting from the face of housing member 10. It will be seen, therefore, that collar 64 can be moved inwardly of conical member 48 to permit fingers 60 to be withdrawn by spring ring 62 by pivoting starting lever 76 in a clockwise direction as viewed in Figs. 3 and 4 to cause its end 74 to engage the innermost surface of groove 72 whereupon continued movement of said lever forces said collar 64 inwardly against the opposition of spring 66.

A sleeve-like member 80 is slidably journaled in an enlarged portion 82 of recess 56 and is spring urged inwardly of conical member 48 by means of a compression spring 84 one end of which abuts an inwardly extending flange 86 formed on member 80 and having its other end in engagement with an outwardly extending flange 88 on collar 64. The inner end of sleeve-like

member 80 is adapted, when fingers 60 are in their retracted position, to engage in notches 90 formed in the rearward side of said fingers 60 to hold said fingers retracted against the action of cam 68 and spring 66. The rearmost end of sleeve-like member 80 is provided with a flange 92 having a diameter greater than the diameter of the base of package core 18. Flange 92 is adapted to be engaged by the base of said core to pinch the running strand of yarn between said base and said flange to thereby attach said strand to the winding spindle. Flange 92 also functions, upon being moved rearwardly by said core, as said core is pressed home upon conical member 48, to withdraw the forward edge of sleeve-like member 80 from notches 90 to thereby release fingers 60 for outward movement to securely grip said core. When it is desired to release core 18 and the wound package it carries from spindle 20 starting lever 76 is pivoted in a clockwise direction to force collar 64 inwardly and to thus move cam 68 from under the innermost ends of fingers 60 whereupon spring ring 62 retracts said fingers to release said core. As soon as the notches 90 in fingers 60 come in alignment with the innermost end of sleeve-like member 80 compression spring 84 moves said sleeve-like member inwardly into said notches to thus effectively hold said fingers in their retracted position against the action of spring 66 and cam 68. Flange 92 is provided at its periphery with a forwardly extending flange or lip 94 adapted to overlay the base of core 18 to guide the running strand of yarn away from said base and onto said core in a manner which will become more apparent hereinafter. A guard 85 is located around spring 84 to prevent yarn from becoming entangled in said spring in the event the strand is not properly threaded through the machine.

A bracket 96 is fixedly attached to rod 36 by any convenient means as, for example bolts 98 which draw clamping members (not shown) up against said rod. Bracket 96 has a downwardly extending flange 100 located above spindle 20 and having its surface substantially in the plane of flange 92 of the package core holder when said core holder is in the position illustrated in Fig. 3, i. e. with fingers 60 retracted to permit the removal of a full package of yarn and the starting of the winding of a new package. Bracket 96 carries a tail winding guide 102, yarn cutting mechanism 104 and a yarn guiding wheel 106.

Tail winding guide 102, see Figs. 6 and 8, comprises a lever 110, preferably formed from a stamping bent to the desired shape but which can be formed in any other convenient manner, pivotally supported on bracket 96. A stud 112 fixedly secured to rearwardly extending ear or tab 108, carried by the right hand end of flange 100, passes through aligned holes in a pair of forwardly bent flanges 111 and 113 on lever 110 to pivotally mount said lever on bracket 96. The upper end of lever 110 extends above bracket 96 through a notch 97 formed in the end thereof to form an operating handle 114 by means of which the tail winding guide can be moved from yarn engaging position to yarn releasing position. The lower end of flange 113 is provided with a short rounded detent 116 adapted to be selectively engaged by the holes 118 and 120 formed in ear 108 to selectively hold the lever 110 in either its yarn engaging or yarn releasing position. Flange 111 carries on its front edge a forwardly extending yarn engaging hook 122 which is adapted to project through a suitable opening 124 formed in flange 100 when operating handle 114 is in its rearward position, illustrated in Fig. 6, whereby it can be engaged by the running strand of yarn Y, and which is withdrawn back of the surface of flange 100 when handle 114 is in its forward position, illustrated in Fig. 8, whereby it drops the strand of yarn. Lever 110 is resiliently pressed against ear 108 by spring 115 located between the head of stud 112 and flange 111.

A rearwardly extending ear 126 is formed on the left hand end of flange 100. A bracket 128, see Figs. 7, 8 and 9, having a flange 127 thereon is secured to ear 126 by means of said flange 127 and rivet 125. Yarn guiding wheel 106 is pivotally carried by the left hand end of bracket 128 for rotation around an axis substantially parallel to the axis of spindle 20.

The yarn cutting mechanism 104 comprises an extension of bracket attaching flange 127 extending downwardly below the level of ear 126 and inclined a slight amount from the vertical to form depending flange 130. A notch 132 is formed in flange 130 substantially in the plane of downwardly extending flange 100, and that portion of flange 130 in front of notch 132 is bent to one side to form an anvil 134. A spring blade 136 is secured adjacent its rearmost end to depending flange 130 with its forward end curving slightly in the direction of yarn guiding wheel 106 and with its cutting edge, located on the forward edge, thereof lightly contacting the rearmost surface of anvil 134.

The apparatus of the present invention functions in the following manner. Traverse frame 16 is moved away from spindle 20 and operating handle 114 is positioned to move yarn engaging hook 122 to its yarn engaging position. The running strand of yarn Y is threaded, see Fig. 2, over yarn engaging wheel or roller 32, around roller 30 of the spindle speed controlling mechanism, through yarn retaining eye 138 carried by yarn guide 14, over yarn engaging hook 122, through the notch 132 of yarn cutting mechanism 104 and between knife blade 136 and anvil 134, around yarn guiding wheel 106 and into the nozzle 40 of aspirator 38. Aspirator 38 functions to continually dispose of the continuously advancing strand of yarn Y to thus prevent the accumulation of an unwanted and tangled pile of yarn prior to the initiation of the winding operation.

When the mechanism is threaded in the above described manner the length of yarn extending between yarn engaging hook 122 and the yarn cutting mechanism 104 extends across the face of flange 92 of the package holder. Starting lever 76 is swung in a clockwise direction, as viewed in Fig. 3, to thereby retract core engaging fingers 60 and to lock them in their retracted position by means of sleeve-like member 80. The rotation of spindle 20 is started and package core 18 is then thrust upon the core holder to engage and move flange 92 rearwardly to thereby disengage sleeve-like member 80 from core engaging fingers 60 whereupon said fingers are forced radially outwardly to grip said package core and to rotate it with spindle 20. When the base of package core 18 contacts flange 92 and moves it rearwardly the running strand of yarn is pinched and held between said base and said flange so that said strand commences to wind upon said package core. Immediately upon the strand of yarn commencing to wind upon the package core the length of yarn extending from said core to aspirator 38 is drawn in a direction opposite to that in which it has been moving and such movement causes spring knife blade 136 to immediately cramp against anvil 134 to sever that portion of the strand.

As the winding commences on package core 18, yarn engaging hook 122 holds the running strand of yarn in line with the base portion of said package core so that said strand is wound on said base portion to form a transfer tail. When a sufficient length of yarn has been wound to form the transfer tail operating handle 114 is moved to its forward position to cause hook 122 to drop the strand of yarn and to retract behind the surface of flange 100. As soon as hook 122 drops the strand of yarn the winding strand moves from the base of the package core towards the mid-portion of package core 18 due to the tension thereon and the action of yarn retaining eye 138. Immediately after the wind-

ing yarn moves to the mid-portion of package core 18, traverse frame 16 is pivoted in a counter-clockwise direction to bring yarn guide 14 into contact with the surface of core 18, or closely adjacent thereto, whereupon said yarn guide picks up and traverses said strand of yarn to cause a self-supporting package to be wound.

When the winding of the package of yarn has been completed the wound package is doffed by swinging traverse frame 16 away from the surface of the package, engaging the running strand of yarn between the surface of the package and yarn guide 14 and carrying that length in a loop across the face of aspirator nozzle 40 and under aspirator knife blade 47 whereupon the strand is severed by said knife and the running strand of yarn from the source of supply is sucked into and is continuously carried away by said aspirator. After the strand has been severed and the advancing strand caught in aspirator 38, spindle 20 is stopped in the conventional manner and handle 76 rotated in a clockwise direction to again retract core engaging fingers 60 whereupon the completed package can be removed.

After the wound package has been doffed the running strand of yarn will follow the path illustrated in Fig. 1 and the mechanism can be rethreaded to commence winding a new package by moving operating handle 114 rearwardly to cause yarn engaging hook 122 to project into its yarn engaging position, engaging the length of yarn extending from yarn guide 14 to aspirator 38 and carrying that length around spindle 20, engaging it in hook 122, passing it through yarn cutting mechanism 104 and over yarn guiding wheel 106 so that said running strand travels through the path illustrated in Fig. 2, whereupon the starting operation described above can again be carried out.

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 and not in a limiting sense.

What is claimed is:

1. In a winding machine for winding a continuously advancing strand of yarn the combination comprising a rotatable spindle, core holding means on said spindle having means operable to grip a core placed thereon, a member engageable by a core placed on said holding means while said spindle is rotating to actuate said gripping means to engage said core and secure it to said holding means whereby a package of yarn can be wound thereon, a yarn guide for traversing yarn being wound on said core, means comprising a supplementary yarn guide and a yarn cutter for holding said continuously advancing strand of yarn in position to be pinched between said core and said member whereby said strand can be attached to said core at substantially the same time said core is secured to said holder, and means for disposing of said continuously advancing strand of yarn prior to the time it is attached to said core.

2. In a winding machine for winding a continuously advancing strand of yarn the combination comprising a rotatable spindle, core holding means on said spindle having means operable to grip a core thereon, a member engageable by a core placed on said holding means

while said spindle is rotating to actuate said gripping means to engage said core and rotate it to wind a package of yarn thereon, a yarn guide for traversing yarn being wound on said core, means comprising a supplementary yarn guide and a yarn cutter for holding said continuously advancing strand of yarn in position to be pinched between said core and said member whereby said strand can be attached to said core at substantially the same time said core is secured to said holder, said supplementary yarn guide having a yarn engaging position wherein said continuously advancing strand of yarn is held in position to be pinched between said core and said member and to wind a transfer tail on said core after said strand has been attached thereto, and a second position wherein said strand of yarn is released for winding into a package, said yarn cutter including a resilient blade inclined against an anvil in the direction of travel of said continuously advancing strand of yarn prior to its attachment to said core whereby said strand of yarn can pass between said blade and said anvil prior to its attachment to said core and whereby said blade can sever said strand when the direction of travel of said strand through said cutter is reversed subsequent to its attachment to said core, and means for disposing of said continuously advancing strand of yarn prior to the time it is attached to said core.

3. The method of doffing a winding machine including a rotatable spindle and a traverse for laying up a wound yarn body thereon from a continuous supply that comprises maintaining a suction zone, changing the path of yarn travel between said body and said traverse so the yarn passes from said traverse to said suction zone and then to said body, cutting said yarn between said zone and said body whereby the succeeding portions of the yarn supplied are drawn into said suction zone and the spindle may be stopped for removal therefrom of the wound body thereon.

4. The method of threading-in a winding machine including a rotatable spindle and a traverse for laying up a wound yarn body thereon from a continuous supply that comprises maintaining a suction zone, changing the path of yarn travel between said body and said traverse so the yarn passes from said traverse to said suction zone and then to said body, cutting the yarn between said zone and said body while taking up at said suction zone the yarn continuously supplied, stopping said spindle, removing the wound body therefrom, changing the path of yarn travel between said traverse and said zone so the yarn passes from said traverse to said spindle and then to said zone, and thereafter cutting the yarn between said spindle and said suction zone.

References Cited in the file of this patent

UNITED STATES PATENTS

664,643	Jackson	Dec. 25, 1900
1,728,417	Lewis	Sept. 17, 1929
2,042,968	Siegenthaler	June 2, 1936
2,361,813	Beckman	Oct. 31, 1944
2,481,031	McDermott	Sept. 6, 1949
2,563,642	Columbu et al.	Aug. 7, 1951
2,570,469	McDermott	Oct. 9, 1951
2,617,244	Kayser et al.	Nov. 11, 1952
2,630,976	Keight	Mar. 10, 1953