

Nov. 10, 1964

P. VAN DIJK ET AL

3,156,084

FALSE TWIST DEVICE

Filed April 28, 1961

3 Sheets-Sheet 1

FIG. 1

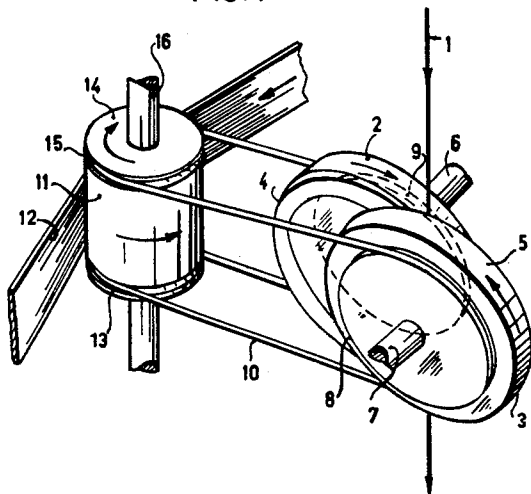


FIG. 4

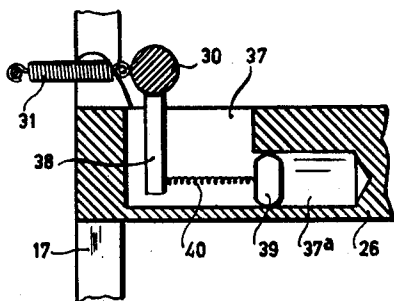
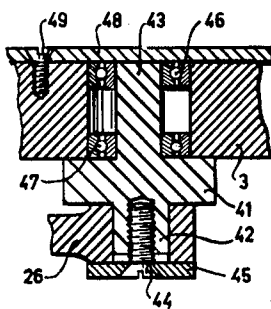


FIG. 5



INVENTORS

PIETER VAN DIJK, DECEASED,
BY HENRIETTE JACOBA VAN DIJK-GROENEVELD, HEIR
JAN VAN SILFHOUT

BY *Sherman and Sherman*
ATTORNEYS

3,156,084

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FIG. 2

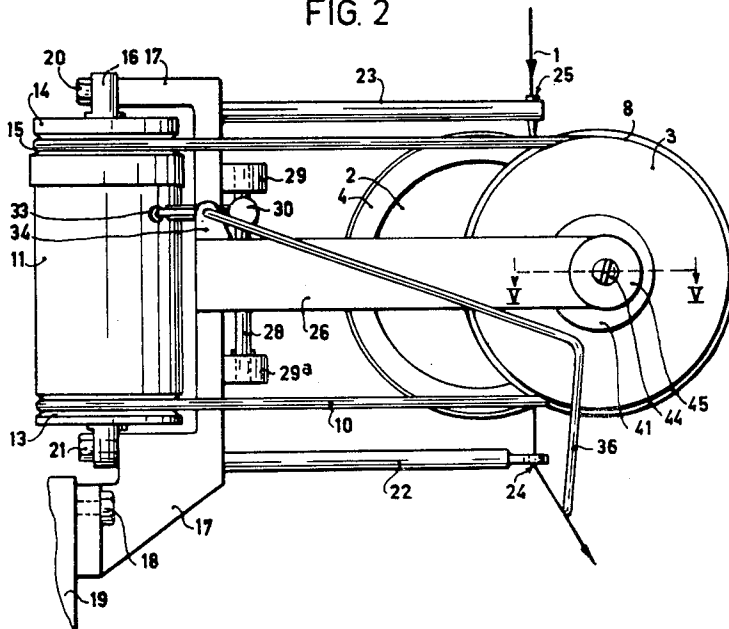
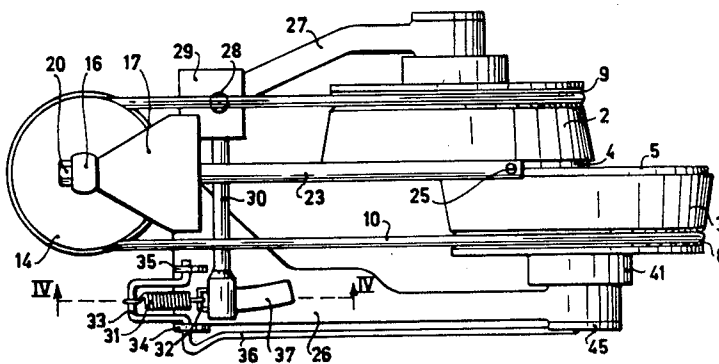


FIG. 3



INVENTORS

PIETER VAN DIJK, DECEASED,
BY HENRIETTE JACOB A VAN DIJK-GROENEVELD, HEIR
JAN VAN SILFHOUT

BY *Sherman and Sherman*
ATTORNEYS

Nov. 10, 1964

P. VAN DIJK ETAL
FALSE TWIST DEVICE

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FIG. 6

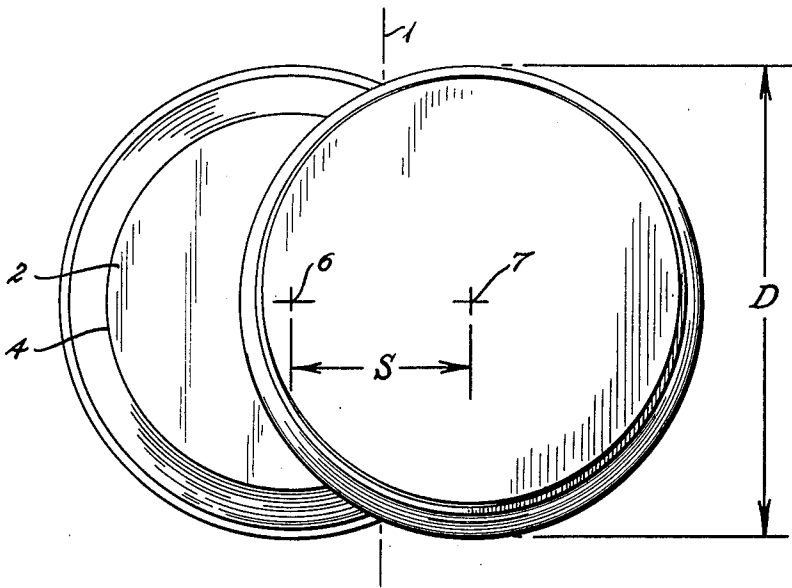
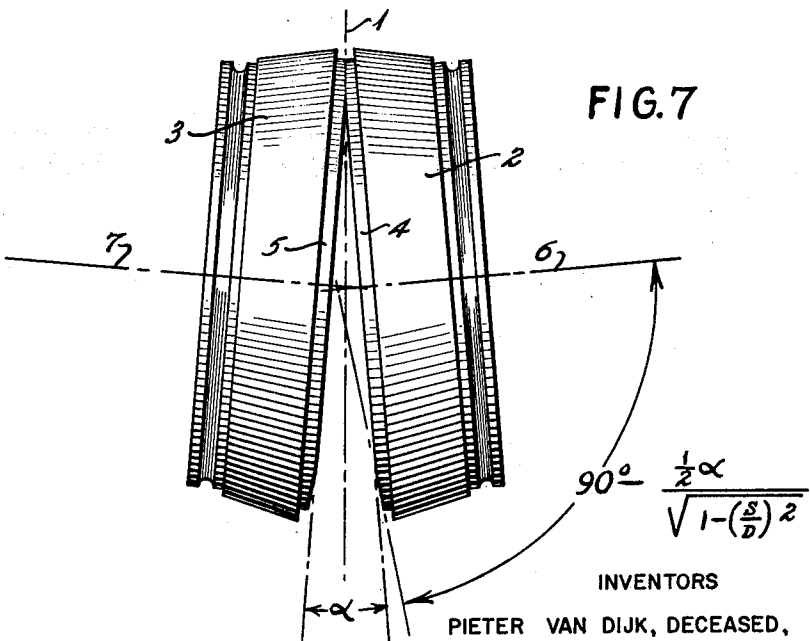


FIG. 7



INVENTORS

PIETER VAN DIJK, DECEASED,
BY HENRIETTE JACOBA VAN DIJK-GROENEVELD, HEIR
JAN VAN SILFHOUT

BY *Sherman and Sherman*
ATTORNEYS

1

3,156,084

FALSE TWIST DEVICE

Pieter van Dijk, deceased, late of Velp, Netherlands, by Henriette Jacoba van Dijk-Groeneveld, heir, Velp, Netherlands, and Jan van Silfhout, Arnhem, Netherlands, assignors to N.V. Research, Arnhem, Netherlands, a corporation of the Netherlands

Filed Apr. 28, 1961, Ser. No. 107,007

Claims priority, application Netherlands May 2, 1960

13 Claims. (Cl. 57-77.4)

This invention relates generally to the textile field, and more particularly to a false twisting device, a yarn crimping method utilizing this device, and crimped threads or yarn manufactured thereby.

In the yarn twisting and crimping art, previous methods of producing crimped yarn included a method of inserting a temporary high twist in the yarn by a false twisting device or the like, and heat setting these twisted yarns. However, during this heating the torsional stresses inserted into the yarn during twisting are allowed to relax and this reduces the liveliness or elasticity of the yarn.

There have been prior art devices for imparting false twist to the yarn by the use of two rotating circular discs which are inclined at a small angle with each other with the discs facing or engaging each other, their axes of rotation being disposed in the same plane. In such devices the yarn is passed through that point along the discs where they are in engagement (the nip) which is also in the plane of the axis of rotation. By rotating the discs in opposite directions, the yarn is also rotated and a twist inserted therein.

However, since the forces exerted by the discs at the nip are opposite to each other, in order to deliver the yarn from the discs it must be pulled out of the nip between the disc rims. Torsional slip of the yarn between the disc rims is to be avoided, and a rather large force is required for withdrawing the yarn from the discs, which results in an undesirable increase in the tension of the yarn. Thus, in order for the yarn to be transported away from the nip, it is necessary that longitudinal or axial slippage occur. This slippage in turn renders it difficult for twist to be imparted to the yarn by the discs without the occurrence of torsional slip, and it is necessary that the disc rims be pressed together with great forces which means that a heavier construction of the device is necessary.

In addition, with the discs of the false twisting devices of the prior art a rather large amount of wear occurs, which may in part be attributed to the continual slip between the yarn and the rims of the discs, as well as the abrasive effect of the discs against each other encountered when a yarn is not disposed in the nip. This latter condition also causes the generation of a considerable amount of heat due to friction, which will burn away the disc rims.

The discs of some of the prior art devices are provided with contacting surfaces having sharp or rounded rims which provide point to point contact therebetween, and which render it difficult to transfer the force and motion from the discs to the yarns.

In using the known types of false twisters, it is found that vibrations are brought about and transmitted through the machine frame to the false twisting assembly proper. Undesired movements are also created in the false twisting assembly such as by its belt drive. These vibrations and movements cause periodic force changes on the discs which are opposite to those providing pressure at the nip, so that the nip pressure becomes variable. This results in uneven and nonuniform twists being inserted into the yarn which obviously disadvantageously affects the finished product. Such yarn defects are easily recog-

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nized in a fabric woven from said yarn by the presence of streaks and the like.

With these defects of the prior art in mind, it is an object of the present invention to provide a method of crimping yarns wherein the torsional stresses imparted to the yarns are not permitted to relax so that they constantly strive to attain a relaxed position, i.e. the yarn contracts, whereby the yarn possesses considerable elasticity.

A further object of the invention is to provide a device of the character described wherein slip between the yarn and the discs is eliminated.

Another object of the invention is to provide a false twisting device of the disc type wherein the resultant forces of the oppositely rotating discs are not directly opposite to each other at the nip but contain components which extend in the longitudinal direction of movement of the yarn as well as in the transverse direction, in order to twist and feed the yarn simultaneously.

Still another object of the present invention is to provide a false twist device wherein a surface of contact is provided between the discs in order to permit proper transfer of the force and motion from the discs to the yarns.

Still a further object of the invention is to mount at least one disc movable laterally with respect to the other so that they may be spread apart against a biasing action to simplify threading of the yarn through the device and to render it possible for the discs to be constantly rotating, yet drastically reduce wear of the discs.

Yet another object of this invention is to provide a disc type false twisting device which automatically spreads the discs apart upon breakage of the yarn, in order to reduce wear on the disc rims.

Still a further object of the invention is to provide a false twisting device wherein each false twisting assembly is belt driven, yet each may be operated independently of the others.

A further object of this invention is to provide a yarn twisting device wherein variations in nip pressure are eliminated.

The foregoing objects and others ancillary thereto are accomplished according to preferred embodiments of the invention.

The crimping method of this invention includes heating the fibers or filaments of the yarn, and subsequently cooling the yarns so that they may be hardened, it being noted that they are softened when heated. The cooling zone may simply comprise a sufficiently long run for the yarn which passes through the air and is cooled by the ambient air. Then, the yarn passes through the false twisting device and is in a state of twist which is the same as that before it was high twisted. The yarn retains the stresses which tend to return it to the twisted state, and these tensions produce a liveliness or great elasticity in the yarn. This crimps the yarn which tends to reduce its internal stresses by contracting.

Each false twist assembly includes a pair of rotating discs offset in a direction transverse to the movement of the yarn, and rotating in opposite directions with the yarn passing between the axes thereof. The nip between the discs, which provides surface contact because of hyperbolic or cone shaped rims on the discs, is disposed at the upstream portion of the yarn path and the yarn is given both torsional and longitudinal motion by the forces imparted thereto by the disc rims. In order to completely eliminate slippage between the yarn and the rims this movement will be such that all of the transverse components of the forces will be utilized in twisting the yarn, and all of the longitudinal components of the forces will be utilized in feeding the yarn out of the nip of the discs.

One of the discs is mounted on a stationary arm while the other is mounted on an arm pivotally connected to the frame and which is biased against the first mentioned disc by means of a spring. Thus, for simple threading of the yarn through the device the discs may be spread apart. In addition, the discs may be constantly rotating even though the yarn is not passing therebetween, and this will nevertheless pose no problem of wear, because the discs will not be in contact with each other if a yarn is not disposed therebetween.

This is accomplished by providing a feeler below the nip of the discs and which is connected to an arm which is spring urged to move the movable disc against the stationary disc. In the event of breakage of the yarn the feeler moves and releases the spring tension, whereby the movable arm pivots away from the stationary arm due to the inclination of its pivot pin.

A lever arm is connected to the movable arm. The end of this lever moves in an arcuate path and a spring is connected between the feeler arm and this lever arm. An assembly is connected to this end of the lever which includes a piston immersed in oil to act as a damping means so that vibrations and other undesirable motions tending to vary the pressure between the discs will, to a large extent, be eliminated. In furtherance of this object, the driving means, which consists of a belt connected about both discs and to a driving roller, is disposed in alignment with the pivot axis of the movable arm when the disc of this arm engages the disc of the stationary arm so that there will be no movement about this pivot caused by the driving belt, and thus variations in nip pressure due to torsional forces about the pivotal axis of the arm is eliminated.

Each of the false twister assemblies is connected so as to be driven from a roller about which a single string like belt is connected and disposed over each of the discs so that as this roller turns, the discs rotate in opposite directions. This roller has a smooth driving surface which may engage a driving belt. Since one disc of each pair is mounted on an arm which is pivotally mounted with respect to an arm supporting the other disc, the discs may be spread apart when the assembly is not to operate upon a yarn, and although the discs will rotate, there is no wear on the disc rims.

The yarn produced by the above method and the above mentioned false twisting device is not abraded and scraped by slippage of the discs, and does not possess large portions having no twist inserted therein which is present in yarns produced by the prior art due to pressure variations in the nip between the rims. Furthermore, the crimp when inserted into the yarn provides the same with great elasticity.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being made to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a diagrammatic perspective of the false twisting device;

FIG. 2 is a side elevation of the false twisting device illustrated in FIG. 1;

FIG. 3 is a plan view of the device shown in FIG. 2;

FIG. 4 is a detail of the damping structure and is a vertical sectional view taken substantially along the plane defined by line IV—IV of FIG. 3;

FIG. 5 is a horizontal sectional view illustrating the eccentric bearing mounting and taken substantially along the plane defined by line V—V of FIG. 2;

FIG. 6 is a view of the discs 2 and 3 shown in FIG. 2, and

FIG. 7 is an end view of the discs 2 and 3 shown in FIG. 6.

In FIGS. 1, 2, 6 and 7 reference numeral 1 designates

a yarn traveling vertically downwardly through the false twisting device. Upstream of the false twisting device are provided a feeding device, a twist stopping device, a heat setting and a cooling zone, and downstream of the false twisting device are a drawing-off device and a collecting device. None of these are shown in the drawing since per se these devices are known.

The false twisting device comprises two discs 2 and 3 having a diameter D (FIG. 6). The facing peripheral surfaces of said discs are provided with rubber rims 4 and 5. They are rotatable around the axes of shafts 6 and 7 (FIGS. 1, 6 and 7) and contact each other since they are at a small angle γ (FIG. 7) less than 10 degrees and preferably about 1.5 degrees. Shafts 6 and 7 are separated a distance S (FIG. 6) and are so disposed that they lie in parallel vertical planes and thus discs 2 and 3 form a wedge shaped slit expanding downwardly. Consequently, the rims 4 and 5 of the discs 2 and 3 are in contact with the yarn 1 only at the inlet for said yarn which is at the upper end of the overlapping portions of the discs.

The discs are provided with circumferential grooves 8 and 9 in which a string like belt 10 is disposed. The belt 10 passes about a drum 11 normally disposed in engagement with belt 12. The drum 11 and belt 12 thus serve to drive the discs by means of the string like belt 10.

The belt 12 may be disposed along several false twisting devices or assemblies in the direction of the arrow to drive each drum 11 in the direction of its arrow. The drum 11 is provided with a peripheral groove 13 near its bottom. A freely rotatable disc 14 having a circumferential groove 15 is disposed over drum 11. The drum 11 and the disc 14 are freely rotatable around the stationary shaft 16.

The string 10 is disposed in the grooves 8, 9, 13 and 15 as shown in FIG. 1 and is provided with a certain pretension. As soon as the belt 12 starts moving the discs 2 and 3 will turn in opposite directions. The rubber rims 4 and 5 will impart a simultaneous false twisting and a transporting or feeding motion to the yarn. In order to obtain the best possible contact between the rims 4 and 5 and the yarn, said rims are slightly conical, i.e. according to conical surfaces running coaxial with the shafts 6 and 7 and having a top angle of about 178 degrees.

As shown in FIGS. 2 and 3, shaft 16 is attached to a U-shaped holder 17 which is in turn attached to the machine frame 19 by means of bolts 18. The shaft 16 is attached to the holder 17 by means of bolts 20 and 21. For this purpose the top and the bottom end portions of the shaft 16 are flattened.

Attached to the parts of the holder 17 on both ends of the drum 11 are eyelet brackets 22 and 23. At their free ends said brackets 22 and 23 are provided with a thread guiding eyelet 24 and a guiding tube 25, respectively. Said tube 25 tapers towards the nip of the rims where the yarn 1 is to be false twisted.

Arms 26 and 27 for supporting the discs 3 and 2 are attached to the holder 17 rigidly and hingedly, respectively. The supporting arm 27 is pivotally attached to the holder 17 (see FIG. 3) by a pivot pin 28 journaled in two bearings 29 and 29a. Said bearings 29 and 29a form part of the holder 17. The pivot pin is disposed at a small angle to the vertical. As a result the center of gravity of the disc 2 and the supporting arm 27 combined will be in such a position with respect to the pivot pin 28 that the disc 2 tends to pivot away from the disc 3. Furthermore, the position of the pivot pin 28 is so chosen (FIG. 3) that if the disc 2 is in its operating position it will not be possible for the driving string like belt 10, disposed about the disc, to exert any torsional moment about the pivot 28. This advantageous feature will be attained as long as pivot pin 28 is disposed in substantial vertical alignment with the rims of the belt 10 be-

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tween disc 2 and drum 11. Note that if pin 28 were disposed inwardly of belt 10, arm 27 would be urged counterclockwise (FIG. 3). Consequently, the force pressing the discs 2 and 3 towards each other is not dependent upon the belt tension.

Connected to the arm 27 of disc 2 is a lever arm 30 disposed substantially parallel to the shaft thereof. The end of said arm 30 is provided with an eye 32 into which an extension spring 31 is hooked (FIG. 3). When extended, the spring 31 causes the discs 2 and 3 to be pressed together because the arms 27 and 30 are urged clockwise about the pivot pin 28.

The extension spring 31 is tensioned by a crank arm 33, onto which it is hooked. Said member 33 is mounted in the upright ears 34 and 35 which are attached to the supporting arm 26. The crank arm is a bent steel wire, having an extending section 36 bent to form a thread feeler (see FIG. 2). When in position according to the drawing the thread feeler 36 rests on the moving yarn. In this position the tensioned spring 31 lies in the plane of the crank arm 33. Consequently, the spring 31 has a fixed position relative to the crank arm 33, as a result of which the disc 2 is pressed against the disc 3.

If the yarn 1 breaks, the thread feeler 36 falls down. As a result, member 33 deflects so that the spring 31 can relax. As explained above, the disc 2 is mounted to move away from the disc 3 because of the inclined pivot pin 28. It has been found that this movement can even be accelerated by the spring 31, in that the falling thread feeler 36 together with the member 33 attached thereto tend to compress the prestressed spring 31.

It is found that in case of thread rupture the rapid swinging away of the disc 2 can prevent undue wear on the rubber rims 4 and 5 by preventing an abrasive action therebetween as well as the production of heat. This also prevents the broken thread from being seized by the disc and becoming entangled in rotating machine parts.

The supporting arm 26 is provided with an arcuate recess 37 which is shaped similar to a cylinder casing, with the pin 28 forming the axis of rotation of the arc. In FIG. 4 this part of the arm is illustrated along the section line IV—IV of FIG. 3. On the right side the bottom part of the recess is provided with an extension in the form of a cylindrical bore 37a. Attached to the arm 30 is a vertical pin 38 which fits in the recess 37. Said pin limits the amount of deflection of the pivoted supporting arm 27. A small piston 39 fitting loosely in the bore 37a is connected to the pin 38 by means of a flexible member 40. Member 40 is a thin helical spring, the prestressed helices of which lie against each other. If the pin 38 moves through the recess 37, it is followed by the piston 39 on its way through the bore 37a. The recess 37 and the bore 37a are filled with thick oil. The displacement of the members 38, 39 and 40 through said oil strongly damps any lateral displacement of the disc 2 with respect to the disc 3. This furthers the uniformity of the false-twisted yarn.

FIG. 5 is a cross-section along section line V—V of FIG. 2 and shows the mounting of disc 3 to the supporting arm 26. The disc 2 is attached to the supporting arm 27 in an identical manner. Attached to a disc 41 are two parallel shaft butts 42 and 43 which are displaced longitudinally relative to each other. The disc 41 is fastened to the supporting arm 26 by means of a screw 44 and a washer 45. The shaft butt 43 fits in between two ball bearings 46 and 47 which are fixed in the disc 3. A cover plate 48 is secured to the disc 3 by means of the screw 49. By loosening the screw 44 the disc 41 can be turned into various positions relative to the supporting arm 26, after which the disc is fixed again. In this way the distance between the shafts 6 and 7 of the discs 2 and 3 can be varied. This makes it possible to adjust the false twist level and the conveying speed of the discs simultaneously.

The operation of the device is as follows.

In the crimping operation the false twisting device is

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merely one in a series of continuously operated devices for the continuous production of crimped yarn. In this series of devices for continuously crimping yarns of thermoplastic synthetics such as those made from polymerization of polycondensation products, the yarns are fed by means of a non-slip thread feeding device and a twist stopping or twist retaining device, through a heating device, and a cooling zone. Then, the yarns pass through the false twisting devices and they are fed through a collecting device with the aid of a drawing off means. It should be noted that it is important in this method that the novel false twisting process as performed by the device comprising the present invention be used because of the particularly advantageous features of the invention which will be described in further detail below.

As to the false twisting device itself, the yarn 1 is fed through tube 25, through a path between the overlapping portions of the discs 2 and 3, and into the nip thereof which is formed at the uppermost end of the overlapping portions of the discs and between the rims 4 and 5 which are of resilient material such as rubber. These rims are slightly conical or parabolic in configuration so that the nip which is provided, albeit small, is nevertheless greater than the point to point contact which had to a large extent been encountered in the prior art. Thus, a more substantial surface of contact is provided so that the torsional component providing twist to the yarn and the longitudinal component providing feeding direction to the yarn are both positively acting upon the yarn and slippage is avoided.

Before the yarn is fed into the nip, the disc 2 is displaced laterally from the disc 3 because there is no tension on spring 31 and the inclination of pivot pin 28 causes arm 27 to move away from arm 26. Thus, although the discs are constantly rotating there is no contact therebetween until a yarn is placed in the nip. When the yarn is presented to the nip, the yarn feeler 36 is placed over the yarn and is retained in position by the yarn itself, and therefore the crank arm 33 tensions spring 31 and moves arm 27 towards arm 26 so that the rims 4 and 5 will come together in contact to form a nip for the yarn.

While in operating position it should be noted that the axis of pivot pin 28 is disposed along the path of movement of that portion of belt 10 which is disposed between the disc 2 and the drum 11, so that there is no torsional movement of arm 27 about pivot pin 28 which would be caused by the belt 10 if the disposition of the pin 28 with respect thereto were otherwise. It is to be noted that due to the disposition of the discs the yarn is caused not only to rotate about its own axes but is also fed in the direction of the yarn movement because the discs are displaced laterally from each other as clearly seen in FIG. 2. This displacement is along an axis which is normal to the direction of yarn movement, so that the lateral or twisting components of the resultant force, as well as the feeding components thereof provided by each disc will be equal.

If these lateral forces were unequal, there would be some slippage between the discs and the yarn which would cause abrasion of the yarn which is one of the disadvantageous features of the prior art. This would occur if the axis of displacement between the two discs were disposed at an angle to the path of yarn movement other than 90 degrees. In this event the components of frictional force causing the twisting action would be unequal and there would necessarily be slippage between the discs and the yarn.

The relative position of the discs may be chosen or adjusted so that the components of twisting and longitudinal movement are such that all of the torsional movement or lateral components are taken up in the twisting of the yarn so that there is no slippage between the yarn and the discs. Such a suitable arrangement of the discs is generally one wherein they overlap at the

shortest distance, which is 30 percent to 85 percent of the diameters of the discs. It should thus be clear that there is no longer any slip between the discs and the yarn and that since there is some longitudinal movement of the yarn it is no longer necessary to cause an increase in the yarn tension when withdrawing it from the nip of the discs. This is so because the discs will themselves aid in delivering the yarn from the nip. With this construction it is found that the nip exerted by the rims on the yarn is greater than that attained previously so that the discs need not be pressed together with as large an amount of pressure as was necessary previously. This in turn makes it possible to construct both the discs and their bearings with a cheaper and lighter construction.

Although it is possible in principle to arrange the discs at any angle relative to each other it has been found that better performance is obtained if the discs are inclined so that they make an angle with each other of less than 10 degrees and preferably between 1 and 2 degrees. In such case a minimum pressing force on the discs is required for the false twisting operation to proceed satisfactorily and therefore the device may be constructed of a relatively simple and light construction.

The point to point contact between the rims of the discs which was prevalent in the prior art has been eliminated by shaping the rims as parts of hyperbolic surfaces the axes of which coincide with those of the discs and which surfaces contact according to a straight line running through the middle of the shortest imaginary line connecting the disc axes. The hyperbolic surfaces are those surfaces generated by the revolution about each of axes 6 and 7 of discs 4 and 5, respectively, of the straight line, coinciding with the path of travel of yarn between discs 4 and 5. The disc rims are in contact with each other according to a section of a straight line. The shaping of the disc rims into hyperbolic surfaces must be figured with a theoretical value of the axes being spaced at one particular distance apart. However, by using the present invention the discs can be given a shape which in a simple manner renders it possible to obtain proper contact between the disc rims even though the axes of the rims be displaced.

The rims thus shaped are rendered less sensitive to deviations from their relative positions. To this end the rims of the discs are, at the point of contact, shaped as parts of conical surfaces whose axes coincide with those of the discs and which have top angles of which the supplement of each top angle is equal to:

$$\frac{\alpha}{\sqrt{1 - \left(\frac{S}{D}\right)^2}}$$

where α is the angle which the discs make with each other, S is the shortest distance between their axes, and D is their diameter as shown in FIGS. 6 and 7. Since, as will be understood, the supplement of the top angle of each of the conical surfaces is 180° less the top angle and equal to twice the angle the conical surface makes with a plane normal to the axes of the conical surfaces, each of the above-described conical surfaces intersects its axis at an angle equal to:

$$90 - \frac{1/2\alpha}{\sqrt{1 - \left(\frac{S}{D}\right)^2}}$$

If the angle α is kept small, which will always be the case, it will be apparent that with the disc rims shaped in this way a satisfactory contact between the discs is hardly influenced by small variations in the quantity S. The false twisting device can consequently be successfully adjusted for false twisting at various twist levels.

It should be noted that it has been found possible to completely compensate for the influence of small variations in the distance between the disc axes on the proper contact between the discs by varying the angle at which

said axes cross each other. In order to ensure a very good contact between the discs and the yarn it has been found preferable for the contacting disc rims to be made of an elastic material having a high coefficient of friction, e.g. rubber.

It must also be noted that variations in the pressure at the nip caused in part by vibrations on the device proper, or by a tendency of the arm 27 to move away from arm 26, is negated, by the arrangement of the axis of pin 28 with respect to the belt 10. This arrangement eliminates torsional forces about the pin. Also, vibrations at the nip are eliminated because of the damping system which has been provided, and which is shown in FIG. 4.

The foregoing is considered only as illustrative of the principles of the invention. Further, since numerous minor modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed is:

1. A false twist device comprising a pair of rotatable discs disposed at a small angle with respect to each other to define a nip therebetween at the apex of said angle, adjacent portions of said discs defining a yarn path passing through said nip, said discs being displaced from each other along an axis normal to said yarn path, a fixed arm on which one of said discs is rotatably mounted, a movable arm on which the other of said discs is rotatably mounted, means mounting said movable arm for pivotal movement laterally with respect to said fixed arm, and means for constantly rotating said discs including a belt for driving said disc on said movable arm, said mounting means having a pivot axis intersecting said belt when said discs are in engagement to form a nip, whereby torsional forces from said belt tending to pivot the movable arm about said pivot axis are eliminated.

2. The device of claim 1, comprising adjustable eccentric bearing means rotatably mounting one of said discs on its arm so that the displacement between the disc axes may be selectively varied.

3. The device of claim 1, wherein the inclination of the discs with respect to each other is less than 10 degrees.

4. The device of claim 1, wherein said discs include rims which are in contact with each other and are shaped as portions of hyperbolic surfaces having axes coinciding with those of the discs and which contact along a straight line extending through the middle of the shortest imaginary line connecting the disc axes.

5. A false-twisting device according to claim 1, wherein the discs have rims which are in contact with each other, said rims being shaped as parts of conical surfaces the axes of which coincide with those of the discs and of which the supplement of each top angle is equal to:

$$\frac{\alpha}{\sqrt{1 - \left(\frac{S}{D}\right)^2}}$$

where α is the angle at which the discs are inclined to each other, S is the shortest distance between their axes, and D is their diameter.

6. The device of claim 1, comprising an adjustable bearing mounting one of said discs on its arm for selectively displacing said one disc to overlap the other disc, wherein said bearing includes an adjusting disc, a shaft butt projecting from each side of said adjusting disc and having longitudinal axes which are displaced from and parallel to each other, one of said shaft butts being rotatably mounted in the arm of said one disc, anti-friction means rotatably mounting said one disc on the other shaft butt, and means for selectively locking said one shaft butt to the arm of said one disc, whereby the overlapping of said discs may be varied by rotating said adjusting disc.

7. A false twist device comprising a pair of rotatable

discs disposed at a small angle with respect to each other to define a nip therebetween at the apex of the angle, means for constantly rotating said discs, a fixed arm on which one of said discs is rotatably mounted, a movable arm on which the other of said discs is rotatably mounted and laterally movable with respect to said one disc, whereby said discs may be moved apart, and damping means connected between said movable arm and a stationary frame portion, said damping means including a recess in said frame portion, a pin connected to and movable with said movable arm and limiting movement thereof by engaging the ends of said recess, a blind bore in said frame portion in communication with said recess, a piston in said bore, a flexible member connecting said piston to said pin, and oil filling said bore and said recess.

8. A false twist device comprising a pair of rotatable discs disposed at a small angle with respect to each other to define a nip therebetween at the apex of the angle, means for rotating said discs in opposite directions, adjacent portions of said discs defining a yarn path passing through said nip, said discs being displaced from each other along an axis normal to said yarn path, a fixed arm on which one of said discs is rotatably mounted, a movable arm on which the other of said discs is rotatably mounted, whereby said discs may be moved apart, and adjustable eccentric bearing means rotatably mounting one of said discs on its arm so that the displacement between the disc axes may be selectively varied.

9. A false twist device comprising a pair of rotatable discs disposed at a small angle with respect to each other to define a nip therebetween at the apex of the angle, means for rotating said discs in opposite directions, adjacent portions of said discs defining a yarn path passing through said nip, said discs being displaced from each other along an axis normal to said yarn path, wherein said discs have rims which are in contact with each other, said rims being shaped as parts of conical surfaces the axes of which coincide with those of the discs and of which the supplement of each top angle is equal to:

$$\frac{\alpha}{\sqrt{1 - \left(\frac{S}{D}\right)^2}}$$

where α is the angle at which the discs are inclined to each other, S is the shortest distance between their axes, and D is their diameter.

10. A false twist device comprising a pair of rotatable discs disposed at a small angle with respect to each other to define a nip therebetween at the apex of the angle, adjacent portions of said discs defining a yarn path passing through said nip, said discs being displaced from each other along an axis normal to said yarn path, means for constantly rotating said discs, arms on which said discs are rotatably mounted, an adjustable bearing mounting one of said discs on its arm for selectively displacing said one disc to overlap the other disc, wherein said bearing includes an adjusting disc, a shaft butt projecting from each side of said adjusting disc and having longitudinal axes which are displaced from and parallel to each other, one of said shaft butts being rotatably mounted in the arm of said one disc, anti-friction means rotatably mounting said one disc on the other shaft butt, and means for selectively locking said one shaft butt to the arm of said one disc, whereby the overlapping of said discs may be varied by rotating said adjusting disc.

11. A false twist device comprising a pair of rotatable discs disposed at a small angle with respect to each other to define a nip therebetween at the apex of said angle, adjacent portions of said discs defining a yarn path passing through said nip, said discs being displaced from each other along an axis normal to said yarn path, a fixed arm on which one of said discs is rotatably mounted, a movable arm on which the other of said discs is rotatably mounted, means mounting said movable arm for pivotal movement laterally with respect to said fixed arm, means

for constantly rotating said discs including a belt for driving said disc on said movable arm, said mounting means having a pivot axis intersecting said belt when said discs are in engagement to form a nip, whereby torsional forces from said belt tending to pivot the movable arm about said pivot axis are eliminated, and damping means connected between said movable arm and a stationary frame portion, said damping means including a recess in said frame portion, a pin connected to and movable with said movable arm and limiting movement thereof by engaging the ends of said recess, a blind bore in said frame portion in communication with said recess, a piston in said bore, a flexible member connecting said piston to said pin, and oil filling said bore and said recess.

12. A false twist device comprising a pair of rotatable discs disposed at a small angle with respect to each other to define a nip therebetween at the apex of said angle, adjacent portions of said discs defining a yarn path passing through said nip, said discs being displaced from each other along an axis normal to said yarn path, a fixed arm on which one of said discs is rotatably mounted, a movable arm on which the other of said discs is rotatably mounted, means mounting said movable arm for pivotal movement laterally with respect to said fixed arm, means for constantly rotating said discs including a belt for driving said disc on said movable arm, said mounting means having a pivot axis intersecting said belt when said discs are in engagement to form a nip, whereby torsional forces from said belt tending to pivot the movable arm about said pivot axis are eliminated, said discs including rims which are in contact with each other and are shaped as portions of hyperbolic surfaces having axes coinciding with those of the discs and which contact along a straight line extending through the middle of the shortest imaginary line connecting the disc axes, adjustable eccentric bearing means rotatably mounting one of said discs on its arm so that the displacement between the disc axes may be selectively varied, and a damping means connected between said movable arm and a stationary frame portion, said damping means including a recess in said frame portion, a pin connected to and movable with said movable arm and limiting movement thereof by engaging the ends of said recess, a blind bore in said frame portion in communication with said recess, a piston in said bore, a flexible member connecting said piston to said pin, and oil filling said bore and said recess.

13. A false twist device comprising a pair of rotatable discs disposed at a small angle with respect to each other to define a nip therebetween at the apex of said angle, adjacent portions of said discs defining a yarn path passing through said nip, said discs being displaced from each other along an axis normal to said yarn path, a fixed arm on which one of said discs is rotatably mounted, a movable arm on which the other of said discs is rotatably mounted, means mounting said movable arm for pivotal movement laterally with respect to said fixed arm, means for constantly rotating said discs including a belt for driving said disc on said movable arm, said mounting means having a pivot axis intersecting said belt when said discs are in engagement to form a nip, whereby torsional forces from said belt tending to pivot the movable arm about said pivot axis are eliminated, said discs having rims which are in contact with each other, said rims being shaped as parts of conical surfaces the axes of which coincide with those of the discs and of which the supplement of each top angle is equal to:

$$\frac{\alpha}{\sqrt{1 - \left(\frac{S}{D}\right)^2}}$$

where α is the angle at which the discs are inclined to each other, S is the shortest distance between their axes, and D is their diameter, adjustable eccentric bearing means rotatably mounting one of said discs on its arm so that the displacement between the disc axes may be selec-

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tively varied, and a damping means connected between said movable arm and a stationary frame portion, said damping means including a recess in said frame portion, a pin connected to and movable with said movable arm and limiting movement thereof by engaging the ends of said recess, a blind bore in said frame portion in communication with said recess, a piston in said bore, a flexible member connecting said piston to said pin, and oil filling said bore and said recess.

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