United States Patent [19]

Raschle

[11] **3,828,541**

[45] **Aug. 13, 1974**

[54] **FRICTION FALSE-TWIST DEVICE**

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[73] Assignee: **Heberlein & Co. AG,** Wattwil, Canton of St. Gallen, Switzerland

[22] Filed: **May 1, 1973**

[21] Appl. No.: **356,206**

[30] **Foreign Application Priority Data**

May 3, 1972 Switzerland 6588/72

[52] **U.S. Cl.** **57/106,** 57/77.4

[51] **Int. Cl.** **D01h 13/04,** D02g 1/08

[58] **Field of Search** 57/77.3–77.45, 57/106

[56] **References Cited**

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Primary Examiner—John Petrakes

Attorney, Agent, or Firm—Fitzpatrick, Cella, Harper & Scinto

[57] **ABSTRACT**

A friction false-twist device has at least one pair of friction discs mounted on parallel shafts for rotation about the axes thereof and a swivel shaft has at least two thread-guide elements thereon arranged so that at least one guide element is above and one guide element is below the discs.

13 Claims, 10 Drawing Figures

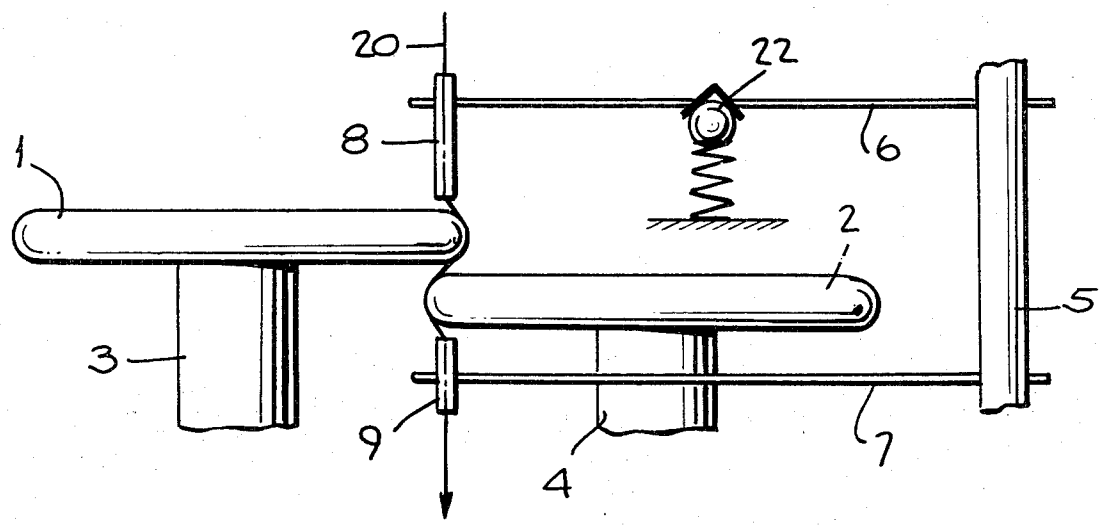
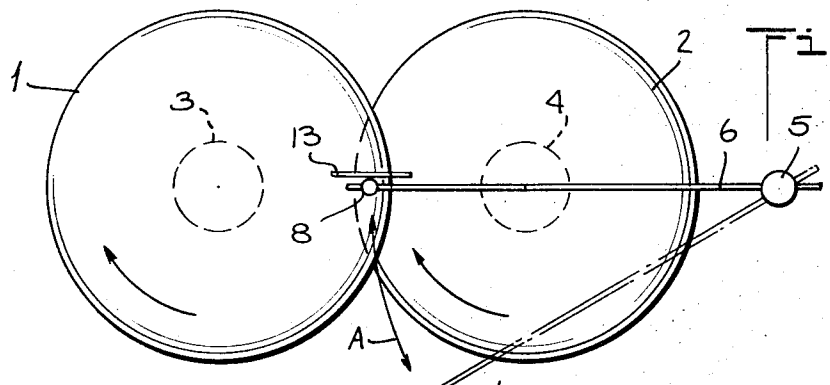


Fig. 1.



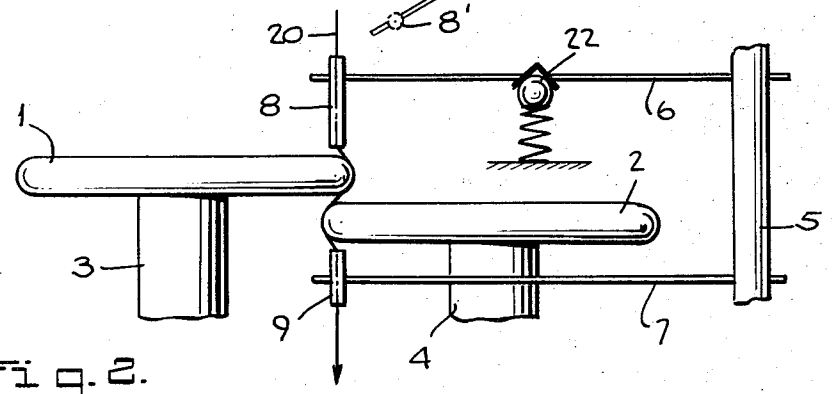


Fig. 2.

Fig. 5.

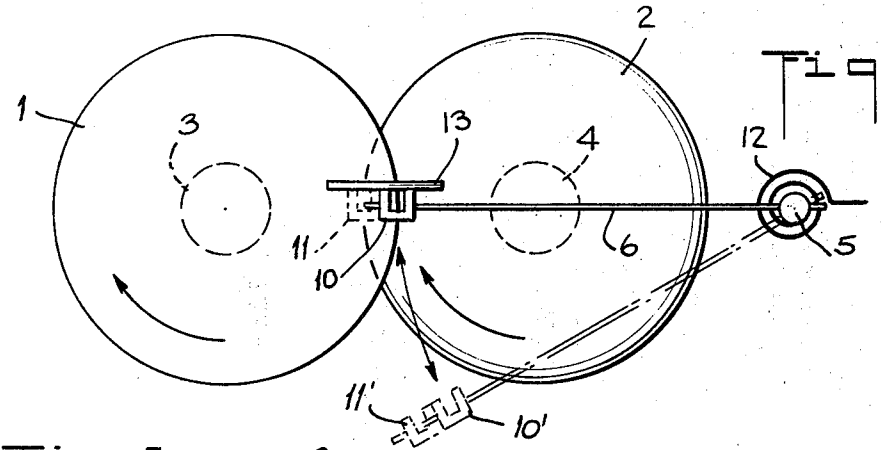
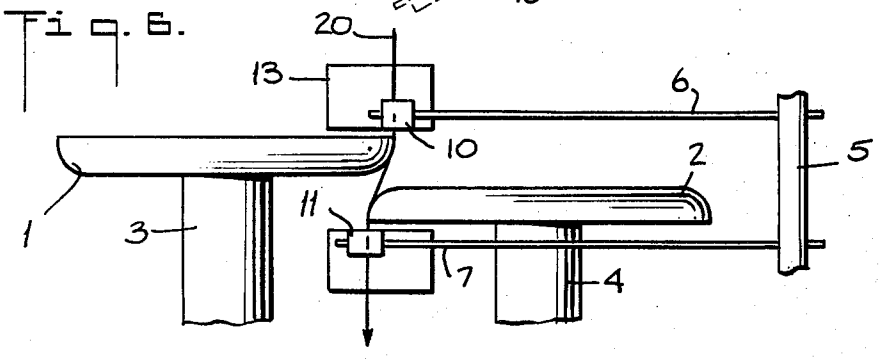


Fig. 6.



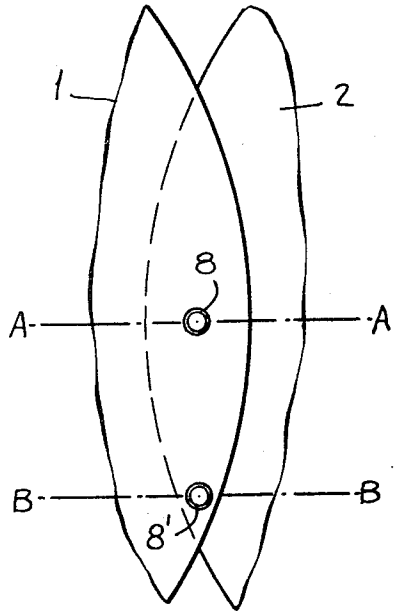


Fig. 3.

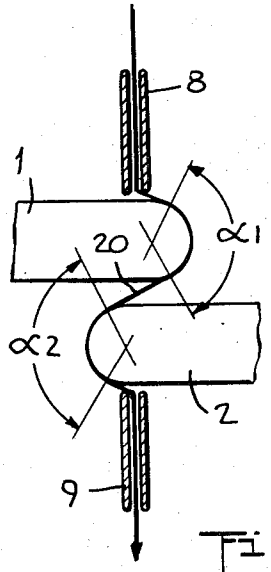


Fig. 4A.

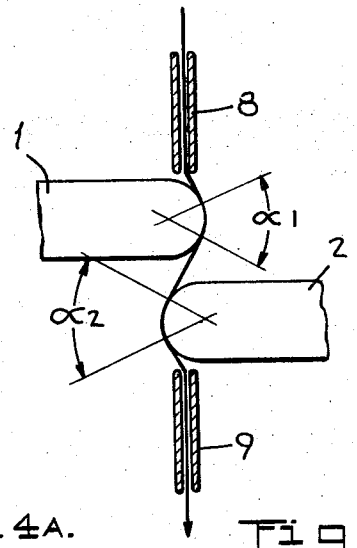


Fig. 4B.

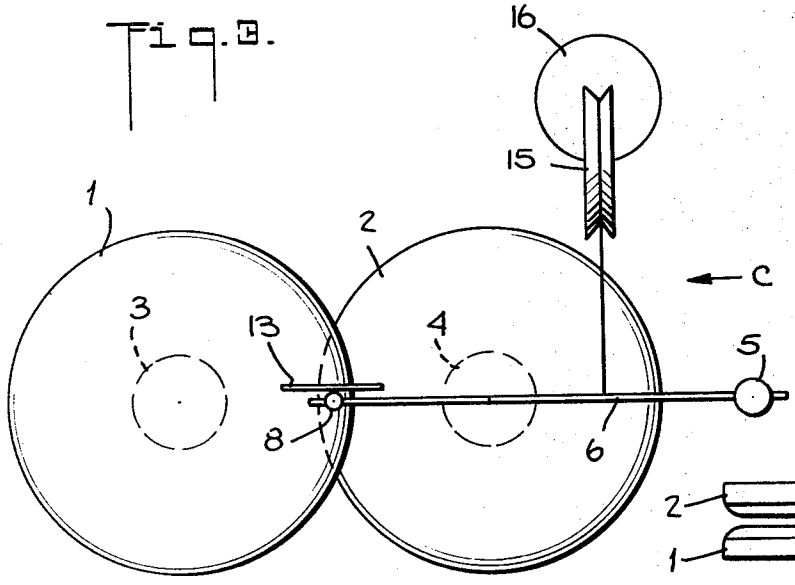


Fig. 7.

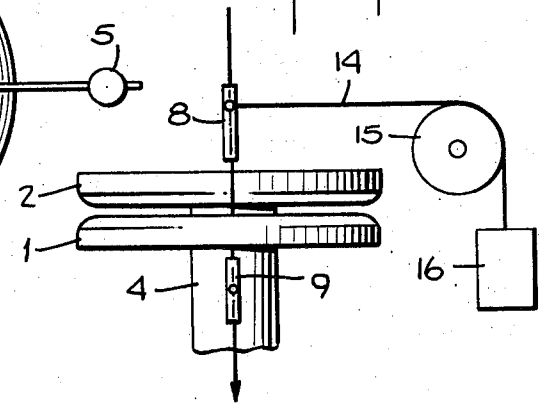


Fig. 8.

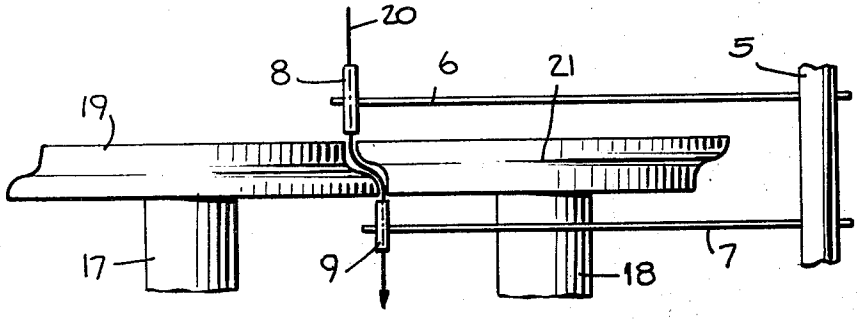


Fig. 9.

FRICTION FALSE-TWIST DEVICE

This invention relates to false-twist devices, and more particularly to such devices utilizing friction elements consisting of a pair of rotatable discs between which the yarn to be twisted advances, and wherein a thread-guide device controls the position of the yarn prior to entry between the discs and subsequent to leaving same.

Devices for the production of false-twist in textile yarns are known in which the twist is imparted to the yarn by direct frictional contact with rotating surfaces. Thus, for example, a device is disclosed in German patent specification No. 253,786 in which the yarn to be twisted is passed, in axial or nearly axial direction, through the arc throat between two rollers rotating in the same direction and with the same circumferential speed. The rollers are provided with ribs and grooves and arranged so that the ribs of one roller engage with the grooves of the other roller. This measure is taken to prevent the yarn from moving out of the engagement position. Experiments have proved however that, with such apparatus, the path of the yarn is entirely out of control and that, therefore, uniform yarn engagement and required uniform yarn quality cannot be obtained.

Furthermore, a similar device is disclosed in Swiss patent specification No. 341,103 in which the yarn is passed in frictional contact with a number of circular discs arranged on parallel shafts by means of thread-guides provided above and below the discs to provide a yarn path parallel with the disc shafts. According to a first embodiment, the circular discs of the two shafts may have a distance between each other corresponding approximately to the yarn thickness, the yarn being maintained on the straight line between the two disc shafts by means of the thread-guides. Because of the irregular diameter of the textile yarns to be treated, of play of the disc shafts and the relatively rapid wear of the disc rims, uniform yarn entrainment is not assured. Also with this device, it is not possible to obtain uniform yarn quality.

According to another embodiment of the known device, subsequent circular discs can mutually overlap and the yarn is maintained between the overlapping portions of the discs by means of the thread-guides. Experiments have also shown that this solution does not provide sufficient pressing of the yarn against the disc rims to assure safe uniform yarn engagement so that, again, the required uniform yarn quality cannot be obtained.

Accordingly, I have conceived by the present invention a false twist device whereby I am able to avoid the disadvantages of the known devices. Thus, in essence the present invention relates to a friction false-twist device for textile yarns with at least one friction element consisting of at least one pair of discs characterized in that a thread-guide arrangement is provided which consists of at least two thread-guide elements arranged to swivel on a common shaft so that, in operating position, there is a thread-guide element at least above and below each friction member.

The friction member may advantageously consist of two axially parallel circular discs the rims of which overlap in a zone of between 1 and 10 mm., preferably between 3 and 4 mm. or the rims of which are provided with mutually engaging profiles, the thread-guide elements being so arranged on the swivelling shaft that they are intercepted by an imaginary straight line extending between the disc shafts when the unit is in operation, i.e. a line perpendicular to the axes of the shafts. The thread-guide elements may be situated in the middle of the straight line between the disc shafts or by symmetrically displaced with respect to this central point. The thread-guide elements may consist of low-wear material, for example a hard metal such as wolfram carbide, may be of annular or tubular shape, and may have maximum interior widths of between 0.5 and 3mm. They may also be formed with a yarn introduction slot which may, for example, be of V, U or L shape and may abut against a stop when being swivelled into readiness for operation. This embodiment of the thread-guide elements permits yarn introduction while the machine is in operation. The thread-guide elements, or more precisely, their ends lying opposite the friction discs, may be spaced from each other by a distance of up to 30mm.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of the invention.

Specific embodiments of the invention have been chosen for purposes of illustration and description, and are shown in the accompanying drawings, forming a part of the specification wherein:

FIG. **1** is a top plan view of a first embodiment of the present invention;

FIG. **2** is a front elevational view of the device of FIG. **1**;

FIG. **3** is a detail of FIG. **1** on an enlarged scale;

FIGS. **4***a*, **4***b* are cross-sectional views taken along lines A—A and B—B, respectively, of FIG. **3**;

FIG. **5** is a top plan view of a second embodiment of the invention;

FIG. **6** is a front elevational view of the device of FIG. **5**;

FIG. **7** is a plan view of an embodiment with a device for controlling the thread-guides according to yarn tension;

FIG. **8** is a side elevation of the device of FIG. **7** in the direction of arrow C; and

FIG. **9** is a further embodiment of the invention shown in front elevation.

The device of FIGS. **1** and **2** includes two circular discs **1** and **2** formed of an elastomeric material, such as polyurethane, the rims of which mutually overlap by approximately between 3 and 4 mm. The discs **1, 2** are placed on axially parallel shafts **3, 4** which are driven in the same direction and with the same revolution speed by suitable drive means (not shown). Depending on yarn thickness, the distance between the discs is from 0.5 to 1.5 mm. I also provide a shaft **5** rotatable about its axis which is parallel to the axes of the shafts

3 and 4 and on this shaft I mount carrier rods 6, 7 extending transversely with respect to the shaft 5, and on the free ends of which I mount the tubular thread-guide elements 8, 9 consisting of hard metal, such as wolfram carbide. The carrier rods 6, 7 with the thread-guide elements 8, 9 can be swivelled simultaneously in the direction of the arrow A from the operating position shown in solid lines to the phantom line position by rotating shaft 5. In the operating position, the thread-guide elements 8, 9 are centered along a straight line between the axes of shafts 3, 4 and are fixed in the operating position by means of a detent latching device 22. The yarn 20 then runs along the path shown in FIG. 2, the tangential yarn engagement forces from the rims of the two discs 1, 2 being directed oppositely.

FIGS. 3, 4*a* and 4*b* show the overlapping rims of discs 1, 2 and two different positions of the thread-guide elements 8, 9 on an enlarged scale. If the thread-guide elements are exactly on the straight line A—A of the axes (not shown) of shafts 3, 4, the yarn 20 passes over the rims of discs 1, 2 with maximum wrap angles α_1, α_2 (FIG. 4*a*). The further away the thread-guide elements 8, 9 are from line A—A, the smaller are the wrap angles α_1, α_2, as can be seen from FIG. 4*b*. It is therefore important that the thread-guide elements, when in operation, should be on or as close as possible to the line A—A to assure optimal yarn engagement.

The device of FIGS. 5, 6 differs from that of FIGS. 1, 2 in that the thread-guide elements 10, 11 are symmetrically displaced with respect to the center of the straight line between the axes of the shafts of the discs and in that these elements are U-shaped and are pressed against the stop 13 by means of spiral spring 12 and are thus fixed in the correct position for operation. The displaced arrangement of thread-guide elements 10, 11 permits very exact control of yarn movement on the friction surfaces of discs 1, 2 since, as can be seen from FIG. 6, the yarn 20 runs from thread-guide element 10 to the rim face of disc 1 along a straight line and runs from the rim surface of disc 2 to the thread-guide element 11 also in a straight line.

The device of FIGS. 7, 8 also shows two circular discs 1, 2 with overlapping rims. On the carrier rod 6 is fixed a flexible cord or cable 14 which runs over guide roller 15 and on the other end carries a weight 16. With this device, which may for example also be replaced by a traction spring, it is possible to control the guiding of the yarns depending on variations of yarn tension so that the yarn guide elements are always on or as near as possible to the straight line between the axes of the discs.

In the device of FIG. 9, two discs 19, 21 are provided in the same plane on parallel shaft 17, 18, the rims of which have mating step-shaped profiles which engage with each other. The thread-guide device is the same as shown in FIGS. 1, 2.

The advantages obtainable by the device of the present invention lie particularly in the fact that exact control of yarn movement on the friction surfaces is possible by precisely guiding the yarns at the input and output ends of the friction elements. It furthermore assures uniform yarn engagement and therefore very uniform yarn quality. Safe yarn engagement because of he maximum wrap angles of the yarns on the disc rims furthermore permits the use of friction surfaces of more wear-resistance, but with lower friction coefficients than elastomeric materials, such as for example metal oxide ceramic material. The engageable and disengageable thread-guide device furthermore permits me to bring the yarn into frictional contact with rotating friction elements or to remove the yarn from the latter.

I believe that the construction and operation of my novel friction false-twist device will now be understood and that the several advantages thereof will be fully appreciated by those persons skilled in the art.

I claim:

1. Friction false-twist device for textile yarns with at least one friction element consisting of a pair of parallel shafts and at least one disc mounted for rotation about the axis of each shaft thereof, characterized by a swivel shaft (5) and a thread-guide device which comprises at least two thread-guide elements (8, 9) adapted to guide a yarn end serially traversing the elements and so arranged on said shaft that in operation at least one thread-guide element is present above and one below the respective friction elements, whereby a yarn end may traverse one guide element before and the other guide element after running over the friction element.

2. Device according to claim 1, wherein said discs overlap in a zone of between 1 and 10 mm.

3. Device according to claim 2, wherein said discs overlap in a zone of between 3 and 4 mm.

4. Device according to claim 2, wherein the distance between said discs at the overlapping zones thereof is between 0.5 and 1.5 mm.

5. Device according to claim 1, wherein said friction element comprises two axially parallel circular discs, characterized in that the thread-guide elements (8, 9; 10, 11) are so arranged on said shaft (5) that they each extend perpendicular to each of the discs shafts when in operation.

6. Device according to claim 5, characterized in that the thread-guide elements (8, 9) are centrally positioned along a straight line between the disc shafts when in operation.

7. Device according to claim 5, characterized in that the thread-guide elements (10, 11) are in a symmetrically displaced position from the middle of a line perpendicular to the axes of said disc shafts when in operation.

8. Device according to claim 5, characterized in that means (12, 13, 22) are provided maintaining the position of said thread-guide elements in operation.

9. Device according to claim 5, characterized in that means (14, 15, 16) are provided to control the position of the thread-guide elements when in operation responsive to the tension in the yarn.

10. Device according to claim 1, characterized in that the thread-guide elements (8, 9) are of tubular shape.

11. Device according to claim 10, characterized in that the thread-guide elements have an interior width of between 0.5 and 3mm.

12. Device according to claim 1, 1, characterized in that the thread-guide elements have a slot through which the yarn may be inserted.

13. Device according to claim 1, characterized in that the respective extremities of said thread-guide elements be opposite the circular discs and are spaced a distance from each other of up to 30 mm.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,828,541 Dated August 13, 1974

Inventor(s) JOSEF RASCHLE

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 59, change "1,1," to -- 1, --.

Signed and sealed this 10th day of December 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334