

Aug. 29, 1961

J. V. KEITH ET AL
INITIAL THREAD END SNAGGER

2,998,202

Filed March 8, 1957

4 Sheets-Sheet 1

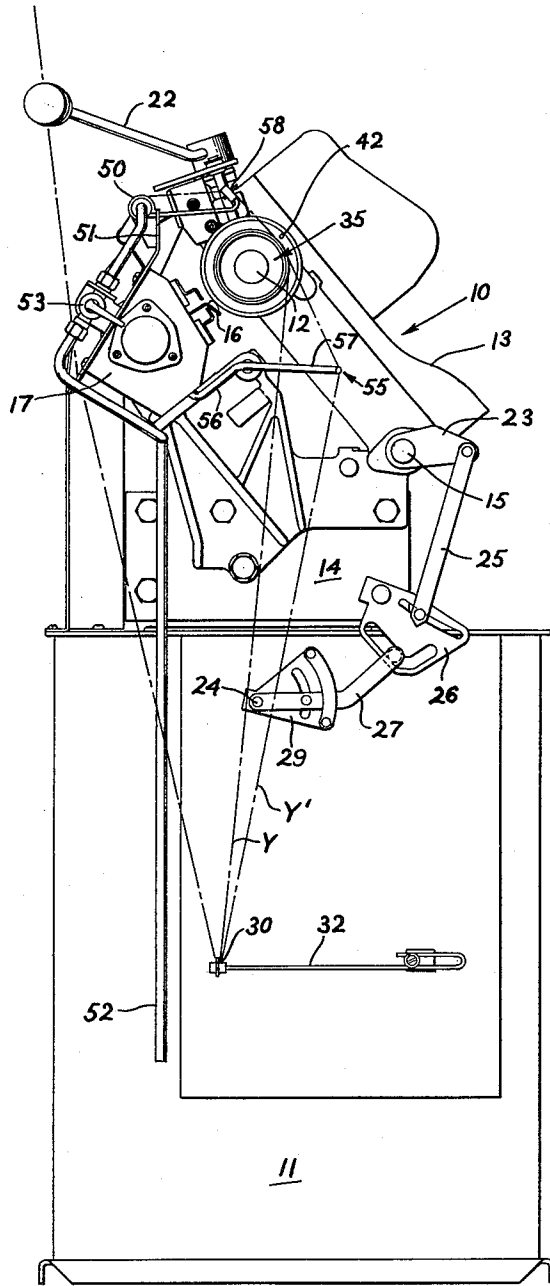


Fig. 1

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4 Sheets-Sheet 2

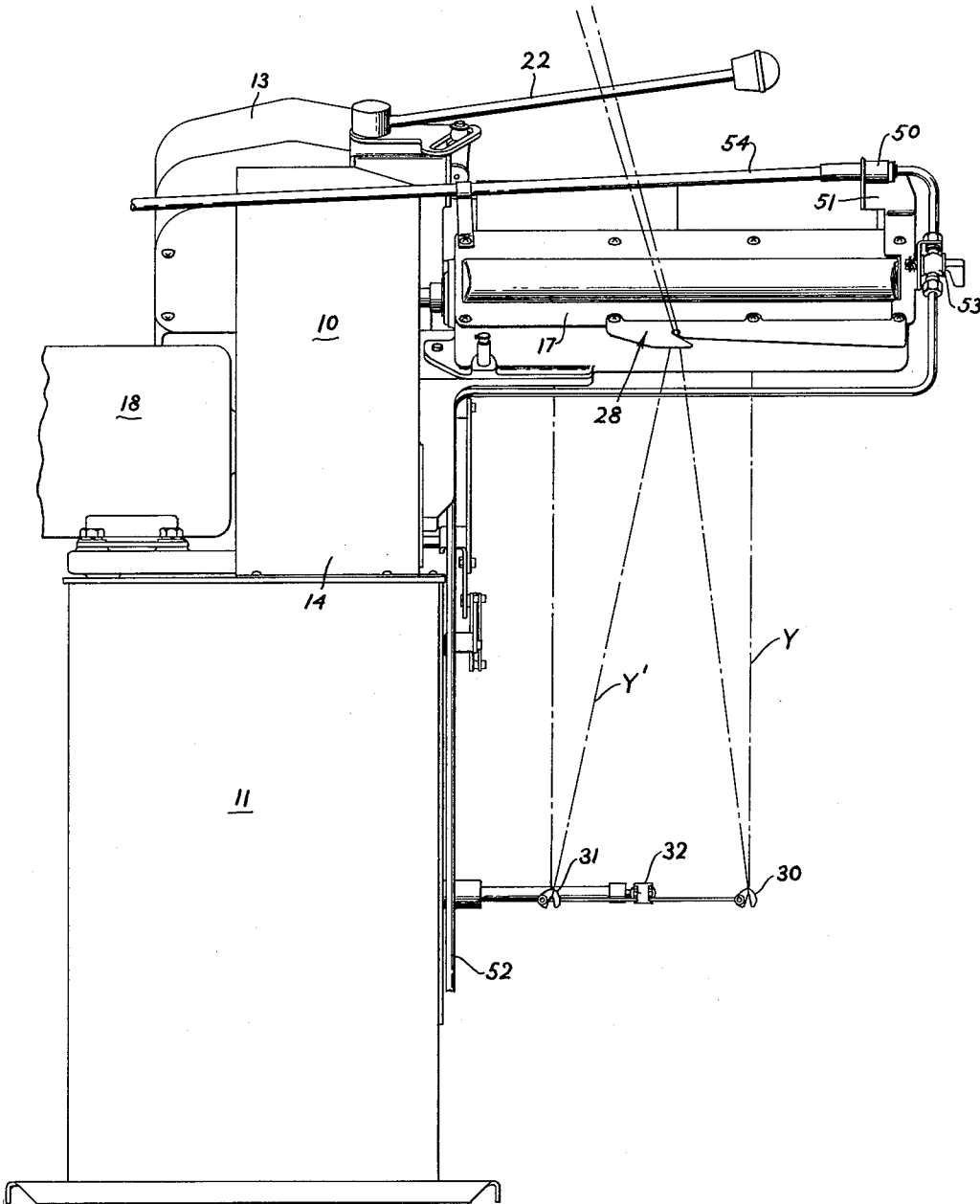


Fig. 2

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4 Sheets-Sheet 3

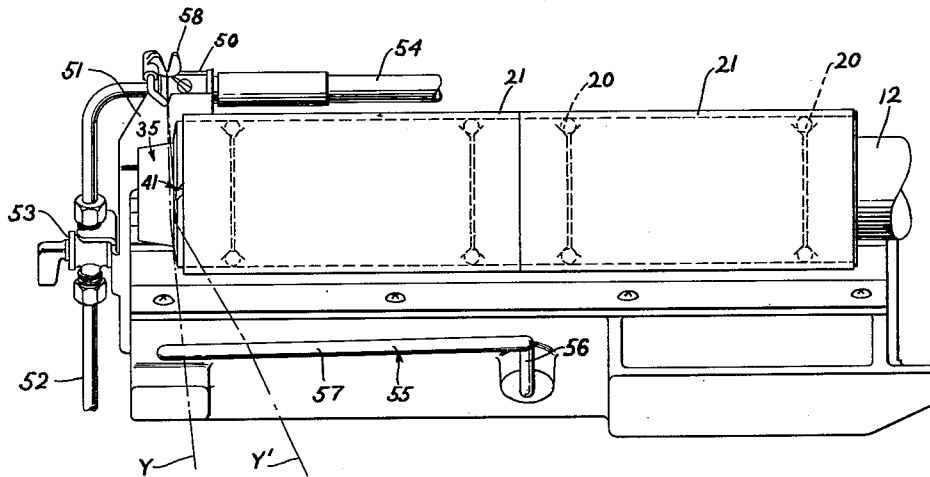


Fig. 3

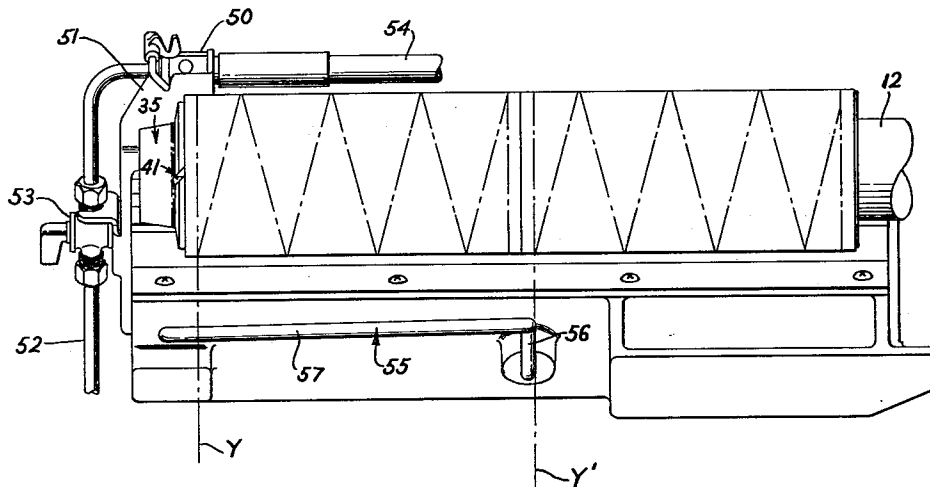


Fig. 4

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4 Sheets-Sheet 4

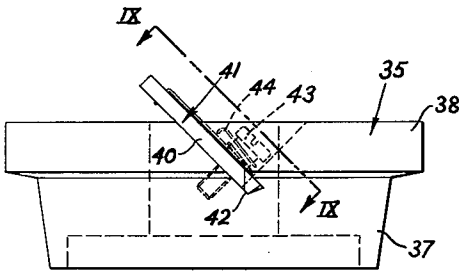


Fig-7

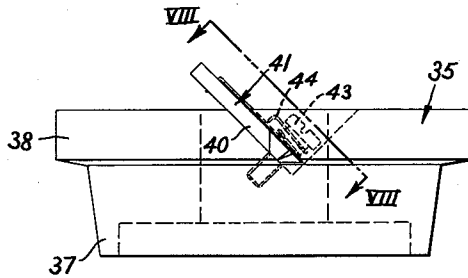


Fig-6

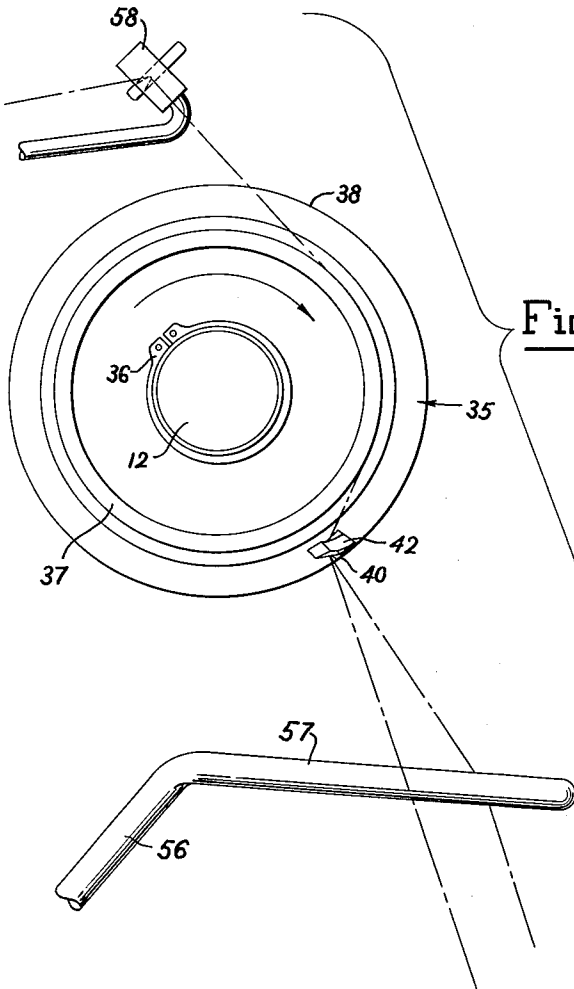


Fig-5

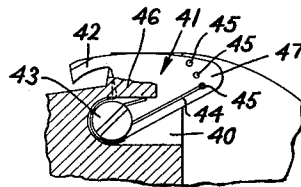


Fig-9

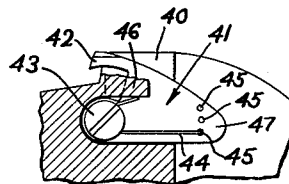


Fig-8

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2,998,202

INITIAL THREAD END SNAGGER

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Filed Mar. 8, 1957, Ser. No. 644,783

10 Claims. (Cl. 242-18)

The present invention relates to winding machines and more particularly relates to such a machine for winding a continuously advancing strand of yarn having means for starting the winding cycle.

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, 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 and without breaking the running strand.

It is, therefore, 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 when said spindle reaches a predetermined speed.

Another object of the present invention is to provide a winding machine capable of simultaneously winding a plurality of packages on a single spindle from a plurality of continuously advancing strands of yarn.

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

Another object of the present invention is to provide a method of starting the winding of a continuously advancing strand of yarn.

Another object of the present invention is to provide a method of doffing a wound package from a winding machine adapted to wind a continuously advancing strand of yarn.

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, and the method involving the several steps and the relation and the order of one or more of such steps with respect to each of the others, 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;

FIG. 2 is a side elevation of the winding machine of FIG. 1;

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FIG. 3 is an enlarged fragmentary view of the winding spindle showing the manner in which the strands of yarn are positioned prior to the start of the winding cycle;

FIG. 4 is a view similar to FIG. 3 but showing the spindle after the winding cycle has started;

FIG. 5 is an end view of the winding spindle and the cap thereon showing the manner in which the strands of yarn are positioned prior to the start of the winding cycle;

FIG. 6 is a plan view of the cap showing the yarn catching finger in its retracted position;

FIG. 7 is a view similar to FIG. 6 but showing the finger in its extended position;

FIG. 8 is a fragmentary sectional view taken along the line VIII—VIII in FIG. 6; and

FIG. 9 is a fragmentary sectional view taken along the line IX—IX of FIG. 7.

The apparatus of the present invention comprises a winding machine of the type adapted to wind a continuously advancing strand of yarn and to utilize the tension in the advancing strand of yarn to control the speed of the winding spindle. The winding spindle is provided with means to automatically attach the advancing strand of yarn to the spindle when said spindle reaches a predetermined speed of rotation to thereby start the winding cycle. The means for automatically attaching the running strand of yarn to the spindle is preferably a cap or end piece fixed to the end of the winding spindle and provided with a finger that is projected by centrifugal force into the yarn path to catch the strand of yarn and start it winding when said spindle reaches a predetermined speed.

The apparatus is preferably provided with a plurality of yarn traverse guides to permit a plurality of packages to be wound simultaneously, and the means for attaching the yarn to the winding spindle is adapted to simultaneously attach a plurality of ends of yarn to the spindle. Yarn guiding means are provided to direct each strand of yarn to a position where it will be engaged by the traverse guide that is to guide it onto the winding package.

Referring now to FIGS. 1 and 2 of the drawing there is shown a winding machine having a winding head 10 mounted on a pedestal 11. Except for the length of the winding spindle, the provision of a plurality of traverse guides and yarn guide means for directing each of a plurality of stands of yarn to its respective traverse guide, winding head 10 is similar to the winding mechanism disclosed in Patent No. 2,740,590, issued April 3, 1956, to J. V. Keith for "Winding Machine." Winding head 10 includes a spindle 12 rotatably journaled adjacent the upper end of a frame 13. Frame 13 is pivotally mounted adjacent its lower end to base 14 by means of shaft 15 to permit spindle 12 to swing toward and away from traverse guides 16 as the winding cycle progresses. Guides 16 are reciprocated by a barrel cam (not shown) which is rotatably journaled in housing 17 fixed to base 14. Spindle 12 and the barrel cam are rotated by motor 18.

Running strands of yarn Y and Y' pass downwardly from the spinning machine, not shown, through guide 28 on the side of housing 17, around the guides 30 and 31 carried by compensator arm 32 and up to package receiving cores 21 mounted on spindle 12. The winding speed of spindle 12 is regulated by a control circuit and mechanism, similar to that disclosed in Patent No. 2,752,105, issued June 26, 1956, to J. V. Keith for "Winding Machine," enclosed in pedestal 11. This control circuit and mechanism are actuated by the winding strand or strands of yarn which move compensator arm 32, forming part of said control mechanism, upwardly to slow said spindle when the tension in said strands exceeds a predetermined value, and permit said arm 32 to pivot

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downwardly when said tension is less than said predetermined value to increase the speed of said spindle. An arm 23 is fixed to frame 13 adjacent the lower end thereof to pivot with said frame around shaft 15. Arm 23 is connected to the shaft 24, journaled in pedestal 11, by link 25, cam plate 26, arm 27 and slotted lever 29 to rotate said shaft 24 as frame 15 pivots in a clockwise direction, as viewed in FIG. 1, to decrease the force which must be exerted on compensator arm 32 to lift said arm.

Spindle 12 is provided with any convenient expansible arbor 20 for releasably gripping and holding package receiving cores 21 on said spindle. Expansible arbor 20 is operably connected to lever 22 which upon being pivoted contracts said arbor to permit wound packages to be removed from spindle 12 and empty cores to be placed thereon preparatory to starting a new winding cycle.

A cap 35 is fixed to the outermost end of spindle 12 by any convenient means as, for example, a key not shown, and retaining ring 36. The diameter of cap 35 is slightly smaller than the inner diameter of package receiving core 21 so that said core will slide over said cap when an empty core is placed on spindle 12 and a wound package is removed therefrom. Cap 35 has a frusto conical nose 37, see FIGS. 5, 6 and 7, axially aligned with and fixed to annular flange 38. Spindle 12 is of such length that nose 37 and a portion of base 38 project beyond package receiving core 21 when said core is in position on the spindle. Slot 40 is formed in the periphery of flange 38 at an angle of approximately 45 degrees to the longitudinal axis of said cap and has yarn engaging member 41 pivotally mounted therein. Yarn engaging member 41 is generally triangular in shape and is provided with a yarn catching finger 42 at one apex thereof as an extension of one side. Member 41 is pivotally mounted in slot 40 with finger 42 adjacent the periphery of flange-like base 38 and directed toward nose 37 by the stud 43 which passes through an aperture in said member adjacent a second apex thereof and threadedly engages cap 35. A spring 44 surrounds stud 43 and has one of its ends selectively engaged in one of the holes 45 formed in member 41 adjacent the third apex 47 thereof. The other end of spring 44 is in engagement with the shoulder 46 overhanging stud 43 to resiliently urge said member 41 inwardly of said cap with finger 42 retracted into slot 40. A plurality of holes 45 are provided in member 51 so that the spring loading on member 41 can be changed to thereby change the speed at which said finger will project from slot 40 to catch a strand of yarn and start the winding cycle all in the manner to be explained more in detail hereinafter.

Yarn engaging member 41 functions in the following manner to catch a running strand of yarn and start the winding cycle. The running strand or strands of yarn are guided across the frusto-conical nose 37, in a manner to be explained in detail hereinafter, and the rotation of spindle 12 is started. As the speed of rotation of spindle 12 increases the apex 47 of member 41 is urged radially outwardly by centrifugal force. When spindle 12 reaches a rotational speed where the surface speed of package receiving core 21 is such that it would wind yarn at a speed slightly faster than the speed of the running strand of yarn, the centrifugal force acting on apex 47 will be sufficient to overcome the force of spring 44 whereupon said apex 47 will swing outwardly thus pivoting yarn catching finger 42 forwardly from slot 40 and over frusto conical nose 37 to catch the running strand of yarn to start it winding on core 21. Inasmuch as spindle 12 is rotating at a speed to wind the advancing strand at a rate faster than it is advancing at the moment said strand is attached thereto, any slack that might be present in the strand is taken up and the accumulation of any slack is prevented. As soon as the strand starts to wind on core 21 the tension therein lifts compensator arm 32 to slow said spindle to a winding speed corresponding to the

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yarn speed. Obviously the rotational speed at which finger 42 will move out of slot 40 can be changed by changing the strength of spring 44, by relocating its end to a different hole 45, or by increasing or decreasing the mass of apex 47 or its distance from stud 43.

An aspirator 50 is mounted on housing 17 adjacent the forward end thereof by means of bracket 51. Compressed air is supplied to aspirator 50 through tubing 52 from any convenient source of supply. Valve 53 is inserted in tubing 52 to permit the flow of air to be controlled. Aspirator 50 functions to collect yarn being advanced by the spinning machine during the interval between the completion of one winding cycle and the start of another. A length of tubing 54 is fixed to the outlet of aspirator 50 to conduct yarn collected by the aspirator to a convenient waste receptacle. A wire yarn guiding bail 55 is fixed at one end to the lower side of housing 17 adjacent spindle 12 at approximately the midpoint thereof. Bail 55 extends upwardly and to the right, as viewed in FIG. 1, in the length 56 and then extends forwardly in the length 57 in a substantially horizontal plane and away from housing 17.

When the packages of yarn have been completely wound on spindle 12 the operator of the machine manually moves the running strands Y and Y' above guide 28 adjacent the orifice of aspirator 50 and then cuts said strands between the aspirator and said guide 28 whereupon said strands are sucked into the aspirator and discharged through tube 54 to a waste receptacle. The operator then stops the machine, moves lever 22 to retract arbor 20 and removes the wound packages from the spindle. After placing two empty package receiving cores 21 on arbor 20, lever 22 is released to clamp said cores on spindle 12 and frame 13 is pivoted in a counterclockwise direction, as viewed in FIG. 1, to place said cores adjacent yarn guides 16. The operator then manually draws the strands of yarn Y and Y' downwardly through the guide 28 and around housing 17 and spindle 12 and engages strand Y' around guide 31 carried by compensator arm 32 and strand Y around guide 30 carried by said compensator arm. The strand Y is passed between the length 57 of bail 55 and spindle 12 and the length Y' is positioned on the opposite side of said length 57. Both lengths then extend across frusto conical nose 37 of cap 35 adjacent the annular flange 38 thereof, over guide 58, mounted on bracket 51, and thence into aspirator 50, see FIG. 1. With the yarn path thus arranged the winding mechanism is then started and when spindle 12 reaches the predetermined desired speed, yarn engaging finger 42 is projected from slot 40 in base 38 to catch the two strands Y and Y' to start them winding on nose 37. As soon as the strands are thus caught the tension thereon between spindle 12 and aspirator 50 cause the ends to break adjacent said aspirator. Also as soon as said strands start winding on nose 37 the tension therein between said nose and said compensator arm 32 causes said strands to move onto the outermost package core 21 and move inwardly thereover. Inasmuch as guide 30 is located substantially under the midpoint of the outermost package core, strand Y will tend to stop at the midpoint of said outermost package core. Guide 31 is located beneath the midpoint of the innermost package core and strand Y' is also passing over length 57 of bail 55, therefore, strand Y' continues across the outermost package core and passes onto the innermost one. The two yarn guides 16 are of the self threading type, well known in the art, so they pick up their respective strands Y and Y' and traverse them longitudinally of their respective package cores to wind the desired packages.

Since certain changes may be made in the above process herein involved, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in the limiting sense.

What is claimed is:

1. A device for use with a rotatable winding spindle and adapted to catch a running strand of yarn to start said strand winding upon said spindle comprising a member mounted on said spindle for rotation therewith, said member having a nose portion contacted by the running strand, a yarn engaging finger movably mounted on said member and movable from a position adjacent said nose portion to a projected position wherein it extends over part of said nose, said finger being moved automatically from said adjacent position to said projected position when said device is rotated at a predetermined speed.

2. A device for use with a rotatable winding spindle as defined in claim 1 wherein said member is provided with a flange adjacent said nose, said flange having a slot formed therein and said finger being mounted in said slot.

3. A device for use with a rotatable winding spindle as defined in claim 2 wherein said finger is pivotally mounted.

4. A device for use with a rotatable winding spindle as defined in claim 3 wherein said finger is actuated by centrifugal force.

5. A device for use with a rotatable winding spindle as defined in claim 4 wherein said nose portion is frusto-conical in shape.

6. A winding machine for winding a continuously advancing strand of yarn comprising a spindle rotatable to wind yarn thereupon, means for guiding said yarn at at least the start of a winding cycle along a path spaced from said spindle and extending generally transversely to the spindle axis, a yarn engaging element mounted on said spindle for bodily rotation therewith and for movement from and to a retracted position spaced from said yarn path to and from a projected position at which the element passes through said path as said spindle rotates, said element being normally maintained in said retracted position when said spindle is at rest and being moved to said projected position when said spindle achieves a predetermined speed of rotation to engage said yarn and initiate winding upon said spindle.

7. A winding machine for winding a continuously advancing strand of yarn comprising a rotatable spindle for rotating a package receiving core to wind a strand of yarn thereupon, a member carried by said spindle for

rotation therewith, said member including an external surface of revolution, means for guiding said yarn at at least the start of a winding cycle along a path adjacent said surface, means for rotating said spindle and said member, and a yarn engaging element mounted on said member for movement from and to a retracted position spaced from said yarn path to and from a projected position extending across said path, at which projected position the element will engage the yarn, said element normally being disposed in said retracted position when said member is at rest and being moved to said projected position when said member achieves a predetermined speed of rotation whereby said yarn is permitted to move freely along said path until said member achieves said predetermined speed of rotation at which time the yarn is engaged by said element to initiate winding upon said core.

8. A winding machine as in claim 7 wherein said member has a slot therein adjacent said surface into which said element is received when in retracted position.

9. A winding machine as in claim 8 wherein said element is of generally L-shape with one end thereof pivotally affixed in said slot and is biased to said retracted position within said slot, whereby said element remains in said slot until centrifugal force acting thereon exceeds the biasing force.

10. A winding machine as in claim 8 wherein a plurality of cores are arranged in axial alignment upon said spindle for winding separate strands of yarn thereupon and said guide means includes a separate guide for each package arranged in alignment therewith for guiding the strand to the corresponding package and means for guiding all of said strands along paths adjacent said surface at at least the start of the winding cycle.

References Cited in the file of this patent

UNITED STATES PATENTS

2,304,712	Siegenthaler	Dec. 8, 1942
2,623,240	McDermott	Dec. 30, 1952
2,706,089	Griset	Apr. 12, 1955
2,706,090	Blok	Apr. 12, 1955

FOREIGN PATENTS

361,696	Great Britain	Nov. 26, 1931
695,038	France	Sept. 23, 1930