July 16, 1963 L. A. OBERLY 3,097,805

WINDING APPARATUS

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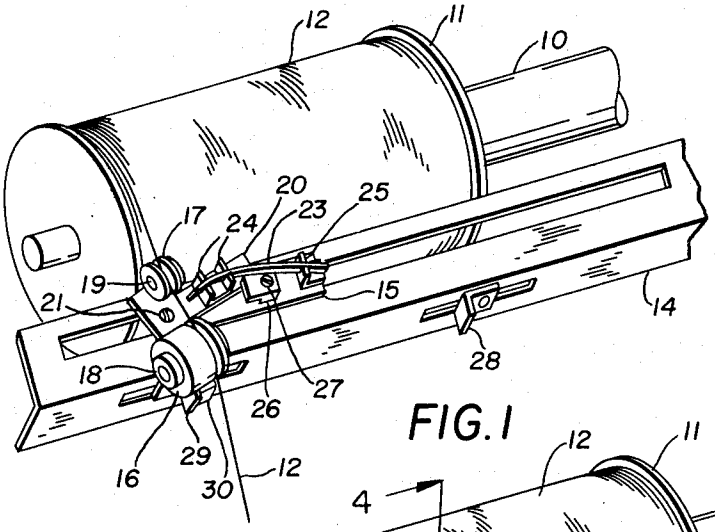


FIG. 1

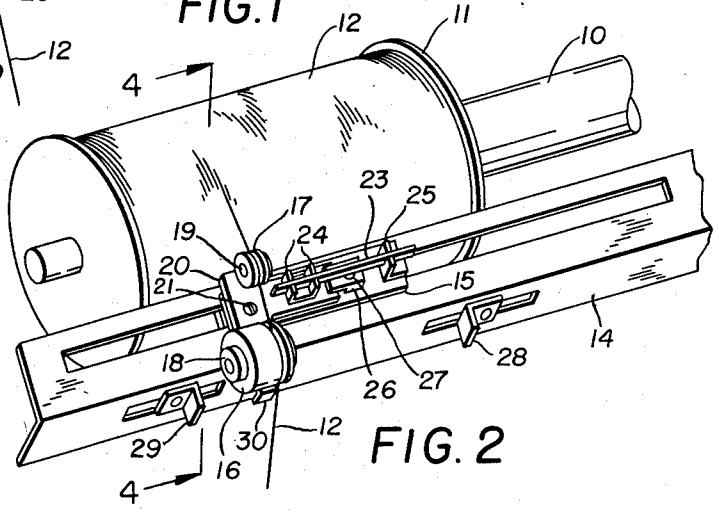


FIG. 2

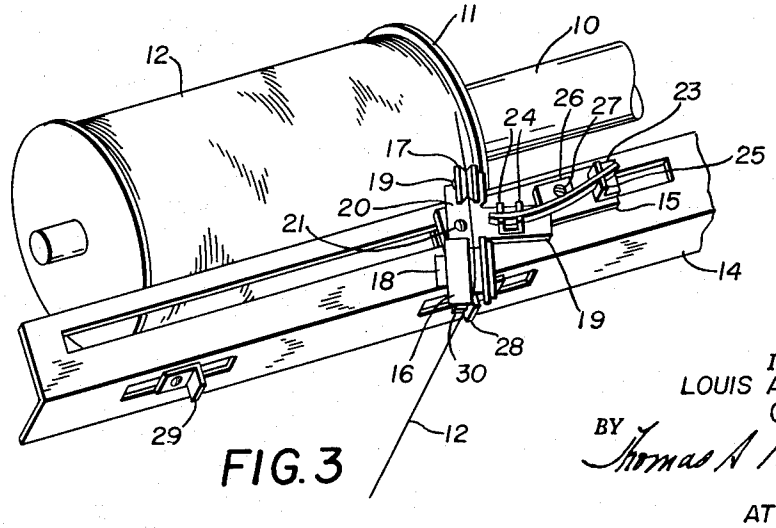


FIG. 3

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WINDING APPARATUS

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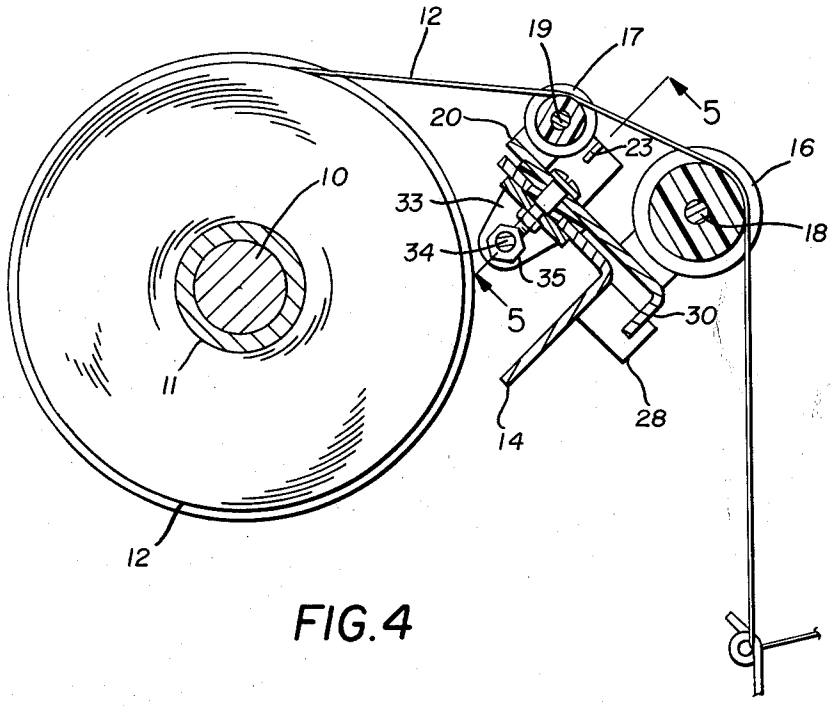


FIG. 4

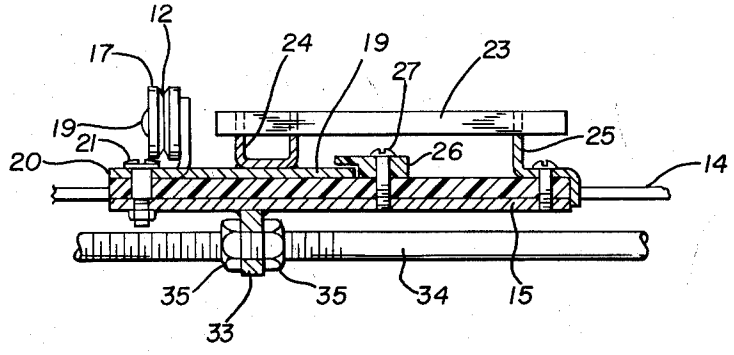


FIG. 5

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WINDING APPARATUS

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2 Claims. (Cl. 242—43)

This invention relates to an improvement in yarn winding apparatus and, more particularly, to a yarn laying means enabling the formation of a generally cylindrical yarn package about the core of a yarn support or of a spool.

In the collection of continuous lengths of yarn on a cylindrical core or on the core of a spool by rapid winding thereon in the form of spirals or helices laid by a reciprocating traverse, there generally will occur a yarn build-up in the form of humps at about each end of the spool or core due to a momentary hesitation upon reversal of the traverse. The resulting package is irregular in diameter and its full capacity is not realized, also, underwinding and entangling frequently occur. It is desirable, of course, to avoid these package irregularities since they are not economic and a low rate of winding would be necessary to avoid them.

Attempts have been made to correct the aforesaid dwell problem and some have been successful, each solution, however, being adapted to a particular type yarn and sometimes to a winding apparatus. With the advent of greater winding speeds the problem continues to exist, especially with synthetic yarns. The improvement of this invention solves the rapid winding of synthetic monofilament yarn, such as regenerated cellulosic yarn, onto a cylindrical spool giving a final yarn package of substantially equal diameter throughout its length.

It has been heretofore generally difficult to properly wind a synthetic monofilament yarn, even more so a large denier monofilament yarn of about 450 to 900 having a nominal twist or no twist at all, into a tight cylindrical package of uniform diameter. Monofilament yarn of the size mentioned is straw-like in character and available winders were found not suitable for such yarn since a build-up at the package ends would occur. This condition was advantageously corrected by the present improvement, in the provision of a traversing member having regulated pivoting of the yarn laying guide, particularly at the reversal points. The controlled pivoting is effected by means of a flexible device carried by the traversing member. The pivoted yarn laying guide is urged forwardly beyond its normal position when it approaches a reversal point and upon reversal, it is quickly brought back to a normal axially parallel position relative to the spool until it reaches a similar point at the other end of its travel. This controlled, advanced laying of yarn provides for tightly laid package ends having a diameter equal to the main body portion of the package.

More particularly, the pivoting of the yarn laying guide is desirably controlled by a leaf spring in cooperation with adjustable stops positioned at about either end of the traverse motion. With the yarn laying guide advanced beyond its normal position yarn is laid in less concentration with no momentary stop in the reversal areas providing for a monofilament package of equal diameter and of substantially equivalent density throughout. The improvement in the winding apparatus will be described in greater detail in the following specification taken in connection with the accompanied drawing, where:

FIGURE 1 is a perspective view of a portion of a winding apparatus showing the pivoted yarn laying guide and traversing member at about the end of a package;

FIGURE 2 is similar to FIGURE 1 with the yarn laying guide in a normal axially parallel position relative to the yarn package;

FIGURE 3 is a similar showing with the yarn laying guide at about the other extreme package position;

FIGURE 4 is a cross section of FIGURE 2 taken along lines 4—4; and,

FIGURE 5 is a partial cross section of the yarn lying guide of FIGURE 4 taken across lines 5—5 showing the controlling leaf spring of the yarn laying guide of the apparatus.

In FIGURES 1 to 3 of the drawing, a spindle **10** supports a spool **11** on which a monofilament yarn **12** is wound in spirals or helices laid thereon by the reciprocated yarn laying wheel **17** rotatably mounted on the traversing member or carrier slide **15** positioned in the traverse support **14**. The traverse support **14** is slotted and in which slot the carrier slide **15** supporting the yarn lying means **17** is reciprocated. The reciprocating means effecting the back and forth motion are well-known and are not herein described or shown.

The carrier **15** supports thereon a frame or base **20** pivoted for rotation within predetermined limits about stud or bolt **21** secured in its base. The base **20** in turn, supports in upright elements grooved thread conducting and laying rollers **16, 17** suitably positioned and rotating about supporting shafts **18** and **19**. Also, there is mounted on the pivoted base **20** a U-section with its pair of parallel vertically positioned arms **24** being slotted to secure therein one end of a leaf spring **23**. The leaf spring **23** is pinched in position in the slots. Since the vertical sections or arms **24** are secured to the pivoted base **20** the leaf spring **23** is adapted to be flexed whenever the base is rotated or pivoted.

On the reciprocating carrier base **15** there is also supported an undercut block **26** being secured against displacement by means of a screw or stud **27**. The block **26** by being undercut permits the support **20** to move within this cut portion within its width limits and, thus, prevent any dislodgment of the pivoting base **20** because of possible loosening of the guide supporting apparatus during traversing motions.

On the traverse support frame **14** there are provided adjustable limit stops **28, 29** positioned at a predetermined distance apart. These stops **28, 29** are contacted by an angular extension **30** forming part of the pivoted support base **20**. Upon reciprocation of the yarn lying guide carrier **15** the base extension **30** abuts either guide **28, 29** effecting the pivoting of the base **20** and of the yarn laying guide wheels **16, 17** causing the yarn laying guide **17** to advance beyond its would-be normal position and, upon instant reversal, quickly retracting the yarn laying guide **17** to a normal yarn laying position.

In FIGURE 1 the yarn guide **17** is shown in a position tilted toward the left end of the yarn laying spool **11** while in FIGURES 2 and 3 the yarn laying guide **17** is normal to the spool, and it is shown as shifted to the right end of the spool **11**. The leaf spring **23** normally controlling the parallel position of the yarn laying wheel **17** yields upon contact of the angular extension **30** with either limit **28, 29** to permit the yarn guide **17** to lay yarn in advance of its normal position when it quickly returns upon loss of contact with either stop **28, 29** to such normal axial yarn laying position as shown in FIGURE 2. The extended laying of the monofilament yarn and elimination of the temporary rest upon reversal prevents a build-up at the spool ends.

FIGURES 4 and 5 show in greater detail the two spaced yarn guiding and laying wheels **16** and **17** and their support on the pivoted slide support **20**. Wheel **16** advantageously guides the yarn to the laying guide **17**

being positioned in spaced relation thereto to provide the necessary distance therebetween giving necessary angularity to the wheel **17** when pivoted over a predetermined arc, which pivoting is resisted from a normal position by the leaf spring **23**. The pivot bolt **21** extends through the traverse support frame **14** into and through carrier slide member **15**. Carrier slide member **15** is connected by a vertical connecting portion **33** to the reciprocating means generally designated by the partially threaded (partially shown) actuating bar or rod **34**. It is fixed thereto by positioning nuts **35**. The leaf spring **23** is securely held by the slotted U shaped member **24** at one end while the other end is slidable in the spaced slotted element **25**. When flexed the leaf spring **23** moves in the element **25**. Instead of grooved rollers or wheels **16**, **17** a metallic yarn guide with or without a ceramic insert can be as readily used for the laying of yarn **12** on the spool **11**. Obviously the leaf spring **23**, while preferred, can be supplanted by a coiled unit. The presently described assembly is one based on economy and a minimum number of parts advantageously providing for prolonged rugged operation.

What is claimed is:

1. In a winding apparatus, a yarn support comprising a spool having end cheeks at right angles to the barrel, means for rotating said yarn support, a traversing member, means for reciprocating said member axially across said yarn support between said cheeks, a pivotally mounted yarn laying guide on said traversing member

also reciprocating therewith axially relative said yarn support, an elongated flexible means, spaced supports for said flexible means, one of said supports being secured to said traversing member and firmly holding one end of said flexible means and the other support being secured to said pivotal yarn laying guide and being slotted so that the other end of the flexible means is slidably positioned therein, stationarily positioned spaced impact members adjacent said traversing means, and said yarn laying guide upon reciprocating contact with either said spaced impact member is axially pivotally moved at an increased velocity in the direction of travel across said yarn support, said yarn guide movement being resisted by said flexible means.

2. In the winding apparatus of claim 1 in which the said flexible means is a metallic leaf spring.

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