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TRAVERSE-ROLL

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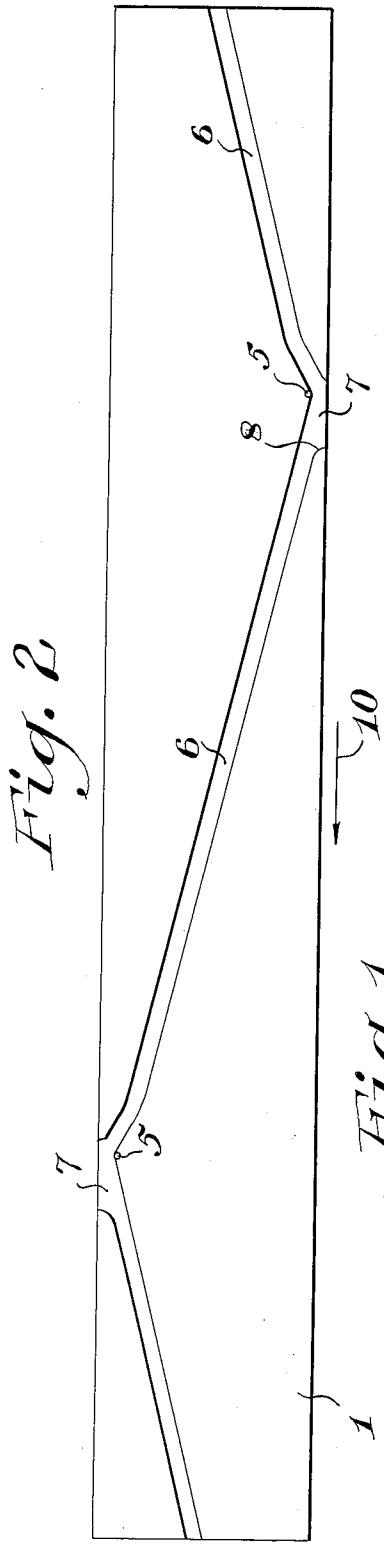


Fig. 2

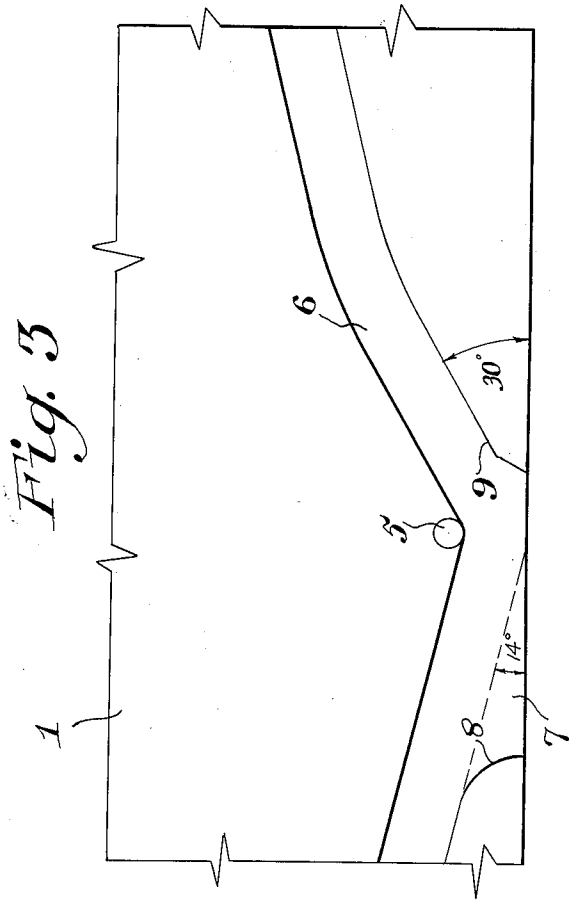


Fig. 3

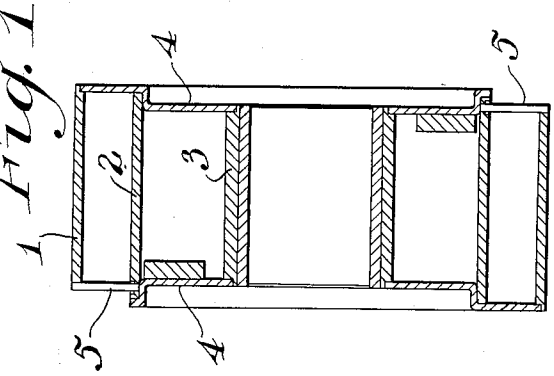


Fig. 1

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TRAVERSE-ROLL

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This invention relates to grooved rolls for traversing yarn and more particularly to rolls made from inner and outer concentric shells with the outer shell having a slot therein to traverse the yarn during the winding of a yarn package.

The traversing rolls described in the copending application of Calhoun and Cook Serial No. 92,176, filed May 9, 1949, and now U. S. Patent 2,646,227, are generally pre-eminently satisfactory for winding yarns at high speed on to packages. To reduce the cost of such traverse rolls and to reduce their weight to make for easier handling, it is desired to manufacture the rolls from hollow concentric shells. However, when these rolls are made from concentric cylindrical shells, for some reason high and erratic tensions occur at the reversal points of the stroke. This condition results in degradation of the yarn at the ends of the stroke by causing broken filaments. Further, hard yarn layers at the ends of the package are formed, and poor package formation and unwinding difficulties result. A further undesirable result of this periodic stressing of the yarn and the maintaining of these varying stresses in the yarn package is non-uniformity in the dyeing characteristics which shows up as so-called barre patterns (e. g., ladder and diamond patterns) in woven or knitted fabric.

While the above difficulties do not attend the use of solid traversing rolls, the economy involved makes the use of hollow rolls an attractive objective. Thus, an object of this invention is to provide a low-cost traversing device for winding threads, yarns and the like at high speeds without damaging the product to give improved packages relatively free from dense layers of yarn and easy to unwind in subsequent operations. Another object is to make a traversing device which is simple and inexpensive to build and easy to clean and maintain in operation. A still further object is the provision of a rapid reversal of the strand at the end of the stroke without producing high or variable tension levels. Other objects will become apparent hereafter in the specification and in the claims.

The objects of this invention are accomplished by constructing traversing rolls out of concentric cylindrical shells with the outer shell slotted in the desired manner to perform the traversing function and containing a guide, at the reversal points, running radially between the concentric shells to act as yarn bearing members at the stroke extremities.

For example, in overcoming the above mentioned difficulties, a pin, preferably of round or elliptical cross-section, is placed at each reversal point. This pin has preferably a hard, wear-resistant surface, for example, "Alsimag," to withstand the cutting and abrasive action of certain yarns, particularly delustered yarns. Since even the hardest and most wear-resistant materials available are still somewhat subject to wear under the most adverse conditions, the pin has been made easily and quickly removable to permit change as required or at regularly scheduled intervals. The invention is not limited to the use of a pin, for the guide may be a series of pins or a suitably shaped sheet of metal substantially spanning the gap between the shells and following the inner edge of the groove. The apparatus is more completely described in the following description but is not limited thereby.

In the drawings:

Figure 1 is an axial cross-sectional view of a traversing roll;

Figure 2 is a development of the surface on the outer cylindrical shell showing the slot and the position of the pin at the reversal point and

Figure 3 is an enlarged view of this development at one of the reversal points.

Referring now to Figure 1, it is seen that inner shell 2 and outer shell 1 are suitably held in concentric relationship with hub 3 by suitable spacer elements 4 which might readily be flange elements or radial spider elements. Concentric shells 1 and 2 can be affixed to these support elements by conventional means, such as screwing, brazing, welding, or the like. The endless groove 6, shown in Figures 2 and 3, runs in the outer shell 1. Actually, the shell 1 is cut through so that the shell 2 forms the base of the groove. The guides, such as pins 5, run between the two shell elements 1 and 2 at the reversal points. These pins are preferably made of a hard, wear-resistant substance, for example, "Alsimag" (bonded titanium dioxide). Other materials very suitable for use with cutting or abrasive yarns are tungsten carbide, sapphire, chromium plated steel, "Isolantite" (ceramic), "Illium" (nickel-chromium alloy), porcelain, and "Tantung G" (cutting tool alloy). Less wear-resistant materials may be used for these pins where the yarns being wound will permit. In the absence of the pins, the yarn traverses properly over the major portion of the groove, being directed by the walls of the groove in the outer shell, but at the reversal points, in the absence of guides the yarn tends to slip under the outer shell and out of the groove. Pins 5 prevent this and the yarn runs properly under uniform tension. The thickness of the shells is such that the device is a sturdy, economical unit. Since the yarn rubs against the edges of the groove on the top shell, these inner walls and its edges are generally smooth and rounded.

The diameter of the pins can vary from 1/32" up to 1/2 or 3/4" or even larger, depending in part on the textile material being wound, the shape of the reversal point, the method of securing the pin, and the like. Preferably, when winding synthetic textile fibers prepared from polyamides, acrylonitrile polymers or polyesters and the like, the diameter will fall within the limits of 1/16 to 1/2". The filament bearing members are replaceably held in position by any of the well known means. For pins, such means might be the use of a threaded plug in the outer shell to keep the pin seated in the holes drilled in the inner and outer shells. Another means might be the use of a positioning depression in the underside of the outer shell and a relatively deep spring detent in the lower or inner shell. Another means might be a positioning depression in the inner shell with a spring clip device in the outer shell to hold the pin in position.

The guides should not be more than 1/2" behind the reversal points to achieve all the advantages of this invention. Preferably the guides abut the edges of the reversal points but for practical reasons (rounded shell edges, pin holding means, etc.) they usually are removed by 1/32" to 1/16" from the edges of the reversal points in the outer shell.

As shown in Figure 2 another feature of this invention is that the thread traversing slot erupts at 7 through the edges of the shell at the reversal points. This feature provides working space to permit replacement of

the pin and additionally provides a valuable self-threading feature; that is, once the yarn end has been started on to the package and rotation begun, the length of the yarn may merely be allowed to fall against the edge of the rotating traverseing roll to complete the threading operation and to cause the self-traversing feature to become operative. Edge **8** is preferably rounded as shown while edges **9**, which can also be rounded, are preferably angular, because yarn pick-up is better. Also surfaces of the groove are ground smooth. The roll rotates in the direction indicated by the arrow **10** in Figure 2.

As shown in Figure 3, the edges of the slots of the particular roll form an angle of 14° with the edges of the shell except that for a short distance at the reversal point this angle is 20°. The helix angle over the major portion of the groove may vary from 5° to 25°, angles of 9° to 20° being preferred. At the rapid reversal the angle is greater than the normal angle and may vary from 15° to 90°. The quotient of the normal helix angle is degrees divided by the depth of the groove in inches should not exceed 40 and is usually between 5 and 40, preferably about 10 to 20. The depth of the groove, that is, the distance of the top surface of the inner shell from the top surface of the outer shell my vary from ¼ to 2". Generally, this depth is from ½ to 1½". The width of the groove may vary from about ⅛ to about 1" and generally the overall diameter of the traversing device of this invention is from about 5 to about 30", diameters of 6 to 12" being preferred. An example of a particular traversing device is one which has a 16° helical groove having a 30° angle at the reversal point. The diameter of the outer shell of this example is 7.9", the diameter of the inner shell being 5.9". With a groove depth of 1", the groove width being ¼", the quotient is 16. These and other modifications described in copending application Serial No. 92,176, now U. S. Patent 2,646,227, may be applied to the traversing roll of this invention.

The guides of this invention preferably extend radially and perpendicular to the roll's axis. Some variation from the perpendicular, either outwardly or inwardly, can be tolerated. The guides need not span the gap between shells. For example, the pins may come within 1/16 or 1/32" of the outer shell. However, it is preferred that the guides extend the full distance to prevent any possibility of a thread becoming caught.

The traversing rolls herein described are in most instances pre-eminently satisfactory for use as self-traversing drive rolls, wherein the roll's surface rotates the bobbin through surface contact, initially with the empty bobbin, and subsequently with the yarn on the partially filled bobbin.

Any departure which conforms to the principles of this invention is intended to be included within the scope of the claims below.

I claim:

1. Apparatus comprising a rotatable member comprising an outer shell and an inner shell, said outer shell being provided with an endless groove in its surface helically cut in its major portion at an angle of from 5° to 25°, said groove containing at least two rapid reversal sections cut helically at an angle greater than said angle in said major portion, and the distance from the top surface of said outer shell to the top surface of the said inner shell being such that the quotient of the helix angle in said major portion in degrees divided by said distance in inches is between 5 and 40; and at the reversal point a guide extending upwardly from said inner shell toward said outer shell.

2. Apparatus in accordance with claim 1 wherein said guide is a pin.

3. Apparatus comprising a rotatable member comprising an outer shell and an inner shell, said outer shell being provided with an endless slot through its surface, said slot containing at least two reversal sections; and at each reversal a guide extending radially between the said shells.

4. Apparatus in accordance with claim 3 wherein said guide is a pin.

5. Apparatus in accordance with claim 4 wherein the said pin has a diameter between 1/32 and ¾ inch.

6. Apparatus in accordance with claim 4 wherein the said pin has a diameter between 1/16 and ½ inch.

7. Apparatus in accordance with claim 3 wherein said guide is not more than ½ inch behind the edge of the reversal.

8. Apparatus in accordance with claim 3 wherein the said guide abuts the edge at the reversal.

9. Apparatus in accordance with claim 3 wherein the said guide is removed between 1/32 and 1/16 inch from the edge of the reversal in the said outer shell.

10. Apparatus comprising a rotatable member comprising an outer shell and an inner shell, said outer shell being provided with an endless slot through its surface, said slot containing at least two reversal sections; at each reversal a guide extending radially between the said shells; and at each reversal a threading means comprising an extension of the said slot in the said outer shell through to the adjacent edge of the said outer shell.

11. Apparatus in accordance with claim 10 wherein said guide is a pin.

12. In a grooved roll for traversing yarn, an outer shell concentric with an inner surface for supporting the traversing yarn, said outer shell having an endless slot through its surface, which slot comprises at least two reversal sections and helical sections between said reversal sections; and a thread guide at each reversal section extending radially from the inner surface substantially to the outer shell.

13. Apparatus in accordance with claim 12 wherein said slot at its reversal sections extends to the edge of the outer shell.

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