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Mutschler et al.

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[54] **TWIST STOPPING DEVICE**

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[30] **Foreign Application Priority Data**

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[51] **Int. Cl.** **D02g 1/02**, D01h 13/08

[58] **Field of Search** ..... 57/34 HS, 106, 12, 57/90; 242/155 R; 74/230.5

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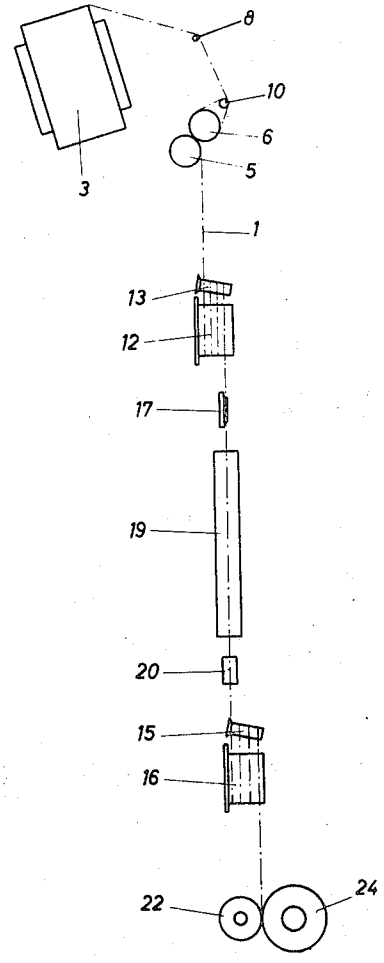
[57] **ABSTRACT**

The twist stopping device described comprises a freely rotatable pulley formed of two axially aligned, identically dimensioned discs which are rotatable as a unit and each of which is provided with a plurality of circumferentially spaced lugs arranged in an interlocking relationship. The lugs together define a circumferential groove in the pulley adapted to receive the yarn running therethrough. The groove arrests the propagation of false twist imparted on the yarn downstream of the twist stopping device.

13 Claims, 6 Drawing Figures



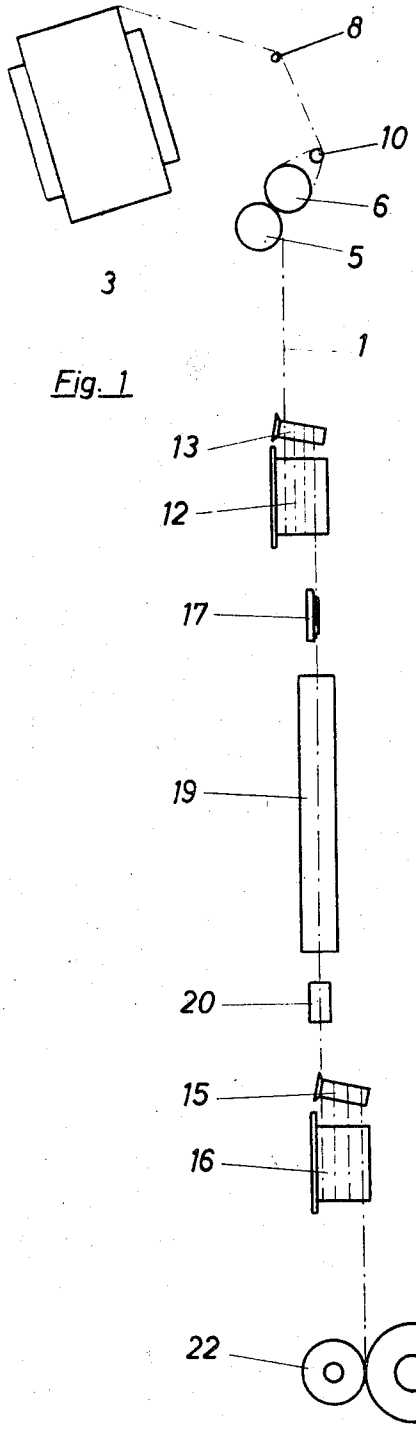


Fig. 1

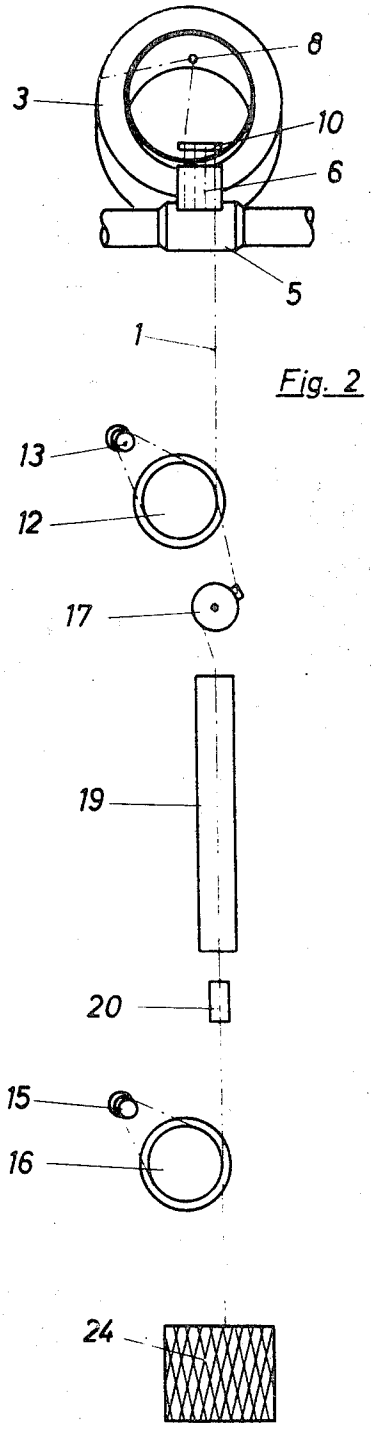


Fig. 2

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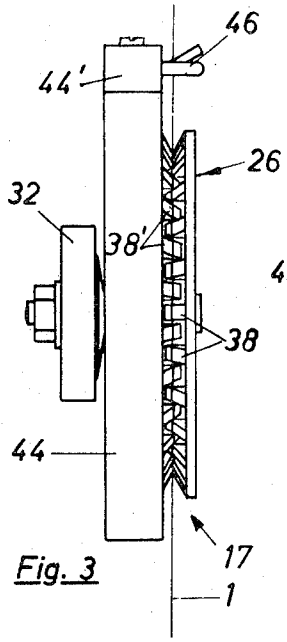

Fig. 3

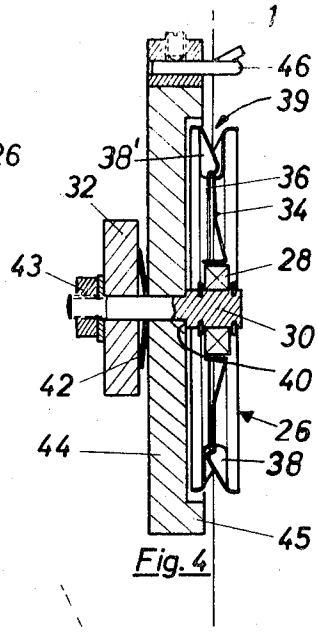

Fig. 4

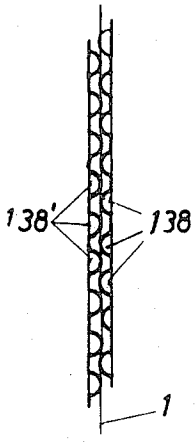

Fig. 6

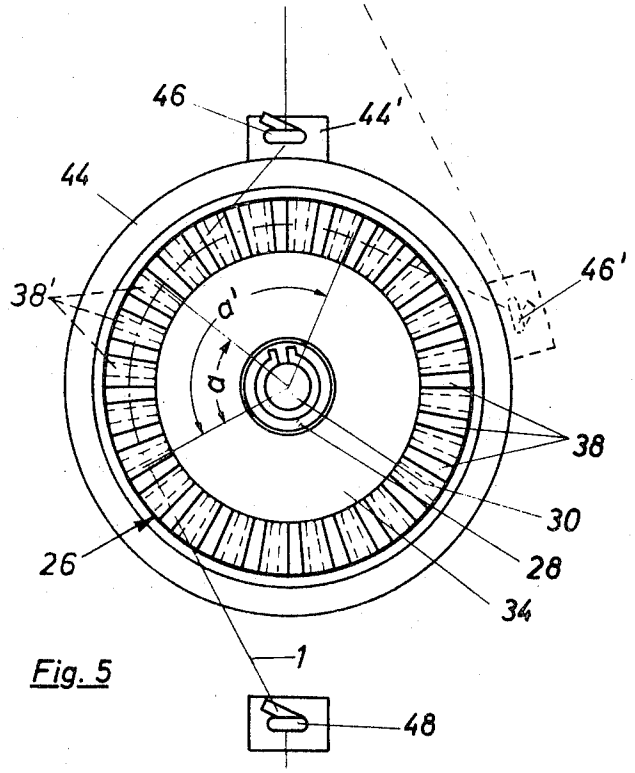

Fig. 5

TWIST STOPPING DEVICE

BACKGROUND OF THE INVENTION

This invention relates to a twist stopping device associated with a textile machine in which to a continuously moving yarn there is continuously imparted a false twist by means of a false twist member disposed at a distance from the twist stopping device. The latter constitutes a barrier for the propagation of the twist in the yarn.

In a known arrangement of the aforenoted type - such as disclosed, for example, in German Pat. No. 1,143,406 - to a synthetic thermoplastic yarn which is formed of a plurality of elementary filaments and which is advanced to and drawn from a treating zone by a feed roller pair and a discharge roller pair, respectively, there is imparted a false twist by means of a false twist member, such as a false twist spindle. In order to ensure that the false twist does not propagate from the false twist member against the direction of yarn travel to the feed roller pair where it would interfere with the operation thereof, the known device comprises, between the false twist member and the feed roller pair, a twist stopping device which has two parallel arranged slide faces spaced from one another at a distance which is smaller than the diameter of the yarn. As the yarn is pulled through the gap between the two slide faces, the yarn is flattened by spreading laterally its elementary filaments. In this manner the yarn is prevented from turning between the sliding faces, so that the false twist may not propagate beyond the twist stopping device.

It is a disadvantage of a twist stopping device of the aforeoutlined structure that the yarn is braked by the interaction of the two stationary slide faces. It is a serious drawback of this twist stopping device that it may cause breakage of the elementary filaments. In order to avoid this disadvantage, in the aforenoted German Pat. No. 1,143,406 there is further described a twist stopping device comprising a pinching roll pair, wherein one roll is provided with a flat circumferential groove in which the yarn is spread with the aid of the other roll, so that a propagation of the twist is prevented. Such a twist stopping device is, however, adapted only for yarns formed of a plurality of elementary filaments; it cannot be used for monofils.

OBJECT AND SUMMARY OF THE INVENTION

It is an object of the invention to provide an improved twist stopping device which is of a simple, operationally safe structure, usable for textile yarns of any type including monofils, which has no effect on the tension of the yarn and requires no driving means and further, it guides the yarn in a gentle manner without the danger of breaking the entire yarn or some of its elementary filaments.

Briefly stated, according to the invention, there is provided a twist stopping device comprising a freely rotatably held pulley which is formed of two adjacent, axially aligned discs each having a plurality of spaced, circumferentially arranged lugs sloping towards a central plane which passes between the two discs and is normal to the pulley axis. Lugs of the two discs are in an interlocking relationship forming a circumferential groove in the pulley. The yarn is trained partially about the pulley and is lying in the groove in such a manner that it bridges the intermediate space between each lug.

The invention will be better understood as well as further objects and advantages of the invention will become more apparent from the ensuing detailed specification of several exemplary embodiments of the invention taken in conjunction with the drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic side elevational view of a false twist device incorporating the invention;

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

FIG. 3 is a side elevational view of a first embodiment of the invention;

FIG. 4 is an axial sectional view of the same embodiment;

FIG. 5 is a front elevational view of the same embodiment and

FIG. 6 is a schematic developed view of a cross section of another embodiment of the invention.

DESCRIPTION OF THE FALSE TWIST DEVICE INCLUDING THE TWIST STOPPING DEVICE ACCORDING TO THE INVENTION

FIGS. 1 and 2 show an exemplary false twist device which, with the exception of the twist stopping device 17 - discussed in more detail in connection with FIGS. 3–5 -, is of known structure. The yarn 1 to be treated is drawn from a bobbin 3 over a yarn guide 8 by means of a feed roller pair 5, 6, the lower roller 5 of which is driven, whereas the upper roll 6 is rotated thereby. By means of a grooved yarn guide 10, the yarn 1 is wound several times about the roller 6 and the guide 10 and is thus advanced by the roller pair 5, 6 slippage-free with a constant first delivery speed.

From the roller pair 5, 6, the yarn runs to a first, driven godet 12 with which there is associated a positioning roller 13. In this manner the yarn 1 is advanced slippage-free with a constant, second delivery speed. The circumferential speed of the godet 12 is preferably higher than the circumferential speed of the roller 5 so that the yarn 1 is stretched in the zone between the roller pair 5, 6 and the godet 12.

From the first godet 12 the yarn advances to a second, driven godet 16, with which there is associated a positioning roller 15. The yarn is wound several times about the godet 16 and the positioning roller 15, and is thus fed by the godet 16 in a slippage-free manner. Between the two godets 12 and 16 the yarn passes through a twist stopping device 17 forming the subject of the present invention, a heating device 19 and a false twist member 20, such as a false twist spindle. From the second godet 16 the yarn runs to a bobbin 24 on which it is wound and which is driven by a drum 22.

During operation, the false twist member 20 imparts to the yarn upstream and downstream thereof a twist in opposite directions (false twist), which, in the absence of the twist stopping device 17, would propagate up to the first godet 12 against the direction of the yarn feed. This would result in a lateral travel of the yarn on godet 12 and, dependent upon the direction of twist, the yarn would either run off the godet or run into the other yarn windings on the godet. The possibility of such an occurrence is effectively eliminated by the twist stopping device 17 by preventing a propagation of the false twist against the direction of yarn travel.

The false twist member 20 serves for crinkling thermoplastic yarns, while the heater 19 "fixes" the false twist by curing the synthetic material. These operations

are well known in the art and are not dealt with here in detail.

DESCRIPTION OF THE EMBODIMENTS OF THE TWIST STOPPING DEVICE

Turning now to FIGS. 3–5, the twist stopping device is formed essentially of a particularly designed pulley 26 which is freely rotatably held on an axle 30 by means of a roller bearing 28. The axle 30, in turn, is mounted on a support 32 forming part of a machine frame (not shown).

The pulley 26 comprises a thin-walled first circular disc 34 supported by the roller bearing 28 and a second, similar circular and annular disc 36 affixed to the first disc 34 in an axial alignment therewith. Both discs 34 and 36 have along a circumferential marginal portion of the disc surfaces facing one another, a plurality of circumferentially spaced radial lugs 38, 38', respectively, made, for example, by an embossing operation. All lugs 38, 38' are of identical configuration; the lugs 38 are formed as mirro-images of lugs 38'. The two series of lugs, 38, 38' are in an interlocking relationship along the entire circumference of pulley 26. As it may be observed in FIG. 5, each lug extends radially with respect to its associated disc. Viewing the configuration of each lug axially (FIG. 4), it is seen that the top face of each begins at the peripheral edge of its respective disc 34 or 36 and slopes toward a point which is spaced from the pulley 26 and which is on the rotational axis thereof. The totality of top faces of lugs 38, 38' forms the side walls of a groove 39 which extends along the circumference of the pulley 26. The axially normal central plane of the groove 39 which extends normal to the plane of the drawing of FIGS. 3 and 4 and which contains the yarn portion shown therein, intersects each lug 38, 38' at about one-half of its radially measured length. Thus, the top face of each lug extends at either side of said central plane. The top faces of the lugs 38, 38' are straight in the longitudinal direction and, according to the embodiment of FIGS. 3 and 4, are approximately planar and their longitudinal edges which extend tranversally to the direction of yarn feed, have an angular configuration. The clearance between adjacent noses 38 and accordingly, the clearance between adjacent lugs 38' corresponds in this preferred embdiment approximately to twice the width of the top face of an individual lug. Consequently, between any two adjoining lugs 38 and 38' there is a clearance of approximately one-half the lug width. Each of these clearances between adjoining lugs 38 and 38' is bridged by the yarn.

By virtue of the aforedescribed structure, the groove 39, when viewed in cross section (FIG. 4) has, in its outer range, an outwardly open V-shaped configuration and, when viewed longitudinally (i.e., in a circumferential direction), it has an undulating course. As shown, consecutive lugs 38, 38' incline alternately and in an opposite direction, but to an identical extent toward the aforedefined symmetry plane of the yarn guiding groove 39.

As shown in FIG. 5, the yarn is trained partially about the yarn guiding pulley 26 so that in the groove 39 it lies alternately on the top face of consecutive lugs 38, 38' of the discs 34 and 36, respectively, and is thereby bent in a wave-like manner. Such a positioning of the yarn effectively prevents the propagation of its false twist beyond the twist stopping pulley 26. This result is obtained without any clamping of the yarn which would risk the damaging thereof. The yarn, dependent upon its tension, is positioned more or less deeply in the yarn guiding groove 39. Since the pulley 26 is supported on the axle 30 with a very low friction and since it has a very small inertia and is not braked, the yarn tension remains practically unaffected by the pulley 26. Thus, in the first place, the yarn guiding groove 39 handles the yarn in the gentlest possible manner and, in the second place, no slippage of the yarn may occur in the yarn guiding groove so that a propagation of the twist of the yarn upstream beyond the pulley is securely prevented under all circumstances.

The false twist imparted to the yarn is generally very substantial because of technological reasons. The greater the false twist, the greater has to be the looping angle of the yarn about the pulley 26. The looping angle, however, should not be greater than necessary to avoid exposing the yarn to unnecessary treatment. In order to permit an optimal matching of the looping angle with the requirements that prevail in practice, there is provided, upstream of the pulley 26, a displaceable yarn guide 46 which directs the yarn to the twist stopping pulley 26. A further, fixed yarn guide 48 is provided downstream of the pulley 26 to guide the yarn off the pulley 26.

The yarn guide 46 is supported on a projection 44' affixed to the circumference of a circular disc 44. The latter is mounted on the axle 30 and is rotatable with respect to the pulley 26. The disc 44 engages a radial shoulder 40 of the axle 30 and is firmly held in its angular position by a friction brake constituted by a Belville-spring 42 disposed between and engaging the disc 44 and the support 32. The axial position of the axle 30 is adjustable with respect to the support 32 by means of a nut 43 engaging a threaded extension of the axle 30. In this manner the magnitude of the frictional force necessary for maintaining the disc 44 in place during operation is adjustable. This frictional force is thus so designed that the disc 44 may be rotated only manually and cannot be turned by the tension exerted by the yarn 1 on the yarn guide 46. The disc 44 has a rim 45 which extends partially over the pulley 26 and thus prevents the yarn from accidently dropping into the clearance between the pulley 26 and the disc 44.

By turning the disc 44, the yarn guide 46 may be brought into desired angular positions. For example, it may be moved from its position shown in full lines in FIG. 5, into a dash-dotted position indicated at 46'. In this new position of the yarn guide 46 the looping angle of the yarn with regard to the pulley 26 is increased from a to a'. For setting a favorable angular position of the disc 44, a practical way to proceed is to first set only a small looping angle which is subsequently increased up to the point when the false twist of the yarn is no longer propagated beyond the pulley 26. It is to be understood that if desired, the yarn guide 48 may also be of a displaceable structure. Furthermore, in some cases it is even possible to dispense with the yarn guides 46 and 48 altogether.

The longitudinal edges of the top faces of lugs 38, 38' have, as set forth before, an angular configuration and accordingly, the lugs have an angular cross section. In this manner, even at small looping angles of the yarn 1 a good stoppage of the yarn twist is obtained. Often, however, the use of rounded, cross sectionally arcuate lugs is advantageous. Such an embodiment is schemati-

cally shown in FIG. 6. Consequently, those portions of the lugs 138, 138' that serve for the support of the yarn, are convex transversely to the longitudinal direction of the lugs. In each lug this convex curvature extends from the said portion to the base of the respective lug.

What is claimed is:

1. In a textile machine including means for continuously moving yarn and a false twist member, the improvement of a twist stopping device for arresting the propagation of a false twist imparted to a continuously fed yarn downstream of said device by said false twist member, said device comprising:

A. a rotary pulley having a plurality of circumferentially arranged lugs interlocking with a clearance, each lug having a top face, all said top faces together defining a circumferential groove, each said top face intersecting the central plane of said groove and projecting beyond said plane in two directions to an extent ensuring a clamping-free support of said yarn solely by contact with said top faces substantially along said plane, said yarn being partially trained about said pulley, said plane being normal to the rotational axis of said pulley; and

B. means for freely rotatably supporting said pulley to ensure its substantially resistance-free rotation by said continuously fed yarn.

2. A twist stopping device as defined in claim 1, wherein the width of each clearance is approximately one-half the width of a lug.

3. A twist stopping device as defined in claim 1, wherein circumferentially consecutive lugs extend towards said central plane from alternately opposite sides thereof.

4. A twist stopping device as defined in claim 3, wherein the angles formed by the top face of each lug with said central plane are of the same magnitude.

5. A twist stopping device as defined in claim 1, wherein said pulley is formed of two spaced, axially aligned discs fixedly secured to one another; each disc is provided along a marginal portion of its side facing the other disc with a series of circumferentially spaced lugs; the lugs of one series extend into the space between the lugs of the other series to constitute said interlocking lugs.

6. A twist stopping device as defined in claim 5, wherein said lugs are formed by embossments in said discs.

7. A twist stopping device as defined in claim 1, wherein said central plane intersects the top face of each lug at approximately one-half of its height.

8. A twist stopping device as defined in claim 1, wherein the top face of each lug has, in the longitudinal direction, a straight configuration.

9. A twist stopping device as defined in claim 1, wherein those edges of the top face of each lug which extend transversally to the yarn feed, have an angular configuration.

10. A twist stopping device as defined in claim 1, wherein those portions of each lug that serve to support said yarn have a convex configuration transversally to the length dimension of the lug; said convex configuration extends beyond said portions.

11. A twist stopping device as defined in claim 1, including adjustable yarn guiding means to vary the looping angle of the yarn about said pulley.

12. A twist stopping device as defined in claim 11, including at least one yarn guide adjacent said pulley and means for adjusting the position of said yarn guide circumferentially about said pulley.

13. A twist stopping device as defined in claim 12, including a support turnable about the rotational axis of said pulley and carrying said last-named yarn guide.

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