Sept. 9, 1969 W. PARKER ET AL 3,465,509

TEXTILE APPARATUS

Filed Feb. 27, 1967 2 Sheets-Sheet 1

FIG. 1.

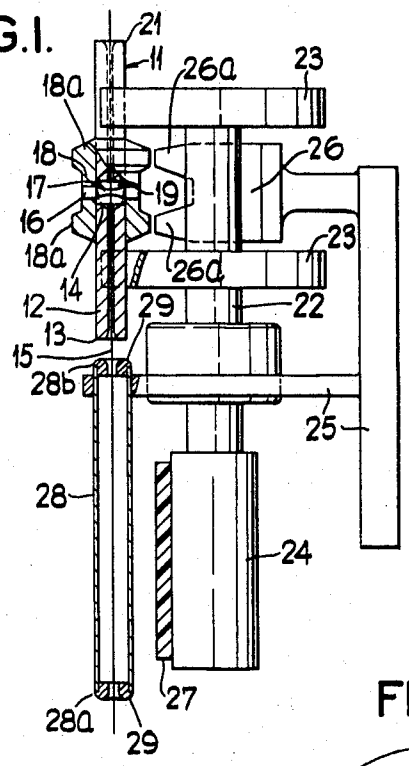

FIG. 2.

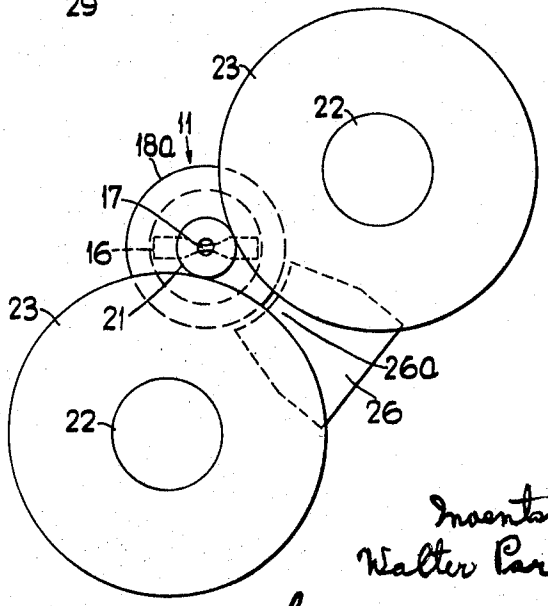

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FIG.3.

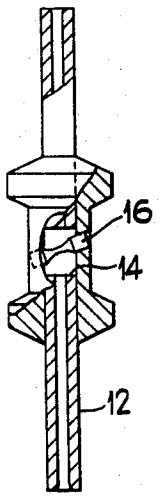
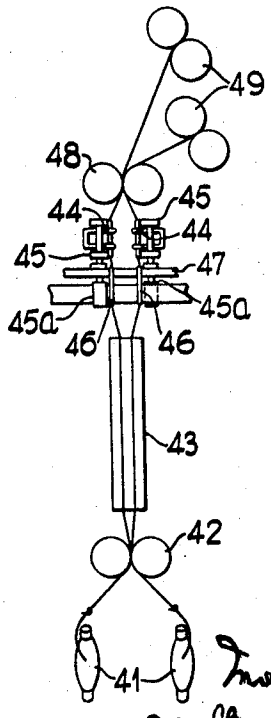


FIG.4.



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TEXTILE APPARATUS

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Int. Cl. D01h 7/46, 7/92, 13/26
U.S. Cl. 57—77.45 13 Claims

ABSTRACT OF THE DISCLOSURE

A false twist apparatus adapted to be operated at at least 400,000 revolutions per minute without experiencing substantial loss of tenacity in the travelling yarn in a predetermining path, the combination of a rotatable hollow tubular false twist spindle having an internal diameter of at most 0.04 inch and a snubbing pin located intermediate the ends of said tubular spindle being inclined transversely to the axis of said spindle and having a diameter of between 0.03 and 0.04 inch. Said tubular spindle surrounds one portion of the yarn and there is a further yarn guide tube surrounding another portion of the yarn having an inner cross-sectional area being a multiple of the inner cross-sectional area of the tubular false twist spindle and so selected to preclude contact of said guide tube with the ballooning yarn.

This invention relates to the false twisting of textile yarn.

The invention comprises a false twist spindle comprising a tubular member having an inlet end and an outlet end for yarn and an internal diameter of 0.04 inch or less between said inlet and outlet ends, and a twist locking device at said outlet end.

Said twist locking device may comprise a pin, around which yarn can be wrapped, extending transversely across said outlet end. The internal diameter of said tubular member may exceed the diameter of the pin by not more than two yarn diameters. A pin suitable for yarns of 100 denier and less may have a diameter between 0.03 inch and 0.04 inch. The pin may extend across said outlet end perpendicularly to the axis of the tubular member, or inclined to a perpendicular to the said axis.

The twist locking device may be located in a body of circular cross-section of larger diameter than the tubular member, and from which the tubular member projects axially. A second tubular member may project axially from said body on the side of the twist locking device remote from the first tubular member. Said second tubular member may also have an internal diameter of 0.04 inch or less, and may be similar to said first tubular member, so that the false twist spindle is symmetrical about the twist locking device. If said second tubular member has the same outside diameter as said first tubular member, both said tubular members can afford tracks for rolling bearings by which the false twist spindle is driven and/or supported in rotation.

The false twist spindle may be adapted to be magnetically located in a supporting and/or driving roller arrangement. Said tubular member or members and/or said body can be of a ferromagnetic material such as steel. The invention also comprises false twisting apparatus comprising a false twist spindle as herein described, and a driving and supporting arrangement therefor.

The false twisting apparatus may include magnetic locating means adapted to locate the false twist spindle in driving and/or supporting roller means.

The false twist apparatus may comprise guide means for guiding the yarn to the false twist spindle, said guide means comprising a tube having, axially aligned with said spindle, an inlet and an outlet for the yarn and between said inlet and said outlet having an internal diameter sufficiently great that yarn, ballooning between said inlet and said outlet, does not touch its wall. Said guide means may comprise, at said inlet and said outlet, ceramic annuli of smaller internal diameter than said tube.

A roller supporting and/or driving arrangement, together with said guide means, may be mounted on a bracket adapted for mounting in a false twist crimping machine. Such a bracket may conveniently have two roller supporting and/or driving arrangements and two guide means mounted thereon.

Embodiments of a false twist crimping apparatus according to the invention, and a false twist machine incorporating said embodiment, will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a part sectional side elevation of a false twist spindle in a roller supporting and driving arrangement, mounted on a bracket together with yarn guide means,

FIGURE 2 is a view to a larger scale along the axis of the false twist spindle shown in FIGURE 1, showing parts of the supporting and driving arrangement,

FIGURE 3 is a sectional side elevation of another false twist spindle, and

FIGURE 4 is a diagrammatic illustration of a false twist crimping apparatus embodying such an arrangement as that illustrated in FIGURE 1, but in which two supporting and driving arrangements are mounted on the same bracket.

The apparatus illustrated in FIGURES 1 to 3 comprises a false twist spindle **11** comprising a tubular member **12** having an inlet end **13** and an outlet end **14** for a yarn **15** and having an internal diameter of 0.04 inch between said inlet end **13** and said outlet end **14**, and a twist locking device **16** at said outlet end **14**. The twist locking device **16** comprises a pin of synthetic sapphire or other wear-resistant material and has a reduced diameter central portion **17**, the smallest diameter of which is 0.03 inch. For commercially processed yarns of 100 denier or less, this diameter is less than the internal diameter of the tubular member **12** by not more than two yarn diameters, and a pin of this size, gives good results in processing.

FIGURES 1 and 2 illustrate a false twist spindle **11** in which the pin **16** extends transversely across the outlet end **14** of the tubular member **12**, perpendicularly to the axis thereof. FIGURE 3 illustrates a false twist spindle **11** generally similar to the spindle **11** of FIGURES 1 and 2, but in which the pin **16** extends transversely across the outlet end **14** of said tubular member **12** inclined to the perpendicular to the axis of the member **12**. In both cases,

the said outlet end **14** is close to the twist pin **16**, and, in fact, is preferably as close as possible to the twist pin **16** while permitting yarn to be threaded around the pin **16**.

The pin **16** is located in a body **18** of circular cross-section of larger diameter than the tubular member **12**, and from which body **18**, the tubular member **12** projects axially. The body **18** has a transverse throughway **19** affording access to the pin **16** for threading, and the pin is located by cementing into a transverse bore through the body **18** substantially at right angles to the axis of the throughway **19**.

A second tubular member **21** projects axially from the body **18** on the side of the twist pin **16** remote from the first tubular member **12**. It is not necessary for this second tubular member **21** to have the same internal diameter as the first, but it is convenient to make the spindle **11** symmetrical about the twist pin in all respects as it does not then matter which way up it is located in the driving and supporting roller arrangement. In any event, it is desirable that both said tubular members **12** and **21** have the same outside diameter (as illustrated), since the spindle **11** can then be supported in a roller supporting arrangement by rollers engaging the spindle **11** on opposite sides of the body **18**, on tracks afforded by both said tubular members **12**, **21**.

The spindle **11** is adapted to be magnetically located in a supporting and/or driving roller arrangement, by its body **18**, at least, being of ferro-magnetic material such as hard steel.

FIGURES 1 and 2 also illustrate a driving and supporting arrangement in which the spindle **11** is located. The arrangement comprises two parallel shafts **22** (of which one only can be seen in FIGURE 1), each carrying a pair of axially spaced rollers **23**, which may be entirely of polyurethane or have polyurethane tyres. The shafts **22** are carried in bearings **24** fixed in a bracket **25** adapted to be mounted in a false twist crimping machine. The bracket **25** also carries a magnet **26** whose pole pieces **26***a* lie between the shafts **22** and act on radial enlargements **18***a* of the body **18** of the spindle **11** to hold the tubular members **12**, **21** against the peripheral surfaces of the rollers **23**.

One of the shafts **22** projects through its bearing **24** and has a belt-engaging wharve which contacts a driving belt **27**, whereby the rollers **23** on that shaft **22**, and hence the spindle **11** are driven in rotation.

Also carried by the bracket **25** is a tube **28**, axially aligned with the spindle **11** having an inlet **28***a* and an outlet **28***b* for the yarn **15**, and, at said inlet and outlet ceramic annuli **29**, of smaller internal diameter than the tube **28** in which they are cemented. The tube **28** acts as guide means for the yarn **15**, guiding it past the belt **27**, and has an internal diameter sufficiently great so that the yarn **15**, ballooning between the ceramic annuli **29**, does not touch the wall of the tube **28**.

It is found that with the arrangement above described, yarn can be processed at high speed (400,000 revolutions per minute) without substantial loss of tenacity. Prior art arrangements have been found to reduce the tenacity of nylon yarn from about 5 grams per denier to as little as 2.5 grams per denier. An arrangement as above described, running at 400,000 revolutions per minute inserting 70 turns per inch produced a false twist crimped yarn with a tenacity of 4.7 grams per denier.

It is convenient to mount two supporting and driving roller arrangements each supporting a false twist spindle, together with two yarn guiding means, on the same bracket. FIGURE 4 illustrates diagrammatically a false twist crimping apparatus comprising a support for two yarns supply packages **41**, feed roller means **42** forwarding yarn from both packages **41** to a contact heater **43** in which the yarns run in separate tracks, and then to false twist spindles **44** as above described each supported in a supporting and driving roller arrangement **45** mounted, together with guide tubes **46** on a common bracket **47** fixed in the machine. Yarn is withdrawn from the false twist spindles **44** by further feed roller means **48** whence it passes to wind-up means **49**, of which two are provided so that the yarns can be taken up singly, or together on one of said wind-up means. The wharves **45***a* of the supporting and driving roller arrangements **45** can be adjusted to contact the belt on the same side, so that both yarns are given twists of the same hand, or on opposite sides, so that the yarns can be given twists of opposite hands. A false twist crimping machine comprises a plurality of such apparatus located side by side, together with associated driving and power supply means.

What I claim is:

1. In a false twisting apparatus for false twisting a yarn travelling in a predetermined path, the combination comprising a rotatable tubular false twist spindle surrounding a portion of said path and having an inlet end and an outlet end spaced from said inlet end downstream thereof, said spindle having an internal diameter of at most 0.04 inch; and a yarn guide tube surrounding another portion of said path upstream of said inlet end and in axial alignment with said tubular false twist spindle, said yarn being subject to ballooning and said guide tube having an inner cross-sectional area being a multiple of the inner cross-sectional area of said false twist spindle so selected as to preclude contact of said guide tube with the ballooning yarn.

2. In a false twisting apparatus according to claim **1** said yarn guide tube having a constriction at its inlet end and a constriction at its outlet end, the inner cross-sectional area of each of said constrictions being a fraction of the inner cross-sectional area of said yarn guide tube.

3. In a false twisting apparatus as defined in claim **1**, further comprising twist locking means provided at said outlet end of said false twist spindle and including a pin extending transversely across said outlet end.

4. A false twist spindle according to claim **3**, wherein the internal diameter of said spindle exceeds the diameter of said pin by at most two yarn diameters.

5. A false twist spindle according to claim **4**, suitable for yarns of 100 denier and less, wherein the diameter of said pin is between 0.03 inch and 0.04 inch.

6. In a false twisting apparatus as defined in claim **3**; and further comprising an additional yarn guide tube surrounding said path downstream of said false twist spindle and said twist locking means.

7. In a false twisting apparatus as defined in claim **6**, wherein said additional yarn guide tube has an internal diameter of at most 0.04 inch.

8. In a false twisting apparatus as defined in claim **6**, wherein both of said yarn guide tubes have identical outside diameters and each provide at the respective exterior circumferential surfaces thereof tracks for supporting roller means supporting said false twist spindle for rotation of the latter.

9. In a false twisting apparatus as defined in claim **8**; and further magnetic means operative for locating and maintaining said false-twist spindle in predetermined position relative to said supporting roller means.

10. In a false twisting apparatus as defined in claim **6**; and further comprising annular inserts of ceramic material mounted in at least one of said guide tubes adjacent the respective inlet and outlet ends thereof and having an inner diameter smaller than the internal diameter of the associated guide tube.

11. A false twist spindle according to claim **3**, wherein the pin extends transversely across the outlet end of said tubular spindle, perpendicularly to the axis thereof.

12. A false twist spindle according to claim **3**, wherein the pin extends transversely across the outlet end of said tubular spindle, inclined to a perpendicular to the axis thereof.

13. A false twist spindle according to claim **3**, wherein the outlet end of said tubular spindle is close to the twist locking means.

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U.S. Cl. X.R.

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