Dec. 13, 1966 W. H. O'BRIEN 3,291,405

WINDING MACHINE

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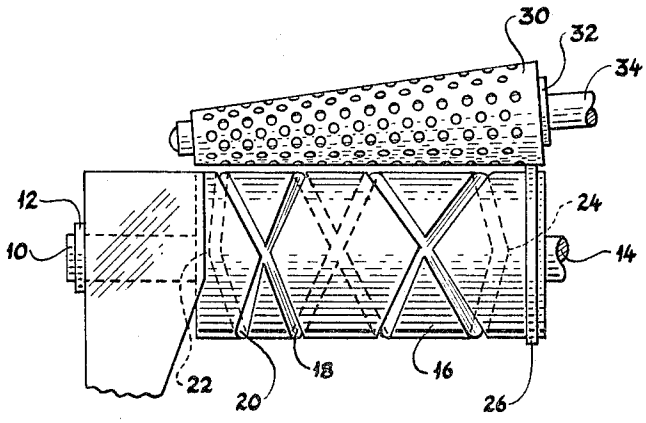


Fig. 1

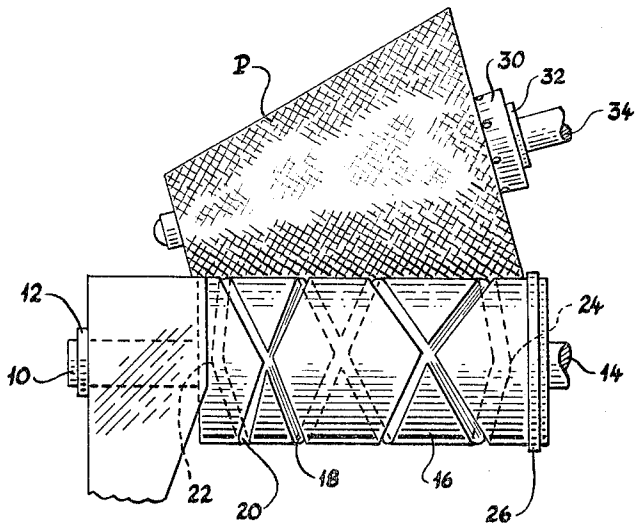


Fig. 2

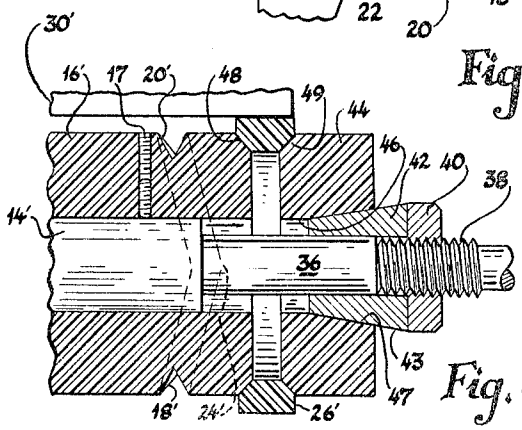


Fig. 3

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# 3,291,405
# WINDING MACHINE

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The present invention relates to a yarn winding machine and relates, more particularly, to improvements in the rotary traverse roll of a winding machine which customarily rotates in frictional driving engagement with a yarn package being wound to impart rotation thereto and which, in addition, is formed with interconnected grooves of relatively reversed pitch through which the yarn is drawn and traversed in winding onto the package.

It is well known in the winding art to guide a strand onto a rotating package core or package by means of a rotatable, cylindrical roll having an endless groove in the peripheral surface thereof. The roll is usually located in surface-to-surface driving contact with the package core and rotation of the roll moves the yarn back and forth longitudinally of the core to distribute the yarn therealong.

Traverse rolls of the type herein referred to are commonly made of metal, plastic, or other relatively hard materials. Furthermore, the package cores which are employed to wind yarn thereon are made of a wide variety of materials such as metal, plastic, wood, and paper, only to cite a few examples. In operation with the high speed winding machines of the present day wherein the traverse roll is rotated, often continuously at speeds of 4,000 r.p.m. and higher, and the package tube or core is moved into peripheral contact therewith for rotation from a non-rotating position, it has been found that damage may result to the traverse roll, the package core, the yarn which is to be traversed by the roll, or, possibly, to two or all three of the foregoing. For instance, if the package core or other container is made of metal it may, due to extended usage, have burrs or other snags on the periphery thereof which will damage the traverse roll when rotated thereagainst. By the same token, if the package core is of a rather soft material such as paper, abrupt contact of this soft core with the rotating traverse roll may cause the core to be damaged at the start of winding. As a further case, when a metallic or other relatively hard package core is placed from a stopped position into peripheral engagement with the rotating traverse roll, as is common at the outset of a winding cycle, it may occur that the yarn will be caught therebetween and will be abraded, broken or otherwise deleteriously affected. The present invention provides means for obviating all of the foregoing disadvantages and provides an improved, economically produced traverse roll capable of operating efficiently at high speeds.

Therefore, it is one object of the present invention to provide an improved grooved traverse roll capable of operating at high speeds without damage to the traverse roll, the yarn being traversed thereby on the core on which the yarn is deposited.

Another object of the present invention is to provide a grooved traverse roll adapted to drive a self-supporting package at high speeds while delivering yarn thereto for winding wherein the traverse roll is profiled so as to establish an effective separation between the yarn core and the roll during the initial stage of winding.

A further object of the present invention is to provide an improved grooved traverse roll for winding machine which is provided with a driving rim or ring at one end thereof for holding the package core apart from surface-to-surface contact with the traverse roll during the initial stage of winding of yarn thereon.



Yet a further object of the present invention is to provide a grooved traverse roll for a winding machine having a driving ring at one end thereof for holding the package core separated from peripheral contact with the traverse roll, wherein the ring serves to drive the core during the initial stage of winding yarn thereon, and wherein the periphery of the package is reecived in surface-to-surface contact with the traverse roll after the initial winding of yarn has been placed on the package core.

An additional object of the present invention is to provide a grooved traverse roll for a winding machine having an adjustable driving ring at one end thereof for driving a package core as the roll is rotated, wherein the ring may be adjusted to hold the core a predetermined distance away from the periphery of the traverse roll as the core is presented thereto.

Another object of the present invention is to provide a high speed, grooved drive-traverse roll for a winding machine which is inexpensive to manufacture and economical, durable and efficient in use.

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

The invention accordingly comprises the apparatus having the construction, combination of elements and arrangement of parts exemplified in the following detailed disclosure and limited as to the scope only as 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:

FIG. 1 is a front elevation of the improved traverse roll of the present invention and illustrating a yarn core in operative association therewith, the core being shown prior to having yarn traversed thereon;

FIG. 2 is a view similar to FIG. 1 illustrating the position of the yarn core relative to the traverse roll after the deposition of yarn thereon to wind at least a portion of a package, such portion being sufficient to engage the package in surface-to-surface relationship with the traverse roll; and

FIG. 3 is a cross-sectional view of a modified embodiment of the present invention.

Briefly, the present invention provides a grooved traverse roll mounted on a winding machine for rotation and arranged to receive a package core thereon in driving contact therewith so that, as the traverse roll is rotated, the package core is similarly rotated and yarn is traversed back and forth longitudinally of the package in the groove of the traverse roll to distribute the yarn on the core. The traverse roll is provided with an annulus or ring adjacent one end thereof, this ring being of somewhat greater diameter than the major diameter of the traverse roll. Moreover, the flange is disposed beyond the longitudinal limits of the effective traversing zone of the traverse roll. The flange is adapted to receive one end of a package core and hold this core with its outside diameter parallel with and in spaced relationship to the periphery of the traverse roll. Due to the fact that the annulus of the core does not interfere with the traversing motion of the yarn on the package core, once sufficient yarn has been wound onto the core so that the yarn thickness exceeds the distance between the diameter of the traverse roll and the diameter of the flange, the package being wound on the core moves into surface-to-surface contact with the traverse roll for the remainder of the winding cycle.

Referring now to the drawing, a portion of the frame of a winding machine is shown at 10. A bearing 12 is suitably affixed to frame 10, and receives the journal por-

tion of a rotatable shaft **14**. A traverse roll **16** in the form of a cylinder molded or otherwise formed from a suitable material such as metal, Bakelite, or other plastic is mounted on shaft **14** for rotation therewith. A substantially continuous groove having two branches **18** and **20** connected at their opposite ends **22**, **24** is formed in the surface of traverse roll **16**. The end of the traverse roll **16** remote from frame **10** is provided with an annulus or ring **26** which may be formed integrally with the traverse roll, or which may be a separate member secured tightly thereon. It will be appreciated by those skilled in the art that the ring **26** may be operatively associated with traverse roll **16** in arrangements other than that described herein. For example, the ring could be a separate element supported on its own hub and abutted against the end of the traverse roll. No attempt will be made to illustrate and describe all possible variations along these lines as most of them will be more or less obvious and within the skill of the art.

Ring **26** surrounds traverse roll **16** and is positioned beyond the confines of the traversing grooves **20**, **22**. That is to say, the ring **26** is positioned intermediate connecting point **24** of the grooves and the right-hand end of the traverse roll as in FIG. 1. It will be observed from the drawing that ring **26** is of somewhat greater diameter than the diameter of traverse roll **16**. The extent to which ring **26** protrudes upward beyond the periphery of roll **16** is determined so that communication between a package core and traverse roll **16** will be prevented. Yet, the distance is maintained, desirably, to a sufficiently small magnitude so that the yarn being traversed onto the core will engage the traverse roll in surface-to-surface contact after only a few layers have been wound thereon. In practice, where the distance which ring **26** rises beyond the periphery of traverse roll **16** at a given point is in the order of .010–.050 inch, acceptable running conditions for winding a package with the traverse roll **16** have been yielded. Prominent factors in the selection of the proper distance will be runout or eccentricity of the core, yarn diameter, plus the radial distance which snags and the like project up from core. Of course, it is desirable that the periphery of ring **26** be concentric with the periphery of traverse roll **16** to present uniform running conditions as the yarn is traversed onto the package core.

In the drawing there is illustrated a conventional conical yarn holder or package core **30** of the type on which a conical self-supporting package or yarn is commonly wound. The core **30** may be of a metallic construction having a plurality of holes pierced therethrough whereby the package wound on traverse roll **16** may be package dyed. It will be appreciated, however, that core **30** may be of any type commonly employed in winding a package of yarn, whether it be cylindrical or conical, and may be manufactured from any acceptable material such as plastic, wood or paper. The core **30** is supported on a winding mandrel **32** mounted for rotation upon a shaft **34** which is connected to the remainder of the winding machine (not shown) in such as way as to permit the core to be positioned with its periphery parallel to traverse roll **16** and to allow package to grow in size as the yarn is wound thereon. In the drawings, the machine is set up for the winding of a conical package or cop that it will be appreciated that other shapes and types of packages could be wound as well by replacing the conical mandrel and package core with other mandrels and packages appropriate to the formation of the particular package desired.

Package core **30** and mandrel **32** are adapted to be rotated, in the first instance, by frictional contact of ring **26** on the periphery of the core. Thus, as shown in FIG. 1 the external diameter of package core **30** lays parallel with the external diameter of traverse roll **16**, and to this end, shaft **34** is inclined appropriately to afford this orientation of the core. As already indicated, shaft **14** may be subject to constant rotation, or alternatively, shaft **14** may be started as the package core is advanced thereto, the means by which the shaft is driven being omitted here. In consequence thereof yarn is traversed back and forth lengthwise of the package core **30** through the grooves **18** and **20** in a fashion such that the yarn is moved longitudinally of the core to become wound thereon. It has already been stated that, at the outset of the winding cycle, the core **30** is driven by ring **26** to achieve rotation of the core and wind yarn thereon. However, it will be apparent that after several layers of yarn have been wound on the core, i.e., a sufficient number of layers of yarn to equal the distance by which the diameter of ring **26** exceeds the outside diameter of traverse roll **16**, the yarn on the package will move into surface-to-surface contact with the periphery of the traverse roll **16**. In consequence thereof the winding condition as depicted in FIG. 2 will be assumed. The take-up package P will lay in peripheral contact with traverse roll **16** and will be rotated thereby so that the yarn delivered to package P and traversed therealong by traverse roll **16** will be moved back and forth lengthwise of the package in the usual fashion to achieve complete winding of said package. However, at this time the layer of yarn on the core **30** acts, in effect, as an insulator so that the core is prevented, at anytime during the winding cycle from laying in surface-to-surface contact along the full length of the traverse roll.

In FIG. 3 there is illustrated a modified form of the present invention. An elongated shaft **14'** serves as a mounting for a traverse roll **16'**. The traverse roll is securely affixed on the shaft by means of a set screw **17**. Thus, as shaft **14'** is rotated by means not illustrated herein the traverse roll is likewise rotated. The surface of traverse roll **16'** has a continuous groove including oppositely extending branches **18'**, **20'**, interconnected at their respective outer ends, formed therein. One such interconnecting point is shown at **24'**. The grooved branches **18'**, **20'** serve to receive a strand of yarn and as the traverse roll is rotated the yarn is caused to move along the branches and be distributed along an adjacent rotatable package core **30'**.

A section **36** of shaft **14'** extending outwardly beyond the confines of traverse roll **16'** is formed to be of somewhat smaller diameter than the section of the shaft which mounts the traverse roll. A portion of shaft section **36** is threaded as at **38** to receive a mating nut **40**. A bushing **42** is slidably situated on shaft section **36** intermediate traverse roll **16'** and nut **40**. The outer diameter of bushing **42** is tapered at **43** so that the outside diameter of the bushing decreases as it extends toward the traverse roll. A circular collar **44** of essentially the same diameter as traverse roll **16'** encircles shaft **14'** and is located intermediate the traverse roll and generally the forward or smaller diameter end of bushing **42**. In fact, the forward end of the bushing **42** enters into the enlarged central aperture **46** through the collar **44** and, in this manner, provides a mounting for holding the collar concentric with shaft **14'**. The central aperture **46** of collar **44** is tapered over the major portion of its width as at **47** to mate with the forward section of bushing **42**.

It will observed that the adjoining outer circumferential edges of traverse roll **16'** and collar **44** are chamfered at **48** and **49**, respectively. A ring **26'** of resilient material, such as plastic or rubber for example, is seated on chamfers **48**, **49** and for this purpose said ring **26'** has side walls which are partially tapered to mate with the chamfers. Ring **26'** thereby normally acts to space collar **44** from traverse roll **16'**. Moreover, ring **26'** may be adjusted to protrude a predetermined distance above the outside diameter of traverse roll **16'** by shifting bushing axially of shaft section **36** through movement of nut **40**. Thus, if it is desired to elevate ring **26'** to a greater distance beyond the circumference of traverse roll **16'** nut **40** is rotated to shift bushing **42** to the left (FIG. 3). In turn, collar **44** is drawn closer to the side of traverse roll **16'** and, in consequence thereof, ring **26'** is cammed outward concentrically. As a result, package core **30'**,

which is intially in driving contact with the ring 26' is held a proportionately greater distance away from the periphery of the traverse roll. Conversely, the ring 26' may be contracted so that its projection beyond the periphery of traverse roll 16' is reduced by shifting nut 40 to the right (FIG. 3). Ring 26' will consequently contract to shift bushing 42 and collar 44 to the right and, thus, reduce the effective diameter of the ring. As a result a package core 30' when engaged on the ring, will lay proportionately closer to traverse roll 16'. It will be appreciated that ring 26' will be formed of a resilient material sufficiently rigid to provide a firm driving means for the core 30' so that, as the traverse roll is rotated, the core will be steadily and evenly rotated therewith. Since the reversal point 44 of the traverse roll is spaced inwardly, i.e., toward the mid-point of the traverse roll, from ring 26', yarn will build up on core 30' to a point where the core will move out of driving engagement with ring 26' and the package will move into surface-to-surface contact with the traverse roll for further rotation.

From the foregoing it will be appreciated that the present invention provides a highly satisfactory means for obtaining winding of a take-up package by means of a rotating traverse roll wherein, in the initial stages of the winding, the core on which the take-up package is to be wound is separated from the grooved section of the traverse roll. By this means damage to the yarn, to the traverse roll and to the package core which would otherwise arise from intimate surface-to-surface contact between substantially the full length of the core and the traverse roll is prevented. Thus, the traverse roll of the present invention is a simple and inexpensive solution to the problem of avoiding damage to the afore-mentioned elements and to the yarn during winding of a package of yarn on a winding machine.

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. In a winding machine, the combination comprising, a mandrel adapted to support a core for rotation, a traverse roll having formed intermediate its opposite ends at least one helical groove defining a traversing zone for traversing yarn longitudinally of said core, means for supporting said mandrel for movement toward and away from said traverse roll, means for rotating said traverse roll, a resilient annular member expandable to a greater diameter than the outside diameter of said traverse roll, said annular member being located adjacent one end of said traverse roll and spaced from said traversing zone, said annular member having a surface of rotation supporting and engaging said core, and biasing means for expanding said annular member to a diameter greater than the diameter of said traverse roll to position said core a predetermined distance from said traverse roll.

2. In a winding machine, the combination comprising,



a mandrel adapted to support a core for rotation, a traverse roll having formed in the surface thereof at least one helical groove including reversing end portions at opposite ends thereof for traversing yarn longitudinally of said core to wind a package, said reversing end portions defining the limits of the effective traversing zone of said traverse roll, means for supporting the mandrel for movement toward and away from said traverse roll, a resilient annular member located adjacent one end of said traverse roll and spaced from said traversing zone, said annular member being expandable to a greater diameter than the outside diameter of said traverse roll, said annular member having a surface of rotation supporting and engaging said core, a collar engageable with said annular member, and biasing means operable cooperatively with said collar to adjust said annular member to position said core a predetermined distance from said traverse roll.

3. In a winding machine, the combination comprising, a mandrel adapted to support a core for rotation, a traverse roll having formed in the surface thereof at least one helical groove including reversing end portions, said reversing end portions being located inwardly from related opposite ends of said traverse roll and defining the limits of the effective traversing zone of said traverse roll, means for supporting said mandrel for movement toward and away from said traverse roll, means for rotating said traverse roll to wind a yarn package on said core, driving means connected with said traverse roll outside the confines of said reversing end portions and extending radially outwardly a predetermined distance from the surface of said traverse roll, said driving means including a surface for engagement with said core to rotate said core while maintaining said core spaced apart from said traverse roll, said traverse roll engaging the outer surface of said package in driving contact and supporting said core after said package attains a wound size equal to said predetermined distance, said traverse roll and said core being further separable as said package increases in diameter, a collar engageable with said driving means, and biasing means operable cooperatively with said collar to adjust said driving means to a predetermined position spaced from said traverse roll.

4. A winding machine as set forth in claim 3 wherein said driving means is a resilient annular member expandable to a greater diameter than the outside diameter of said traverse roll, said annular member having a surface of rotation.

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