

- [54] STRAND HANDLING
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- [73] Assignee: Leesona Corporation, Warwick, R.I.
- [22] Filed: Oct. 1, 1971
- [21] Appl. No.: 185,913

**Related U.S. Application Data**

- [63] Continuation of Ser. No. 5,556, Jan. 26, 1970, abandoned.
- [52] U.S. Cl. .... 242/18 PW, 242/19
- [51] Int. Cl. .... B65h 54/02, B65h 54/34
- [58] Field of Search..... 242/18 PW, 18 A, 242/18 G, 19

**References Cited**

**UNITED STATES PATENTS**

- |           |         |                     |           |
|-----------|---------|---------------------|-----------|
| 2,998,202 | 8/1961  | Keith et al. ....   | 242/18 PW |
| 3,231,207 | 1/1966  | Loscudo et al. .... | 242/18 G  |
| 3,251,560 | 5/1966  | Macedo .....        | 242/18 PW |
| 3,282,516 | 11/1966 | Porter .....        | 242/18 PW |
| 3,385,532 | 5/1968  | Sparling .....      | 242/18 PW |
| 3,428,266 | 2/1969  | Emery.....          | 242/18 PW |

**FOREIGN PATENTS OR APPLICATIONS**

- |         |        |                     |           |
|---------|--------|---------------------|-----------|
| 898,323 | 6/1962 | Great Britain ..... | 242/18 PW |
|---------|--------|---------------------|-----------|

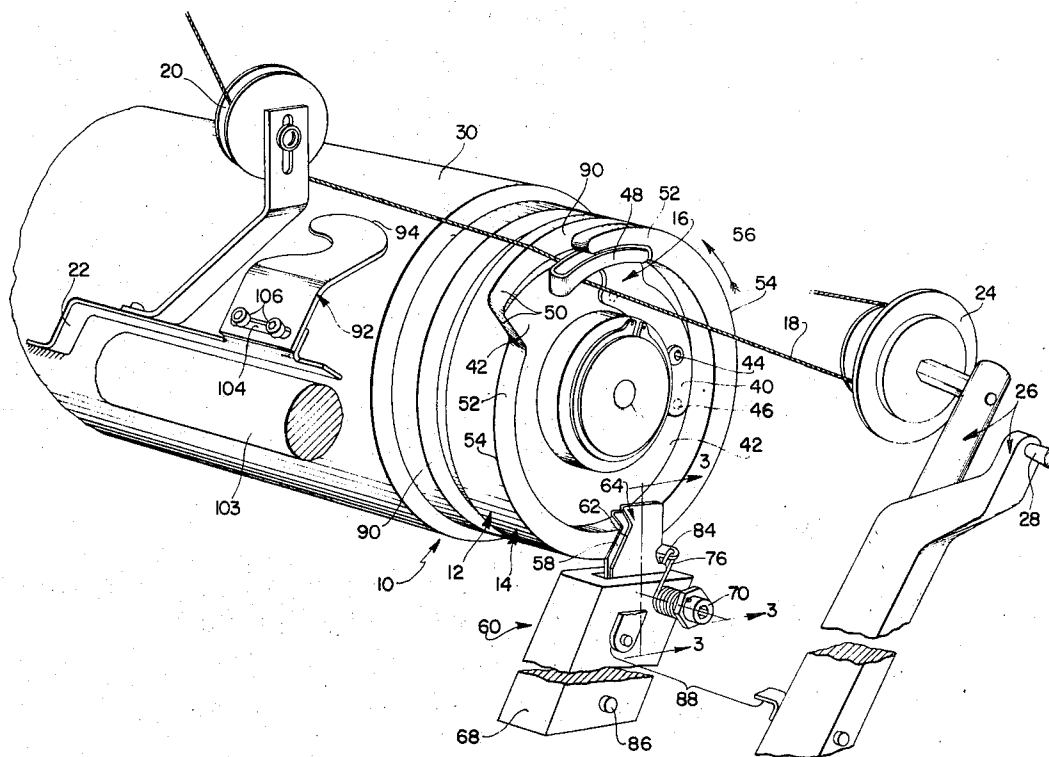
899,418 6/1962 Great Britain ..... 242/18 G

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[57] **ABSTRACT**

A rotary chuck of a winder receives a core on which a body of yarn is wound to form a package. Upon commencing winding of the yarn it is grasped by a clamp recessed into a free end head of the rotating chuck. Immediately after the yarn has been received by the clamp it retracts a cutter guard and the strand is severed outwardly of the clamp. The yarn is wound into a spiral groove in the head to provide a tailing end of yarn of predetermined length. At a predetermined and adjustable position of the yarn in the groove the yarn is released by an adjustable yarn guide cam and is received by a yarn traversing guide which then moves the yarn to and fro axially of the core during winding of the package. When the package is full the chuck and the yarn clamp are concurrently released, and the package is telescoped off of the chuck head as the tailing end is drawn out of the spiral groove and through the core where it remains until needed.

**19 Claims, 5 Drawing Figures**



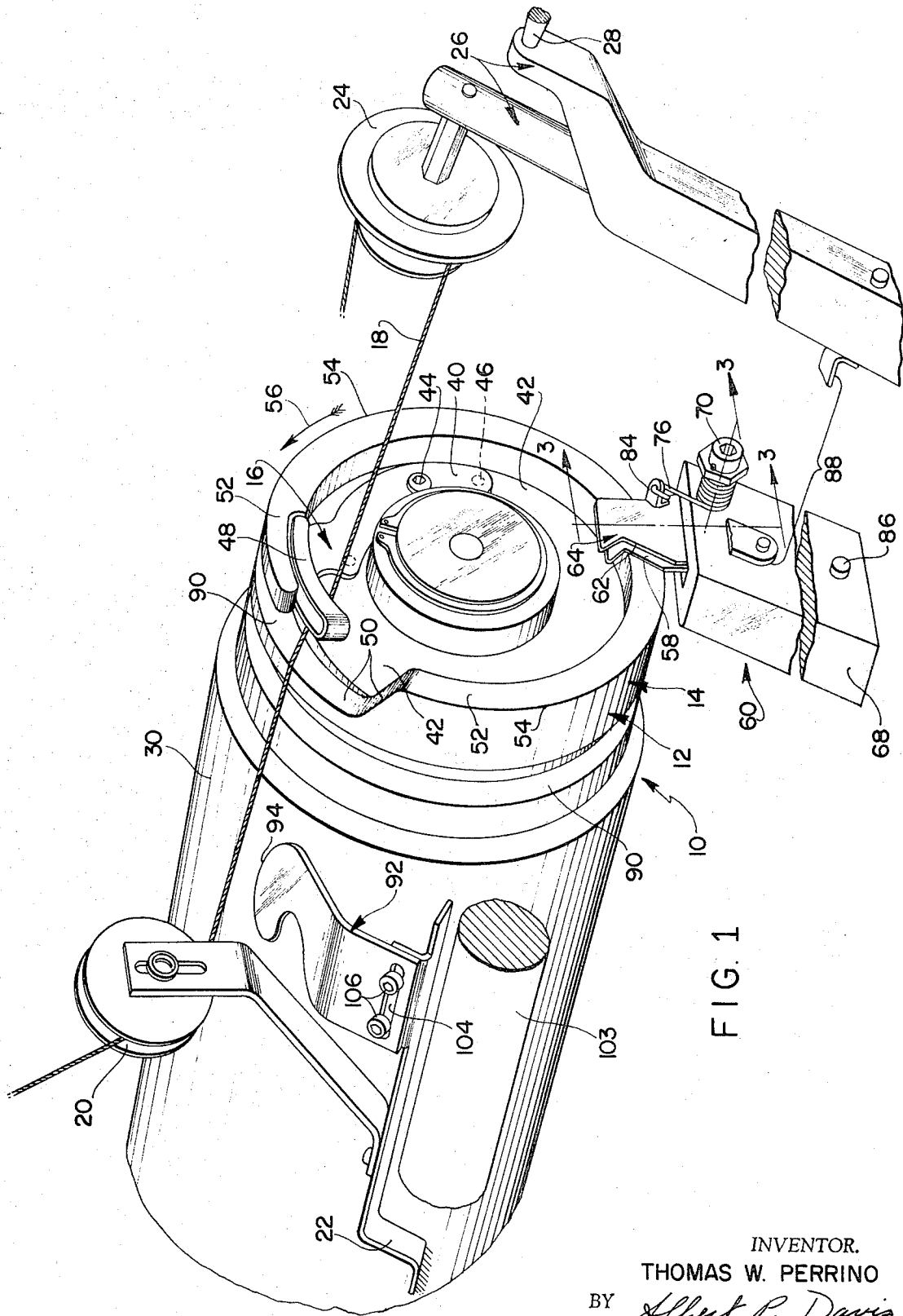


FIG. 1

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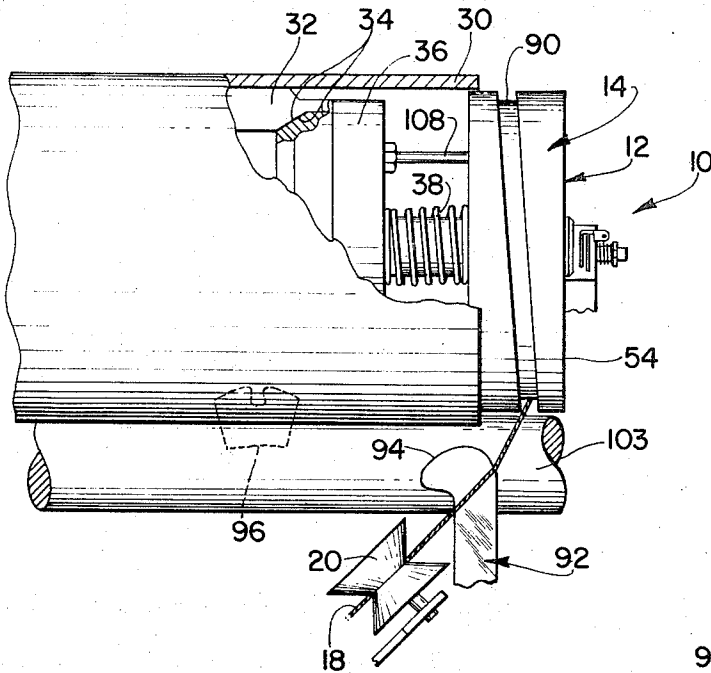


FIG. 2

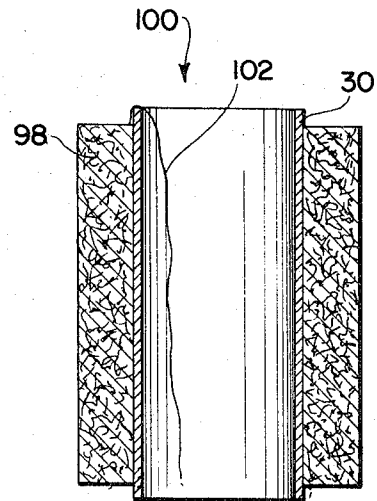


FIG. 5

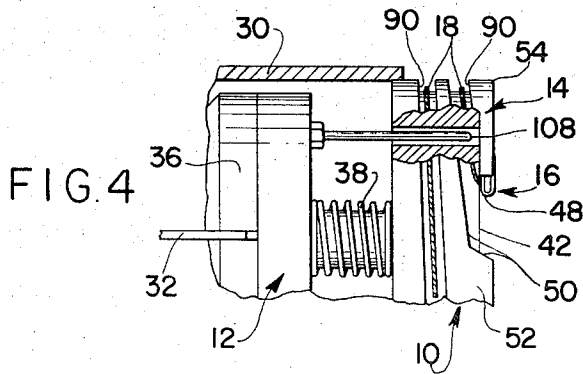


FIG. 4

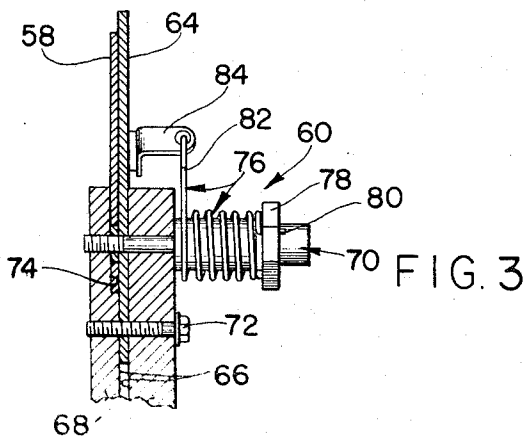


FIG. 3

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## STRAND HANDLING

This is a continuation, of application Ser. No. 5,556 filed Jan. 26, 1970, now abandoned.

This invention relates to winding and, more particularly, to automatically threading-up a rotary chuck and providing a tailing end for a package of yarn wound on the chuck.

As used herein the term "yarn" means any sort of strand material either textile or otherwise. The term "package" means a core of any sort on which a body of yarn is wound, whatever the ultimate form. The term "tailing end" means the end of the strand of yarn from which winding onto a core is commenced.

Attention is directed to the following Leesona Corporation patent application, U. S. Ser. Nos.: 652,819, filed July 12, 1967, now U. S. Pat. No. 3,550,871, dated Dec. 29, 1970, and directed to a winding machine having pairs of winding heads for continuously winding an advancing strand of yarn which is transferred between an active one of the heads and a reserve one of the heads without discontinuing winding; and 725,385, filed Apr. 30, 1968, now U. S. Pat. No. 3,526,348, dated Sept. 1, 1970, and directed to a yarn cutter having a guard.

It is generally common practice to provide a tailing end of yarn on a yarn package by winding a reserve of yarn about an end of the core outwardly of and before commencing traversing of the yarn to and fro across the core to wind the main body of yarn. While this method is commonly used, it has numerous disadvantages. Among these disadvantages is the requirement for generally involved apparatus to hold the advancing yarn free of a traversing mechanism until the reserve yarn is wound on the end of the core and to then release the yarn for pick-up by the traversing mechanism. Another disadvantage is that the amount of yarn wound into the reserve is generally far greater than the amount of yarn required for a tailing end because additional winds of yarn are required for retention of the reserve on the core. Furthermore, the amount of yarn wound as a reserve cannot be readily or accurately controlled because of the general nature of the apparatus, as is understood in the art. Still another problem is that the reserve winding is exposed and if it is relatively loosely wound it may be unseated from the core during handling of the package following its removal from the chuck, or difficulty may be encountered in removing the reserve from the core because of excessive tightness in winding of the reserve.

In initiating winding of the yarn onto the usual prior chuck, the yarn is generally guided into a releasably clamp and is then severed outwardly of the clamp. Many such clamps protrude from the chuck and may foul the yarn or cause other difficulties. Also, many prior cutters are either of complicated construction or do not provide adequate protection of the cutting edge.

It is a primary object of this invention to provide a new and improved winding apparatus and method.

Another object is to provide a new and improved apparatus for providing a tailing end of yarn extending from a package, the apparatus including a chuck having a free end telescopically receiving a core, the chuck including a threading clamp for receiving and holding the yarn upon initiating winding onto the core, with provision for forming a tailing end of the yarn on the free end of the chuck. A related object is provision of a tailing end of predetermined length. Another related

object is provision for adjusting the length of the tailing end. Another related object is provision of a tailing end longer than the distance between the clamp and the body of yarn on the core. A further related object is provision for winding the tailing end in a spiral groove in the free end. Still another related object is provision for recessing the clamp in the free end. A further related object is provision of a yarn cutter having a guard which is automatically operated through engagement with the yarn to securely clamp the yarn and to permit the yarn to contact and be cut by a cutting edge of the cutter.

Another object is provision of a new and improved yarn cutter.

A further object is provision of a new and improved method for providing a tailing end on a body of yarn. A related object is provision of such a method in which the yarn is wound about a core mounted on a chuck having a free end for telescopically receiving the core. Another related object is provision of such a method including the steps of winding a length of the strand about the free end of the chuck to form the tailing end. Still another related object is provision of the step of winding the yarn about the free end a predetermined number of times to provide a predetermined length of the tailing end. A further related object is provision for adjusting the length of the tailing end. Another related object includes withdrawing the core over the free end to deposit the tailing end within the core. A further related object includes releasably attaching the yarn to the free end before winding the yarn about the free end, and releasing the yarn from the free end when the core is withdrawn over the free end.

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

FIG. 1 is a fragmentary, schematic perspective view of apparatus illustrating a preferred embodiment of the invention;

FIG. 2 is a fragmentary, schematic top view of a portion of the apparatus shown in FIG. 1, but in a different position, with parts broken away and removed for clearer illustration, and to a reduced scale;

FIG. 3 is an enlarged, schematic sectional view taken generally along the lines 3—3 in FIG. 1;

FIG. 4 is a fragmentary, schematic view similar to FIG. 2 but with the apparatus in still another position; and

FIG. 5 is a schematic, diametric sectional view of a full package, to a reduced scale.

Referring to FIGS. 1 and 2 of the drawings, the apparatus illustrated is generally similar to that more fully described to the previously noted U.S. Pat. No. 3,550,871, and includes a winding head 10 having a spindle or chuck 12 mounted and rotatably driven at one end (not shown). An opposite free end of the chuck forms a head 14 and has a yarn clamp 16 for receiving a strand of yarn 18 advancing from a threading guide roll 20 on an arm fixedly located on a fixed bracket 22, the yarn then passing across a threading transfer roll 24 of a transfer arm 26, pivoted at its lower end on a fixed shaft (not shown), and having an actuating handle 28. From the transfer roll 24 the yarn is wound onto a core on another winding head (not shown), or it may be disposed of as through an aspirator or any other suitable means, as desired. A core tube 30 is telescopically received on and is tightly clamped

to the chuck 12 by a plurality of generally concentric blades 32 (FIG. 2, only one shown) actuated by cooperating beveled cam surfaces 34 on axially disposed actuating members 36 (only one shown) which are moved axially to the left as by a compression spring 38 to expand the blades 32 and clamp the core 30 in place, and are released by suitable mechanism (not shown) which moves the actuating members 36 to the right.

The yarn threading clamp 16 is in the form of a spring steel member having a flat body 40 facially secured to an annular surface 42 of the head 14 by means of a bolt 44 extending through a hole in the flat body 40 and threadedly received by the head 14, with an inwardly extending protrusion 46 in the flat body snugly received in a depression in the annular surface 42 of the head. A free end of the clamp which receives the yarn 18 is in the form of a U-shaped end 48, as may best be seen in FIG. 1. This U-shaped end 48 is received in a recess 50 (FIGS. 1 and 4) formed primarily in an annular flange 52 which extends axially outwardly from the annular surface 42.

With the yarn 18 advancing across the guide roll 20 and the transfer roll 24, the transfer arm 26 is pivoted clockwise from a normal position (not shown) to a transfer position shown in FIG. 1, to move the yarn 18 into engagement with and bent across an outer edge 54 of the annular flange 52 until the inwardly extending recess 50 in the flange encounters the advancing yarn 18 whereupon the yarn springs inwardly against the annular surface 42 and is received and held by the yarn clamp 16 in a position between the clamp end 48 and the annular surface 42.

Continued rotation of the chuck 12 in a counterclockwise direction, as indicated by the arrow 56 in FIG. 1, causes the portion of the yarn 18 between the clamp 16 and the transfer roll 24 to engage a guard 58 (FIGS. 1 and 3) of a cutter assembly 60 and to move the guard 58 so that the yarn engages and is severed by a cutting edge 62 of a blade 64 of the cutter assembly 60. With particular reference to FIGS. 1 and 3, the cutting blade 64 is sandwiched between opposed faces 66 (FIG. 3) of a base member 68 and is fixed therebetween in any suitable manner as by a pair of bolts 70 and 72 received freely in the base member on one side of the faces 66 and extending through the blade 64 and then threadedly received by the base member on the other side of the faces 66. As shown in FIG. 1, the cutting blade 64 has a generally notch-shaped cutting edge. The guard 58 is sandwiched between the blade 64 and a face 74 and is pivoted therebetween by means of the bolt 70 which serves as a pivot pin. The guard 58 extends outwardly from the cutting edge 62 and has a configuration generally similar to the cutting edge so that as the yarn 18 engages the guard it will be nested in the base of the notch, thereby pivoting the guard 58 clockwise (FIG. 1) whereupon the yarn 18 engages the cutting edge 62 and is severed thereby. A torsion spring 76 is telescoped on the pivot bolt 70 between the mounting block 68 and a nut 78 threaded on an enlarged shank portion of the bolt and against the bolt head. One end 80 of the spring 76 is received in a hole in the nut 78 and an opposite end 82 is received by a tab 84 integral with the guard 58 and extending about the blade 64, for urging the guard 58 to its normal position extending outwardly from the cutting edge 62 of the blade 64.

The base member is mounted at its lower end on a pivot 86 so that the cutter assembly 60 may be moved from a retracted position (not shown) into the cutting position, as shown in FIG. 1, upon movement of the transfer arm 26 to the position shown in FIG. 1. To this end the base member 68 is connected by a linkage 88 to the transfer arm 26, as is more fully described in the previously noted U. S. Pat. No. 3,550,871.

Before the yarn 18 is severed by the cutting apparatus, it begins to move through a spiral groove 90 which opens into the recess 50 in the annular flange 52 and makes approximately one and a half turns about the head 14 in an axially inward direction from the outer end of the groove at the clamp 16 to an inner end of the groove adjacent the core 30. As the yarn 18 is seated in the groove 90 it is received by a yarn guide 92 (FIGS. 1 and 2) adjustably mounted on the bracket 22, as will be described later. The guide 92 has a generally convex cam 94 over which the yarn 18 rides, from right to left as seen in FIGS. 1 and 2, as the yarn is progressively seated in the groove 90. Near the inner end of the groove 90 the yarn 18 snaps free of the left end of the yarn guide cam 94 and is picked-up by a traversing guide 96 (FIG. 2) of a suitable traversing mechanism (not shown) whereupon the yarn 18 is traversed to and fro axially of the core 30 as a body of yarn 98 (FIG. 5) is wound onto the rotating core, thereby forming a package 100 (shown separately in FIG. 5). The yarn between the clamp 16 and the body of yarn 98 provides a tailing end 102 (FIG. 5). As the diameter of the body grows it engages a roller bail 103, for reasons well understood in the art.

A tailing end 102 of desired length is provided by cooperative action of the spiral groove 90 and the yarn guide cam 94. Since the groove 90 causes the advancing yarn 18 to be moved from right to left across the yarn guide cam 94, adjustment of the position of the yarn guide 92 left or right, regulates the length of yarn which will be deposited in the groove because upon release of the yarn 18 by the yarn guide cam 94 the yarn is picked-up by the traverse guide 96 and winding of the body of yarn 98 on the core 30 commences. For adjusting the position of the yarn guide cam 94, the yarn guide has an elongated slot 104 (FIG. 1) which receives a pair of bolts 106 threaded into the bracket to releasably clamp the cam in adjusted position.

When the package 100 is full, the advancing yarn 18 is transferred to another winding head (not shown), as is discussed in the previously noted U. S. Pat. No. 3,550,871, rotation of the chuck 12 is stopped and the full package 100 may then be doffed from the chuck.

Doffing is accomplished by operating the chuck releasing mechanism (not shown) which causes the actuating members 36 (FIGS. 2 and 4) to move to the right whereupon the blades 32 retract, thereby releasing the core 30. Simultaneously therewith, a pin 108 extending axially outwardly from the end actuating member 36 engages the yarn clamp end 48 to flex the clamp 16 away from the annular surface 42, thereby releasing the tailing end 102 of the body of yarn 98. As the core 30 and the body of yarn 98 are telescoped over the head 14, which is of smaller diameter than the inside diameter of the core, the tailing end 102 may be drawn through the hollow of the core 30 and is retained therein (FIG. 5) for subsequent recovery.

While this invention has been described with reference to a particular embodiment in a particular envi-

ronment, various changes may be apparent to one skilled in the art and the invention is therefore not to be limited to such embodiment or environment except as set forth in the appended claims.

What is claimed is:

1. Apparatus for winding an advancing strand to form a wound strand package with a tailing end of the strand extending from the strand package comprising, a rotatable member having a first zone for winding of the package thereon and a second zone projecting axially of said first zone, means for forming the tailing end on said second zone including a strand guideway of predetermined length on said second zone, said guideway being arranged to have the strand laid thereon, strand engaging means positioned proximate to said guideway for seizing the strand during its advance to commence entry of the strand into said guideway as said member is rotated, and means for severing said strand after it has been seized by the strand engaging means.

2. Apparatus as set forth in claim 1 wherein said strand engaging means includes a clamp, and including means shielding the clamp.

3. Apparatus as set forth in claim 2 wherein the shielding means has a recess for access of the strand to the clamp.

4. Apparatus as set forth in claim 3 wherein the shielding means includes an edge over which the strand rides to the recess, and the recess opens through said edge.

5. Apparatus as set forth in claim 1 wherein the guideway includes an entry locus where the strand is initially engaged therein and an exit locus spaced from said entry locus where the strand exits from the guideway.

6. Apparatus as set forth in claim 1 wherein the tailing end forming means comprises a spiral groove extending generally axially about said second zone for receiving the strand to form the tailing end.

7. Apparatus as set forth in claim 5 including means for moving the strand away from said guideway after said strand exits from said guideway, and control means for retaining the strand away from the moving means and for releasing the strand for engagement by the moving means.

8. Apparatus as set forth in claim 1 wherein the severing means includes a blade having a substantially flat body with a cutting edge for severing the strand, and including guard means having a substantially flat guard body facially opposed to the blade body.

9. Apparatus for winding an advancing strand into a strand package and providing a tailing end extending from said package comprising, a rotatable member for winding the strand package thereon, said rotatable member having an outer free end over which the strand package may be slidably removed from the rotatable

member, means for forming the tailing end on the outer free end of said member in position to be deposited within said strand package as said package is removed from said member, said outer free end including a strand guideway of predetermined length thereon, said guideway being arranged to receive said strand, strand engaging means positioned proximate to said guideway for seizing the strand during its advance to commence entry of the strand into the guideway as said member is rotated and means for severing said strand after, it has been seized by said strand engaging means.

10. Apparatus as set forth in claim 9 wherein the tailing end forming means includes a groove formed in said member.

11. Apparatus as set forth in claim 9 wherein the tailing end forming means comprises a spiral groove extending around said free end for receiving the strand to form the tailing end.

12. Apparatus as set forth in claim 11 including traversing means for engaging said strand upon release of the strand from said groove and moving the strand away from said groove.

13. A method of winding an advancing strand into a package on a rotatable support provided with free end comprising the steps of, engaging said advancing strand on said support, severing said strand after engagement with said support, winding a length of the strand about the free end of said support to form the tailing end, winding the strand about the support to form said package, and removing said package over said free end with the tailing end attached to the package.

14. A method as set forth in claim 13 wherein the step of winding the strand about the free end includes winding a predetermined length of strand thereon.

15. A method as set forth in claim 14 wherein the free end has a spiral groove and the step of winding the strand about the free end includes winding said strand into the groove.

16. A method as set forth in claim 13 including the step of withdrawing said package over the free end to deposit the tailing end within said package.

17. A method as set forth in claim 16 wherein the step of winding the strand about the free end includes winding a predetermined length of strand thereon.

18. A method as set forth in claim 17 wherein the free end has a spiral groove and the step of winding the strand about the free end includes winding said strand into the groove.

19. A method as set forth in claim 18 including the steps of releasably attaching the strand to the free end before winding the strand about the free end, and releasing the strand from the free end when the package is withdrawn.

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