Aug. 6, 1957 R. J. GILBERT 2,801,808

TRAVERSING ROLL

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Fig. 1

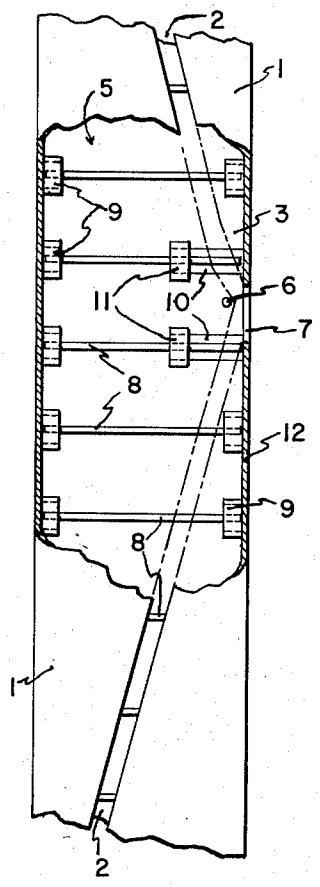


Fig. 2

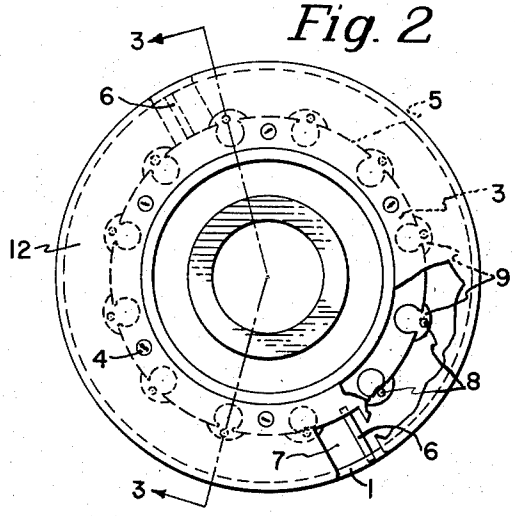


Fig. 3

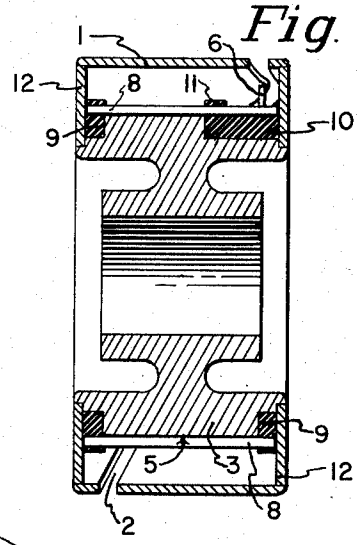
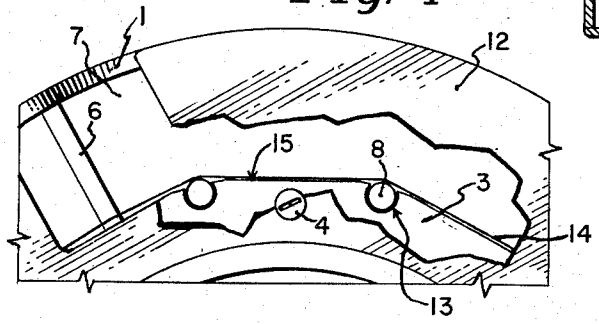


Fig. 4



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TRAVERSING ROLL

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1 Claim. (Cl. 242—43.2)

This invention relates to grooved rolls for traversing yarn and more particularly to such rolls equipped with removable pins periodically spaced along the bottom of the groove to provide a smooth, wear-resistant surface.

In winding a thread using a grooved traversing roll, the groove in the roll is designed to traverse the thread along the package as the roll rotates, and frequently the core or yarn package is surface driven by means of the roll. Such a roll may consist of a solid drum having one or more grooves cut in its surface in a helical fashion. To reduce the cost and weight, the traverse roll may be made from an inner shell or hub and a concentric outer shell having the slot.

The development of synthetic textile fibers from nylon, poly(ethylene terephthalate) and polyacrylonitriles have created special problems in the textile industry owing to the relatively high abrasive qualities of many of these yarns. The problem of abrasion is especially serious with those synthetic fibers containing titanium dioxide or other delustering agents. It has been found that the surface of the groove becomes cut and abraded within a relatively short period of time even when a hard metal surface is employed, such as a chromium plated surface.

These irregularities in the surface cause difficulty, because even relatively minor imperfections in the smoothness of the surface are sufficient to cause filament breaks when the yarn is being passed through the groove at high velocity. Another problem caused by the imperfections is variable yarn tension; this may lead to uneven yarn package formation. The dyeability of many of these fibers is affected by their stress history, and variable tension leads to undesirable barre patterns (i. e. ladder and diamond patterns) in the dyed fabrics. Because of these problems associated with abrasive fibers, it is frequently necessary to repair or discard rolls after they have been in use only a short time.

An object of this invention is to provide an improved grooved traversing roll containing replaceable yarn-bearing members. Another object is to provide such a traversing device which is simple to build, easy to clean, and inexpensive to maintain in operation. A further object is to provide a traversing device for winding threads, yarns and the like at high speeds without damaging the yarn to give an improved package built up at uniform tension. Other objects will become apparent hereafter.

The objects of this invention are accomplished by constructing rolls in which the groove bottom comprises replaceable pins or equivalent yarn-supporting members periodically spaced about the roll so that in the bottom the yarn touches only the pins when passing through the groove. The pins are preferably made from a material having a hard, wear-resistant surface, for example "Alsimag," a bonded titanium dioxide. A fresh groove bottom is quickly and easily prepared by replacing the used pins which show undue wear or when surface imperfections are suspected because the quality of yarn appears low. When a large number of traversing rolls

are in use, pin replacement at regularly scheduled intervals reduces loss of operating time to a minimum.

By way of example, the invention is illustrated in the accompanying drawings, in which:

Figure 1 is a partial development of the grooved traversing roll of the inner/outer shell type, showing pins as viewed from above;

Figure 2 is an end view of the traversing roll with a portion of the outer shell removed;

Figure 3 is taken on line 3—3 of Figure 2; and

Figure 4 is a partial section of an end view showing an alternative mounting of the pins.

Referring to Figure 1, the outer cylindrical shell **1** is divided into two parts by endless slot **2**. As shown in Figures 2 and 4 this shell is fixed to inner hub **3** by screws or bolts **4**. In an earlier design, described and claimed by Selby in his application Serial No. 334,606, filed February 2, 1953, now Patent No. 2,736,506, the outermost surface **5** of hub **3** serves as the bottom of the groove. The groove is helically cut in its major portions at an angle of about 5° to about 25° and in the reversal sections at a greater angle which may be about 15° to about 90°. Generally, the angle in the reversal section is greater than the normal angle by at least about 5°. These and certain other features of the roll are also described in Calhoun and Cook, U. S. 2,646,227. In the modification described herein, as in previous embodiments, reversal pins **6** are provided and a gap **7** in the outer shell wall adjacent or opposite reversal pin **6** allows easy string-up of the yarn. When the yarn end has been started onto the package and rotation has begun, the threading operation is accomplished merely by allowing the yarn to fall against the edge of the rotating traversing roll. The roll may or may not, as desired, be used to surface drive the package.

However, in the apparatus of this invention the material on the run, be it a filament, tubing, ribbon or yarn, does not ride on surface **5** but contacts a much smaller amount of surface presented by pins **8**. These pins, as shown in Figures 1 to 3, may rest on surface **5**. The pins may be affixed to the rotatable member in any convenient fashion such as by use of set screws or by cementing or bonding agents. Generally, the majority of the pins are mounted in pin retainers **9** at the outside edges, but, as shown in Figures 1 to 3, the pins near the reversal section are supported by the usual pin retainer **9** at the edge furthermost from reversal pins **6** and by retainer **11** recessed from the other edge and held in place by plug **10**. Thus, in the vicinity of the reversal pins **6**, one end of the yarn-supporting pin is left free to receive the yarn as it travels near the edge of the roll, the pin retainer portion of plug **10**, shown as element **11**, being positioned near the center of the hub on surface **5**. If desired the plug **10** and retainer **11** may be made as a unit. Usually, the plugs are conveniently made of lead for the purpose of balancing the roll.

Lateral displacement of the pin retainers, plugs and pins is prevented by side walls **12** of the outer shell, as shown in Figure 3. However, the outer shell sections are easily removed and old pins may be quickly replaced by new. Usually it will be desirable that the pin retainers grasp the pins firmly to prevent rotation or slipping of the pins during operation of the roll. This is conveniently accomplished by fabricating the pin retainer from soft rubber, the diameter of the hole in the pin retainer being slightly smaller than the diameter of the pin. Such mounting also prevents lateral movement of the pins or rods. When a fresh, unabraded pin surface is required the pin may be rotated through a small arc so that each pin may be used several times at a given position on the roll. Since only a small portion of each pin is used to

support the yarn, the pins may also be switched end for end or moved from one position to another to obtain maximum use of each pin.

While the above description refers to a preferred species of the invention, the principle of utilizing replaceable yarn-bearing members is applicable to any grooved traversing roll. For example, such yarn supports can also be used with solid grooved traversing rolls, e. g. as described in U. S. Patent 2,646,227 to Calhoun and Cook. Various alternative means of attaching yarn-supporting members to the traverse rolls will be obvious to those skilled in the art.

For reasons of simplicity of design and cost of the replaceable members, the members will usually be pins of circular cross-section. However, yarn-supporting members of elliptical cross-section can be employed, and other cross-sections which present a smooth curved surface to the moving yarn can be used.

The yarn-supporting members are conveniently spaced about the roll in numbers and heights above the surface of the hub so that the yarn does not touch the hub at any point. Usually, for a roll having a diameter of around 6 to 12 inches, a minimum of about 8 yarn-bearing members will be required to ensure relatively smooth motion of the yarn, the optimum number being about 12 to 20. When a large traverse roll is used or when especially smooth yarn motion is desired, up to 40 or even more yarn-supporting members may be used, the upper limit being defined by the available space on the roll.

The pins can be fabricated from any wear-resistant material, such as hard steel, a hard metal alloy, or ceramic materials. "Alsimag" is excellent material for this use. The surface of the pins may be treated to give a fine grain and thus effectively reduce the area touched by the yarn. The diameter of the pins may vary from about 1/16" up to about 1/2" or even larger. The pins, especially the larger ones, may be tubular in form.

As shown in Figures 2 and 3 the pin retainers 9 and plugs 10 cannot fly out during the rotation of the roll due to their recessed positioning in hub 3. The diameters of the retainers and plugs are larger than the width of the cut at the hub surface. This feature is used in the modification shown in Figure 4. Here the retainers and plugs are dispensed with and the hub 3 contains a plurality of grooves 13 and the pins 8 are slid into these grooves. The snug fitting of the pins in the grooves and side walls 12 prevent any lateral movement of the pins or outward movement due to centrifugal force. The diameter of the pins are such that the yarn 14 does not touch or ride on the top surface of the hub, or the hub surface between the pins may be cut away as shown by surface 15 in Figure 4. In still another modification, the pins may be mounted on oppositely positioned, radial arms or spokes, and the continuous hub surface 5 or 15 may be eliminated. Of these modifications, that shown in Figures 1 to 3 is preferred.

Thus, the apparatus of this invention comprises a rotatable member having an endless helical slot in its outer surface, which slot contains at least two reversal sections. The member may be a solid roll or it may be constructed from an outer and an inner shell but in either case the slot has as its base or bottom a plurality of periodically spaced rounded members which support the shaped article being traversed. The rounded members, such as pins or rods, are fixed in position against lateral movement or movement due to centrifugal forces. When the device is constructed of the two shells, at each reversal there is a guide extending radially between the shells. Normally, in all modifications, at the reversal section the slot is extended to the adjacent edges to provide a convenient string-up means. By the use of the replaceable pins of this invention, tension or drag on the yarn or shaped article being traversed is appreciably reduced.

The traversing rolls of this invention are highly satisfactory and can be used in combination with a drawing machine to provide a continuous process for drawing and packaging undrawn yarn. In such a draw winding machine for best results the tension of the yarn is kept under control by varying the respective speeds of the drive roll and traverse roll. For example, with 70 denier, 34 filament poly(ethylene terephthalate) yarn, the optimum tension range has been found to be about 5 to 20 grams, preferably about 15 grams. With higher tensions, it is difficult to build a uniform, straight-sided yarn package, while lower tensions may result in backwrapping on the draw roll and subsequent breaking of the thread line.

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

I claim:

In apparatus for traversing a yarn, the combination which comprises a rotatable member comprising an outer shell and an inner shell, said outer shell being provided with an endless helical slot through its surface, said slot containing at least two reversal sections and at the reversals a guide extending radially between the shells; 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 outer shell, and from 8 to 40 replaceably mounted and periodically spaced cylindrical wear-resistant ceramic pins at the outer-most surface of said inner shell for supporting said yarn as it passes through said slot, the pins being equidistant from the axis of the said rotatable member and fixed at their ends to the rotatable member by retaining means to prevent their lateral movement and outward movement due to centrifugal force.

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