

[54] **TWISTER AND METHOD OF TWISTING**

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[51] Int. Cl. **D02g 1/04**

[58] Field of Search **57/51-51.6, 77.3-77.45, 57/156, 157, 34; 28/72**

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Primary Examiner—Donlad E. Watkins

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[57] **ABSTRACT**

A method is disclosed for imparting twist to textile filaments and a friction twister therefor wherein a plurality of turns of twist are imparted to the filament for each revolution of the friction twister. The disclosed friction twister comprises two hollow spindles containing frictional engagement means therein. The two spindles are driven by pivoting the twister about a pivot point so that the hollow spindles come into engagement with a drive belt that passes between the spindles. Reversing guide means is provided to allow a filament to enter the front portion of one spindle and exit from the front portion of the other spindle. Another embodiment of the reversing guide means has a capacity to handle two filaments simultaneously.

18 Claims, 14 Drawing Figures

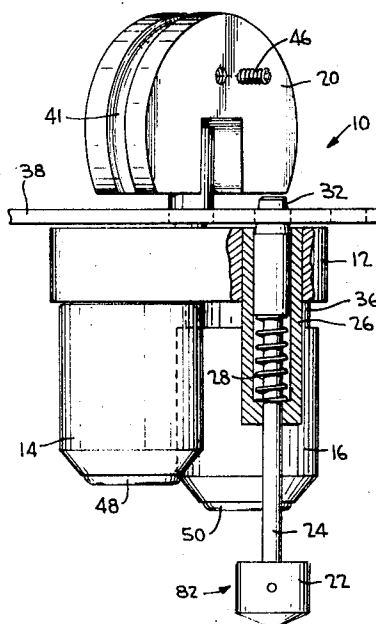


FIG. 1

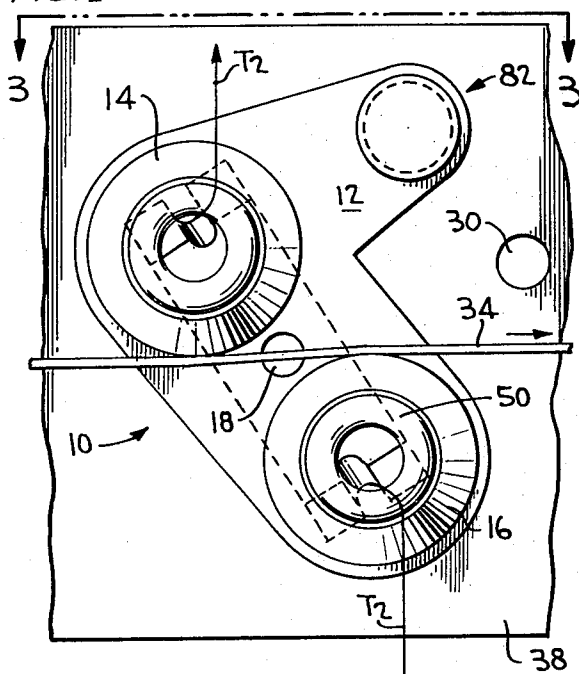


FIG. 2

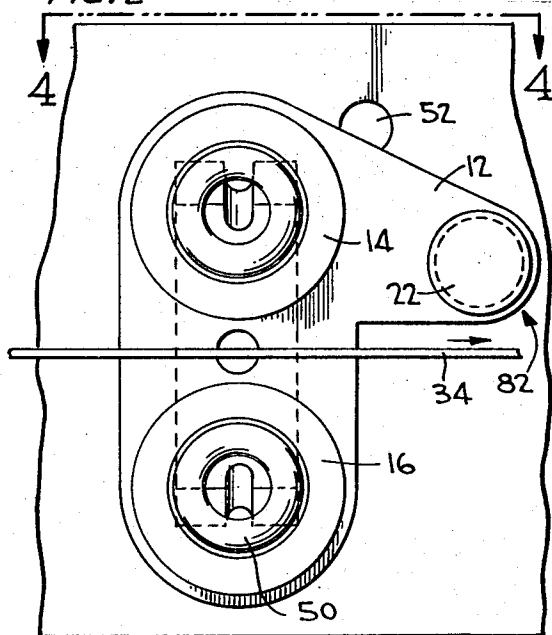


FIG. 3

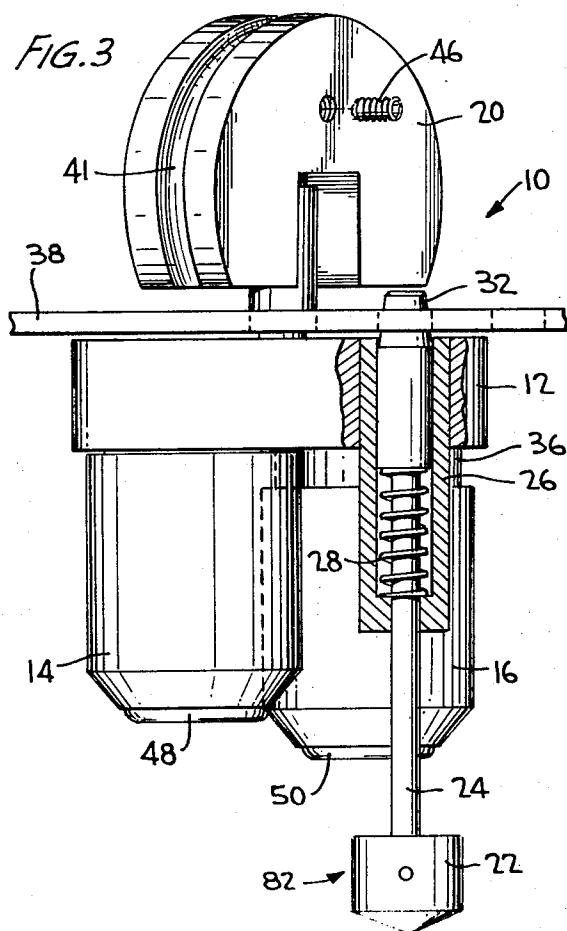
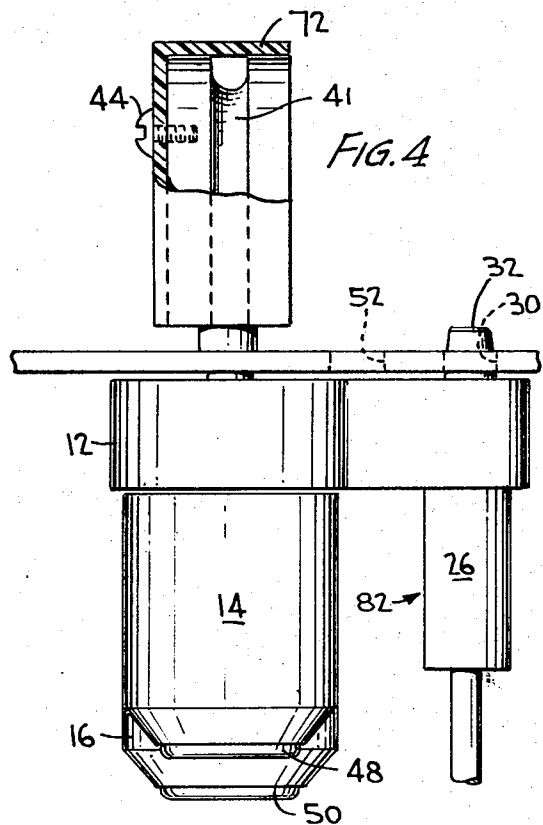
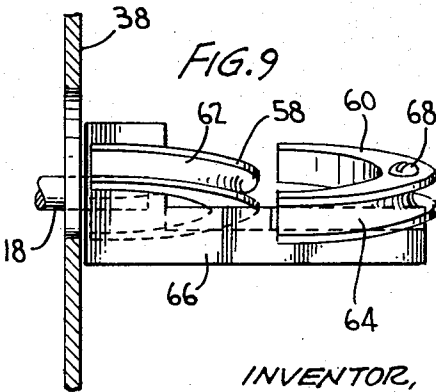
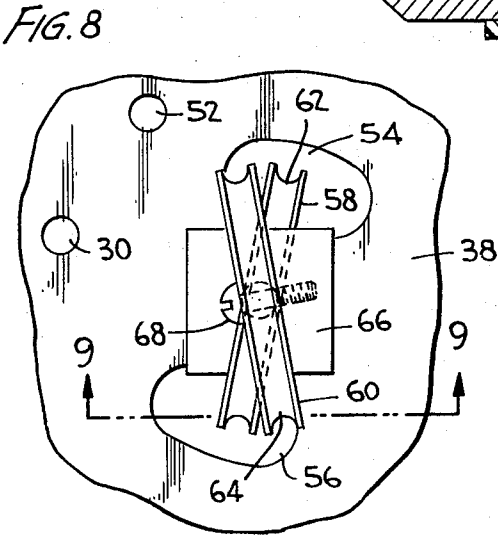
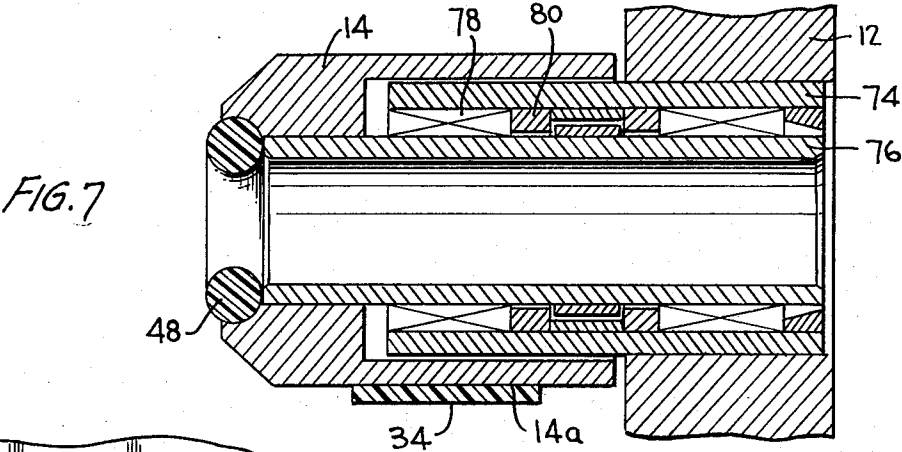
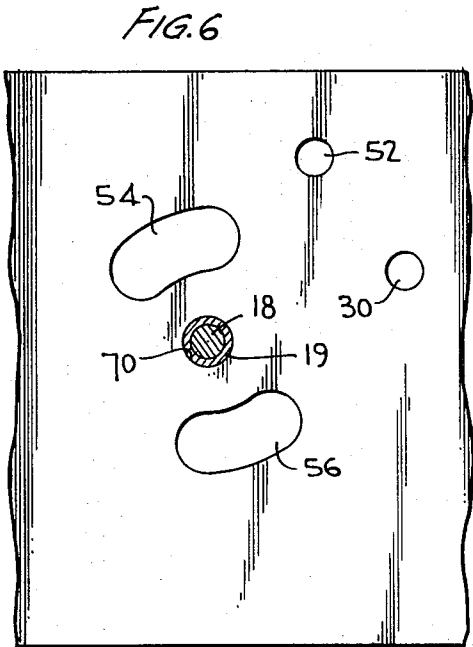
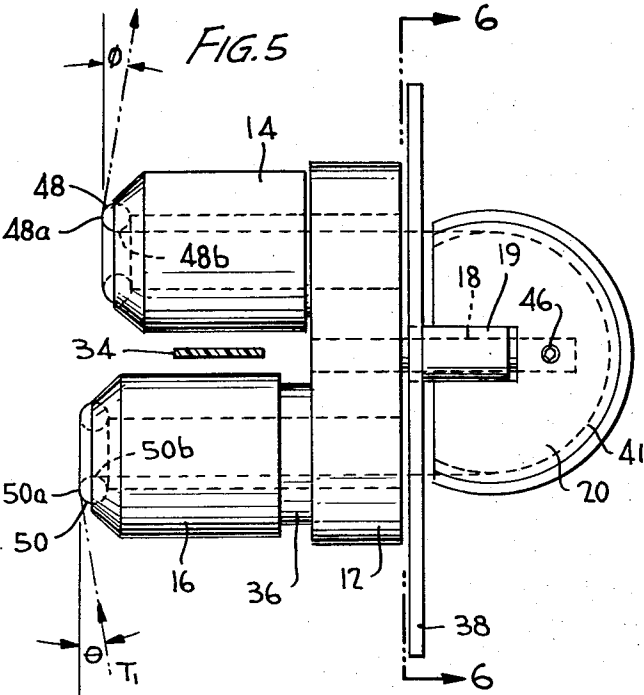


FIG. 4



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FIG. 10

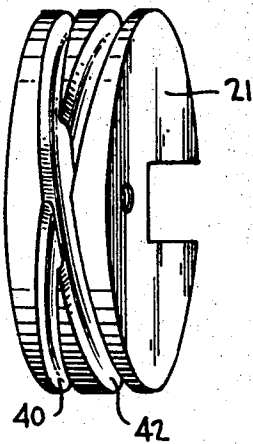


FIG. 11

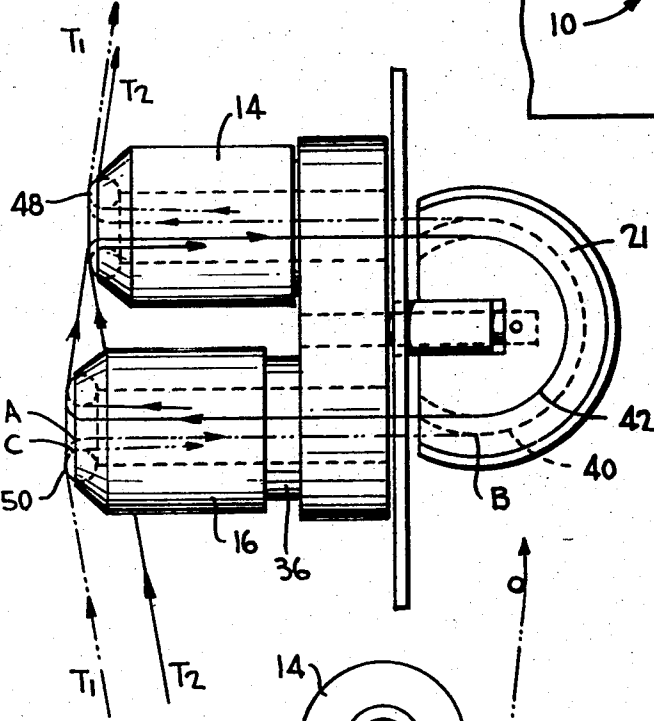
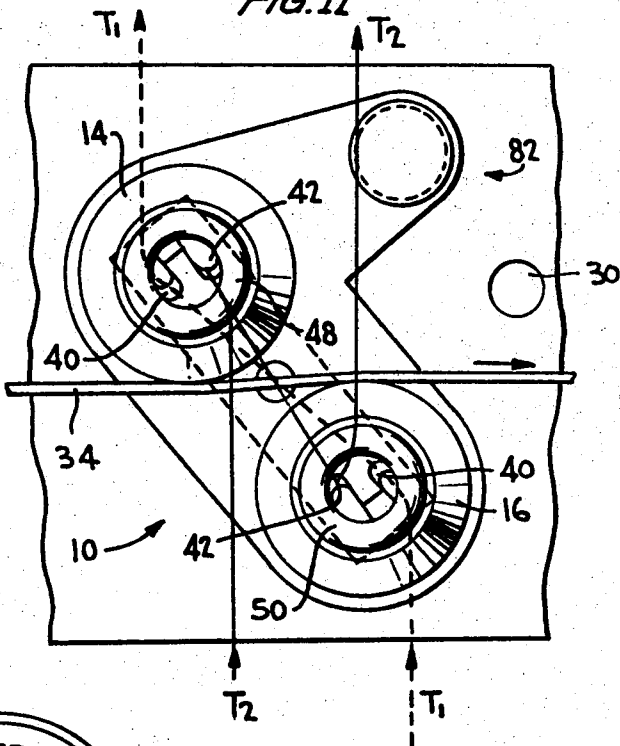


FIG. 12

FIG. 13

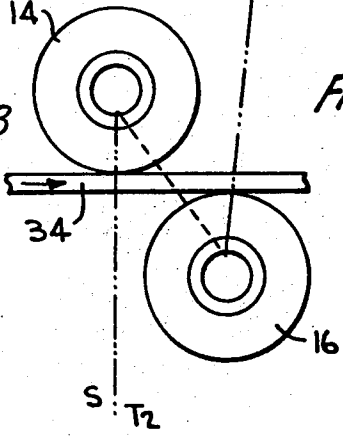
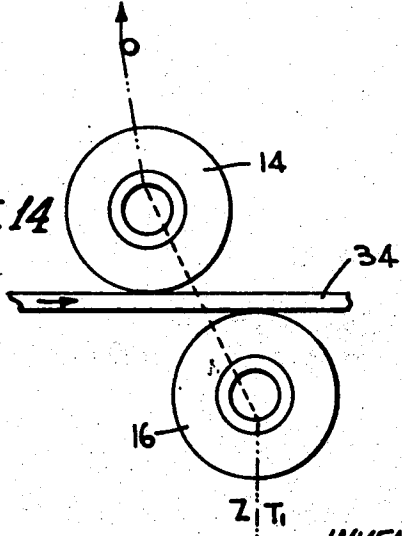


FIG. 14



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TWISTER AND METHOD OF TWISTING

The present invention relates to a twister and a method of utilizing said twister. More particularly, the invention relates to a friction twister for false twisting a textile filament and a method of using said friction twister.

One of the greatest drawbacks of a conventional false twisting blade with a twist trapping pin such as that disclosed in U.S. Pat. No. 3,044,247 to Hilbert is that one revolution of the spindle blade is necessary to impart one revolution of twist to the textile filament. Since conventional false twist spindles are limited to certain speeds by the strength of conventional materials, there is a definite ceiling on the productivity realized by the use of conventional false twist spindle blades.

In U.S. Pat. No. 2,936,567 to Russell, et al., U.S. Pat. No. 2,936,570 to Arthur, et al. and U.S. Pat. No. 3,029,591 to Scragg, et al., there are disclosed several types of devices or apparatus for false twisting a textile filament wherein one rotation of the false twister imparts numerous rotations to the textile filament. However, the false twist apparatus disclosed in each of these three patents is subject to certain disadvantages. For example, in none of these false twisting devices may more than one filament be processed at a time. Furthermore, none of these devices possess rotatable frictional elements that are readily replaceable. In addition, these prior devices do not contain a simple and economical means for rotating the frictional surfaces that perform the actual twisting.

Accordingly, it is an object of the present invention to provide a friction twister that is capable of false twisting a textile filament and simultaneously reversing its direction of travel through the twister.

It is another object of the present invention to provide a friction twister that is capable of simultaneously false twisting two separate textile filaments.

It is another object of the present invention to provide a friction twister wherein the rotatably frictional twisting surface is readily replaceable.

It is another object of the present invention to provide a friction twister wherein a textile filament at least approaches or departs the twisting surface axially of the twister spindle.

It is yet another object of the present invention to provide a friction twister wherein two rotating spindles are combined with a reversing guide in order to simultaneously false twist two textile filaments, yet, at the same time, keep the two filaments physically separated to thereby avoid entanglement of the filaments.

It is a further object of the present invention to provide a friction twister having two hollow spindles wherein simple and economical means are provided to simultaneously rotate both of said spindles.

It is yet another object of the present invention to provide a friction twister having dual hollow spindles mounted on an L-shaped frame with the frame being rotatable about a pivot point, whereby rotation in one direction engages both spindles in contact with a drive belt and wherein rotation in the other direction removes the spindles from contact with the drive belt.

It is a further object of the present invention to provide reversing guide means capable of simultaneously handling two textile filaments.

It is yet another object of the present invention to provide a single reversing guide capable of simultaneously processing two textile filaments without allowing the textile filaments to physically contact each other.

It is an additional object of the present invention to provide a friction twister that may be easily threaded.

It is yet another object of the present invention to provide a friction twister wherein the friction twister is simple and reliably locked in either its on or off position.

It is an additional object of the present invention to provide a friction twister that is readily mountable to a channel beam thereby facilitating insertion of the friction twister in conventional false twist machinery presently employed.

It is another object of the present invention to provide a method of simultaneously false twisting a pair of textile filaments wherein both filaments are closely but distinctly separated from each other throughout the full extent of the friction twister.

It is still a further object of the present invention to provide a friction twister having simple construction, relative ease of maintenance and economy of operation.

Other objects will appear hereinafter.

For the purpose of illustrating the invention, there are shown in the drawings three embodiments which are presently preferred; it being understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown in the three illustrated embodiments.

FIG. 1 is a front elevation view of a friction twister of the present invention as it is engaged by the drive belt.

FIG. 2 is a front elevation view of the same friction twister in its non-driven position.

FIG. 3 is a top view of the friction twister of FIG. 1, taken on line 3—3, with the position locking member shown in cross section.

FIG. 4 is a top view of the friction twister of FIG. 2 taken on line 4—4, with the reversing guide cap shown partially in cross section.

FIG. 5 is a side elevation view of the friction twister of FIG. 2 with the position locking member and mount deleted for clarity, showing the path followed by filament T₁.

FIG. 6 is a front elevation view of the channel beam showing the apertures and openings therein.

FIG. 7 is a cross sectional view of the uppermost spindle of FIG. 5 showing the manner in which the spindle is mounted for rotation.

FIG. 8 is a rear elevation view of a second embodiment of the reversing guide of the present invention, suitable to reverse the direction of travel of two textile filaments.

FIG. 9 is a side elevation view taken along lines 9—9 of the friction twister reversing guide of FIG. 8.

FIG. 10 is a perspective view of a third embodiment of the reversing guide of the present invention, suitable to reverse the direction of travel of two textile filaments.

FIG. 11 is a front elevation view of a friction twister of the present invention similar to FIG. 1 but employing the two groove reversing guide of FIG. 10.

FIG. 12 is a side elevation view of a friction twister of the present invention showing the paths followed by

two filaments T_1 and T_2 when the spindles are at rest and when they are rotating.

FIG. 13 is a schematic representation of the friction twister of the present invention threaded and operating to produce an S twist in the textile filament.

FIG. 14 is a schematic representation similar to FIG. 13 but producing a Z-twist in the textile filament.

Referring more particularly to the drawing, wherein like numerals designate like elements, there is shown in FIG. 3 the friction twister of the present invention generally designated as 10. Friction twister 10 is securely mounted to channel beam 38 by pin 18, which passes through sleeve 19. Sleeve 19 is press fit into a mounting hole in beam 38 and extends on only one side of the beam.

Friction twister 10 is comprised of hollow spindles 14 and 16 which are rotatably mounted to L-shaped frame 12. Position locking member 82 is mounted to L-shaped frame 12 and is engageable with apertures 30 and 52 in channel beam 38, best seen in FIG. 6. As shown in FIG. 3, reversing guide 20 is mounted to L-shaped frame 12 by pivot shaft 18 which extends through pin 19 and channel beam 38. Reversing guide 20 is mounted to shaft 18 by set screw 46. The mounting of reversing guide 20 to shaft 18 is such that, although guide 20 is allowed to rotate to some extent about pivot shaft 18, guide 20 is prohibited from any axial movement along shaft 18.

As is best shown in FIG. 3, position locking member 82 is comprised of tapered dog 32 which is rigidly mounted on rod 24, to the other end of which, in turn, handle 22 is affixed. Spring 28 is enclosed in casing 26 and surrounds a portion of rod 24. Tapered dog 32 is so dimensioned as to fit within apertures 30 or 52 (See FIG. 6). Thus, position locking member 82 may be positioned in either aperture 30 or aperture 52 in channel beam 38 by merely pulling back on handle 22 and compression spring 28 thereby permitting the rotation of frame 12 about shaft 18. When locking member 82 is in one of its locked positions, the bias exerted by spring 28 causes tapered dog 32 to remain in either aperture 30 or aperture 52. In FIG. 3, tapered dog 32 is shown positioned in aperture 52. In FIG. 4, tapered dog 32 is shown positioned in aperture 30.

Hollow spindles 14 and 16 are so positioned as to be simultaneously driven by drive belt 34. As shown in FIG. 1, the lowermost portion of hollow spindle 14 and the uppermost portion of hollow spindle 16 are engaged by drive belt 34 to be simultaneously driven thereby. In the position shown in FIG. 1, position locking member 82 is disposed within aperture 52.

From an examination of FIGS. 1 and 2, it is readily apparent that an arcuate movement of friction twister 10 about pivot shaft 18 will position hollow spindles 14 and 16 either in or out of engagement with drive belt 34. Thus, position locking member 82 serves not only to lock the friction twister in a given position but also serves as a convenient means to manually effect such an arcuate movement of the friction twister from its driven position to its disengaged or rest position.

As shown in FIGS. 3 and 4, reversing guide 20 contains a groove 41 therein for the passage of a textile filament therethrough. As shown in FIG. 4, in operation, reversing guide 20 is covered by reversing guide cap 72 which is secured thereto by cap screw 44.

Reversing guide cap 72 facilitates the threading of reversing guide 20. This is because the threading operation is performed with a flexible, elongated threading tool. When such a tool is first passed through either spindle 14 or 16 and then through groove 41, the physical contact of the tool with the inside surface of reversing guide cap 72 guides the tool around the groove and out the other hollow spindle. A small thread engaging hook on the end of the tool is thus returned to the same side of the spindle, and the operator is able to thread up the device without requiring access to the back of the machine.

The positioning of filament T_1 within hollow spindles 14 and 16 is best shown in FIGS. 1 and 5. As shown in FIG. 1, a filament T_1 first passes through hollow spindle 14 from the front to the rear of spindle 14, passes around groove 41 and is then passed from the rear to the front of hollow spindle 16 where T_1 emerges.

Since reversing guide 20 and L-shaped frame 12 are mounted on opposite sides of channel beam 38, it is necessary that openings be provided in channel beam 38 to accommodate shaft 18 and filament T_1 . It is also necessary, as mentioned above, to provide openings in channel beam 38 to receive tapered dog 32 in order to lock position locking member 82 in both drive and rest positions.

The placement of these openings is best shown in FIG. 6. Thus, aperture 70 is provided for sleeve 19 and pivot shaft 18 to pass therethrough. Apertures 30 and 52 are provided as receptacles for tapered dog 32. As explained above, the placement of dog 32 within aperture 52 locks spindles 14 and 16 in engagement with belt 34 while the placement of dog 32 with aperture 30 locks spindles 14 and 16 out of engagement with belt 34. Arcuate slots 54 and 56 are provided to accommodate filament T_1 . Since T_1 is rotated when frame 12 is rotated by handle 22, it is necessary that arcuate slots 54 and 56 be large enough to accommodate the arcuate displacement of T_1 during this rotation. The apertures just discussed may be formed in an existing frame or support member of an existing false twist texturing machine or may be formed in a channel member provided for use with the spindle of the instant invention.

FIG. 7 shows a cross sectional view of hollow spindle 14 and the mounting therefor. Spindle friction member 48 is mounted within the opening of spindle 14. Since filament T_1 passes over spindle friction member 48, it is apparent that the rotation of spindle 14 and thus the rotation of spindle friction member 48 functions to twist any filaments that are in frictional engagement with member 48. Spindle shaft 76 is rotatably mounted to spindle mount 74 by bearings 78 and bearing spacers 80. Spindle mount 74 is press fit into frame 12. As shown in FIG. 7, drive belt 34 makes contact with the lower exterior portion 14a of hollow spindle 14 and thereby rotates both spindle 14 and spindle friction member 48.

The mounting of hollow spindle 16 to L-shaped frame 12 is very similar to the mounting of hollow spindle 14 to L-shaped frame 12. The major difference is that spindle mount 74 is replaced by extended spindle mount 36 (FIG. 5) which enables spindle 16 and spindle friction member 50 to extend further out from frame 12 than spindle 14. This feature permits a parallel displacement of friction members 48 and 50,

as shown in FIGS. 5 and 12, and is of particular use when the friction twister is used with two filaments.

Spindle friction members 48 and 50 are rings or torus shaped elements formed from an elastomeric material to insure a good frictional engagement with the yarn filaments in contact therewith.

It is apparent from the drawings that both spindle friction member 48 and spindle friction member 50 are easily detachable from their corresponding hollow spindles as spindle friction members 48 and 50 are pressure fitted into spindles 14 and 16 respectively. The natural elasticity of the member material facilitates the pressure fit. It is a simple matter to replace the spindle friction member after they become worn by simply removing the old member and pushing a new member in place. Additionally, the old member may simply be reversed and replaced, thereby using both sides of the member.

FIG. 8 and 9 show a second embodiment of the friction twister of the present invention utilized in twisting two strands or filaments. This second embodiment utilizes a pair of reversing guides 58 and 60 rather than a single groove reversing guide as shown in the first embodiment. As shown in FIGS. 8 and 9, reversing guide 60 containing groove 64 therein is mounted to reversing guide support 66 by screw 68. In like manner, reversing guide 58 containing groove 62 therein is mounted to reversing guide support 66 by a screw (not shown).

The two surfaces on support 66 that these two guides are mounted on are angularly displaced from each other so that guides 62 and 64 will have a corresponding angular displacement as is shown in FIG. 8.

FIG. 10 illustrates a portion of a third embodiment of the false twister of the instant invention. Reversing guide 21 has two yarn grooves 40 and 42 formed therein. As is visible in FIGS. 11 and 12, this embodiment of the twister of the instant invention may be employed to simultaneously false twist two separate filaments T_1 and T_2 . With respect to grooves 40 and 42 it is particularly noted that groove 42 is deeper than groove 40, in order that the two filaments T_1 and T_2 (See FIG. 12) may pass one over the other without physically contacting each other. Thus, shallow groove 40 acts as a bridge for deeper groove 42.

As shown in FIGS. 11 and 12, two filaments are threaded through the twister in the following manner. Filament T_1 is passed from the front to the rear of lowermost spindle 16, is conveyed within groove 40 of reversing guide 21 and is then passed from the rear to the front of uppermost spindle 14. As is best shown in FIG. 12, filament T_2 is passed from the front to the rear of uppermost spindle 14, is conveyed within groove 42 of reversing guide 21 and is then passed from the rear to the front of lowermost spindle 16. As explained above, groove 42 is deeper than groove 40 in order to enable reversing guide 21 to accommodate both T_1 and T_2 without physical contact between T_1 and T_2 at the point where their paths intersect. As such, filament T_2 would be threaded before filament T_1 .

In both FIGS. 1 and 11, the belt 34 is shown moving to the right as indicated by the arrow. With such a belt motion spindle 14 is rotated counter-clockwise and spindle 16 is rotated clockwise. With yarn filaments running through the spindles, the rotary motion of fric-

tion member 48 and 50 will tend to carry the yarn in a rotary direction resulting in the curved path of travel of the filaments as they pass over the members. This curved or distorted path is visible in both FIGS. 1 and 11.

Again, with reference to FIG. 12, the two filaments T_1 and T_2 are threaded in the manner just described and, when the spindles are rotating, the filaments travel along with the friction members to produce the curved or distorted path just described with reference to FIGS. 1 and 11.

Because the yarn filaments have such a distorted path which is difficult to illustrate on a two dimensional drawing, FIG. 12 must be considered in the nature of a schematic view to illustrate the paths taken by the filaments. The internal diameter of each of the friction members is the same and is equal to the distance between the two grooves 40 and 42 when this latter distance is measured along a line normal to both parallel, flat side surfaces of reversing guide 21.

Consequently, in FIG. 12, the yarn paths are shown as follows. Taking filament T_1 as an example, this filament departs friction member 50 substantially parallel to the axis of spindle 16 when the spindle is rotating and distorting the yarn path as previously described. This parallel path is shown by a dashed line and extends from member 50 at point A to the reversing guide at point B. Note that the path is drawn from a point A on member 50 that the yarn would be contacting after it travels up the friction member when spindle 16 is rotating. This path is substantially parallel to the axis of spindle 16. When spindle 16 is at rest, filament T_1 would pass over and contact member 50 at point C and, although shown as only a partial arrow for clarity, would extend to Point B on reversing guide 21.

Similar paths are shown in dashed and solid full and partial arrows for the other portions of the two filaments T_1 and T_2 .

OPERATION

During operation of the device of the instant invention the spindles 14 and 16 are driven by a drive belt 34. With particular reference to FIG. 1, the relationship of spindles 14 and 16 and belt 34 is visible. Assuming that belt 34 is traveling to the right, it will engage and rotate spindle 14 in a counter-clockwise direction and will engage and rotate spindle 16 in a clockwise direction. Because the filament of yarn end reverses its direction around guide 20, the two spindle friction members 48 and 50 will impart twist of the same hand to a given end of yarn passing through the device. For example, if spindle friction member 50 is imparting Z twist to filament T_1 , then spindle friction member 48, despite the fact that it is rotating in the opposite direction, will also impart a Z twist to filament T_1 .

The particular hand of twist imparted to the yarn is a function of the direction in which belt 34 moves and the manner in which the filament is threaded through the twister of the instant invention. With particular reference to FIGS. 13 and 14, it is first noted that from a mechanical standpoint it is simpler to provide a belt drive mechanism that will move the belt in only one direction. Although the instant invention is not so limited, both FIGS. 13 and 14 illustrate movement of belt 34 to the right of the figures. To impart S twist to a

running filament T_2 , the filament is first passed through spindle 14, reversed around guide 20 and then back through spindle 16. With the belt running in the same direction, the impartation of Z-twist is illustrated in FIG. 14 with filament T_1 first passing through spindle 16, around the reversing guide and then back through spindle 14.

The number of twists that may be imparted to an end of yarn with the friction twister of the instant invention may be appreciated by the following example. A friction member with 0.328 inch inside diameter and an 0.702 inch outside diameter (and a circular cross section with a diameter of 0.187 inch) will create a twisting diameter of about one-half an inch. If the spindle friction member has a twisting diameter of one-half inch and a 15 denier filament with a diameter of approximately 0.001 inch is used, a ratio of 1:500 will exist between the two. With such a ratio, every rotation of the friction spindle member will produce 500 revolutions of the yarn end. Consequently, if the spindle is rotating at 20,000 revolutions per minute the end of yarn would have 10 million revolutions per minute imparted thereto. The number of twists imparted per unit length is, of course, a function of the speed at which the yarn is traveling through the twister. Thus, it can be seen that the friction twister of the instant invention is capable of imparting a very large number of twists to an end of yarn running through the device.

It is noted that each filament or strand that is being processed passes over both friction members 48 and 50 during its path of travel. For a relatively high number of units per length the use of two O-rings or friction members in combination with each other facilitates or aids full twist. The twisting action is not additive, that is, one friction member does not impart a given number of twists to the filament and then the second friction member adds still more. Instead, each friction member aids the other in the impartation in a given number of twists.

Of particular advantage with the twister of the present invention is the ability to maintain a tension in the area of the heater of a low enough value that will permit full development of twist and yet permit a high enough tension within the twister itself to assure adequate frictional engagement between the friction members and the yarn. This feature is particularly advantageous when a high number of twists per unit length are to be imparted to the strand of yarn. The tension in the region of the heater must be low enough to permit some contraction of the yarn as it is twisted about its own axis. This tension, however, is too low to permit good twisting results when the yarn is engaged by only one friction member, as the tension would be too low to permit adequate frictional engagement between the friction member and the yarn. Because the yarn passes over a second friction member, excellent twisting characteristics may be achieved in the region of the heater and the region of the twister.

As the portion of the yarn that runs from one friction member to the other friction member passes around a reversing yarn guide in a twisted state, an additional advantage is realized with the twister of the present invention. The cooling path of the twisted yarn is increased in length before the false twist is removed downstream of the spindle. Consequently, the twisted yarn has a

longer period of time in which it may cool, thereby permitting the twist to set. This feature is particularly advantageous as the running speed of the traveling yarn is increased.

With particular reference to FIG. 5 it is noted that as filament T_1 approaches the first friction member 50, it first contacts this friction member at point 50a and then leaves this friction member at point 50b. The yarn approaches the friction member at an angle sufficiently to insure frictional engagement between the friction member and the yarn (designated as θ when measured from the vertical, in FIG. 5) and then departs the friction member in a path parallel to the axis of spindle 16. It is noted that point 50a is a greater distance from the longitudinal axis of spindle 16 than the distance of point 50b. After filament T_1 passes around the reversing guide it first engages friction member 48 at point 48b and departs at 48a. The angle of departure (designated at ϕ in FIG. 5) is again sufficient to insure frictional engagement between the friction member and the yarn. In this instance, the yarn strand approaches friction member 48 in a path that runs parallel to the axis of spindle 14 and, again, departs the friction member at an angle sufficiently to insure frictional engagement between the friction member and the yarn. Point 48a is a greater distance from the longitudinal axis of spindle 14 than the distance of point 48b.

In the event that the friction twister is employed to run two filaments simultaneously, as for example in FIG. 12, the same relationship is true for filament T_2 . Note however that the order of passage through the spindles are reversed, that is friction member 48 is first approached and friction member 50 is the member from which the filament departs.

FIG. 12 shows spindles 14 and 16 in the rest position in vertical alignment with each other. (See also FIG. 11 for the engaged position.) Thus, if spindle 16 extended from frame 12 the same distance as spindle 14, so that members 48 and 50 were tangent to the same plane, the risk of entanglement of running filaments T_1 and T_2 would be great. In order to prevent this, spindle 16 is mounted upon extended spindle mount 36 which, as shown in FIG. 12, creates two separate approach and exit planes in which filaments T_1 and T_2 may run. It will be noted that filament T_1 enters the twister on the first of these planes and exists on the second whereas filament T_2 enters on the second plane and exits on the first.

It will be understood that whereas this invention has been described herein insofar as it operates upon filaments, it is equally applicable to other strand materials such as multifilament bundles, yarns, rovings, etc.

In view of the above set forth description of the three embodiments, it is apparent that the present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, all of which are intended to be encompassed by the appended claims.

I claim:

1. Apparatus for imparting a false twist to a traveling strand of yarn comprising a rotatable hollow spindle with peripheral friction means thereon and guide means juxtaposed to one end of said spindle, bot said spindle and said guide means defining a yarn path, said yarn path approaching said friction means at an angle

sufficient to insure frictional engagement between said friction means and yarn passing through said path during rotation of said hollow spindle; and said yarn path departing said friction means substantially parallel to the axis of said hollow spindle when said spindle is rotating, a second rotatable hollow spindle adjacent to and parallel to said rotatable hollow spindle, second peripheral friction means on said second rotatable hollow spindle and said guide means having means to substantially reverse said yarn path to run through said second rotatable hollow spindle to approach said second friction means substantially parallel to the axis of said second rotatable hollow spindle when said spindle is rotating and depart said second friction means at an angle sufficient to insure frictional engagement between said second friction means and yarn passing through said path during rotation of said second hollow spindle.

2. Apparatus for imparting a false twist to a traveling strand of yarn comprising a rotatable hollow spindle with peripheral friction means on one end of said spindle and surrounding the longitudinal axis of said spindle and guide means juxtaposed to the other end of said spindle, both said spindle and said guide means defining a yarn path, said yarn path approaching and contacting said friction means at a point spaced a given distance from the longitudinal axis of said spindle and said yarn path departing said friction means at a second point spaced a lesser distance from the longitudinal axis of said spindle and approaching said yarn guide, a second rotatable hollow spindle adjacent to and parallel to said rotatable hollow spindle, second peripheral friction means on one end of said second spindle and surrounding the longitudinal axis of said second spindle, and said guide means having means to substantially reverse said yarn path to run through said second rotatable hollow spindle to approach and contact said second friction means at a point spaced a given distance from the longitudinal axis of said second spindle and said yarn path departing said second friction means at a second point spaced a greater distance from the longitudinal axis of said second spindle.

3. A friction twister comprising two hollow spindles, each of said spindles containing friction means, and a reversing guide juxtaposed to both of said spindles, said reversing guide having reversing means whereby a first filament may enter the front of one spindle, reverse its direction and exit from the front of the other spindle and whereby a second filament may enter the front of said other spindle, reverse its direction and exit from the front of said one spindle to permit the simultaneous false twisting of said filaments upon rotation of said spindles.

4. A friction twister in accordance with claim 3 wherein said friction means are torus shaped elements.

5. A friction twister in accordance with claim 3 wherein said friction means are torus shaped elements which are pressure fitted into engagement with said hollow spindles.

6. A friction twister in accordance with claim 3 wherein said reversing guide is covered by a reversing guide cap.

7. A friction twister in accordance with claim 3 wherein said reversing means comprises a first groove and a second groove that intersect on said reversing guide.

8. A friction twister in accordance with claim 7 wherein said first groove is deeper than said second groove in order to prevent said first and second filaments from contacting each other at the intersection of said first and second grooves.

9. A friction twister in accordance with claim 3 wherein said reversing guide means comprises a first guide having a first groove therein and a second guide having a second groove therein, and means to mount said first and second guides to a guide support member.

10. The method of imparting false twist to a traveling strand of yarn comprising the steps of passing said yarn through a first friction member with sufficient tension to be frictionally engaged thereby, passing said yarn so that it departs said first friction member and approaches a reversing guide, passing said yarn about said reversing guide so that it approaches a second friction member, and passing said yarn through said second friction member with sufficient tension to be frictionally engaged thereby and rotating both of said friction members.

11. The method of claim 10 wherein said rotating step includes rotating said first friction member in a first plane and rotating said second friction member in a second plane separate from said first plane.

12. The method of claim 11 wherein said rotation of said first friction member is in a direction opposite to said rotation of said second friction member.

13. The method of imparting false twist to two traveling strands of yarn comprising the steps of passing the first strand of yarn through a first friction member with sufficient tension to be frictionally engaged thereby, passing said first strand of yarn through a second friction member with sufficient tension to be frictionally engaged thereby, simultaneously passing the second strand of yarn through said second friction member with sufficient tension to be frictionally engaged thereby and passing said second strand of yarn through said first friction member with sufficient tension to be frictionally engaged thereby, and rotating said first and said second friction member.

14. The method of claim 13 wherein the step of passing said first strand through said second friction member is performed subsequent to the step of passing said first strand through said first friction member, and the step of passing said second strand through said first friction member is performed subsequent to the step of passing said second strand through said second friction member.

15. The method of claim 14 further comprising the step of substantially reversing the direction of travel of both strands of yarn between said friction members.

16. The method of imparting false twist to a travelling strand of yarn comprising the steps of passing said yarn over a first rotating friction member with sufficient tension to be frictionally engaged thereby, guiding said yarn over a stationary friction member to a second rotating friction member and passing said yarn over said second rotating friction member with sufficient tension to be frictionally engaged.

17. Apparatus for imparting false twist to a traveling strand of yarn comprising a first toroidal shaped friction member mounted for rotation in a first plane, a second toroidal shaped friction member mounted for rotation in a second plane, said first plane and said second plane being displaced from each other, and a

yarn reversing guide juxtaposed to both of said friction members whereby twist may be imparted to said traveling strand of yarn as it frictionally engages said first friction member during rotation, passes about said reversing guide, and frictionally engages said second 5 friction member during rotation.

18. The apparatus of claim 17 wherein said first and second planes are parallel to each other.

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