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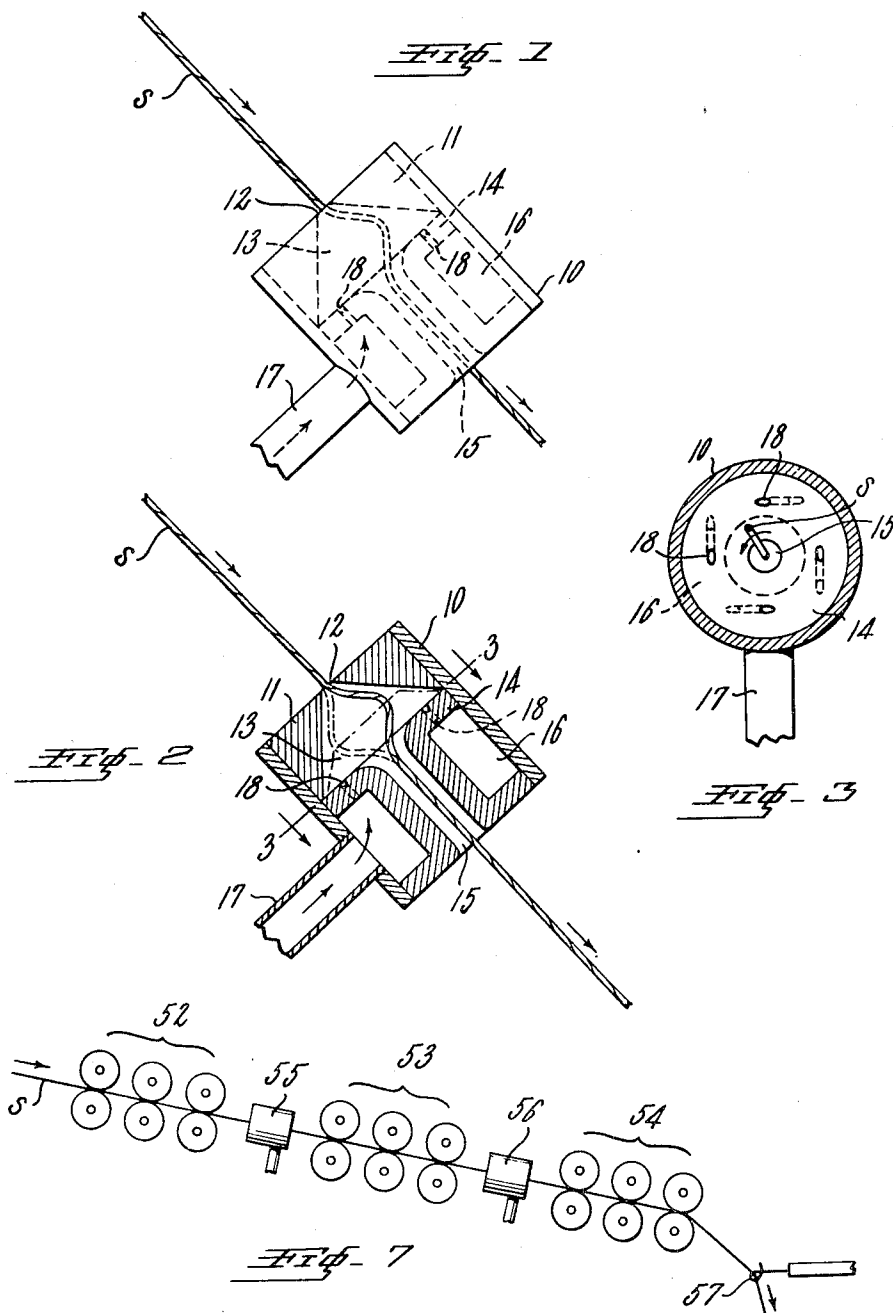
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APPARATUS FOR IMPARTING FALSE TWIST TO STRANDS

Filed Oct. 19, 1948

2 Sheets-Sheet 1



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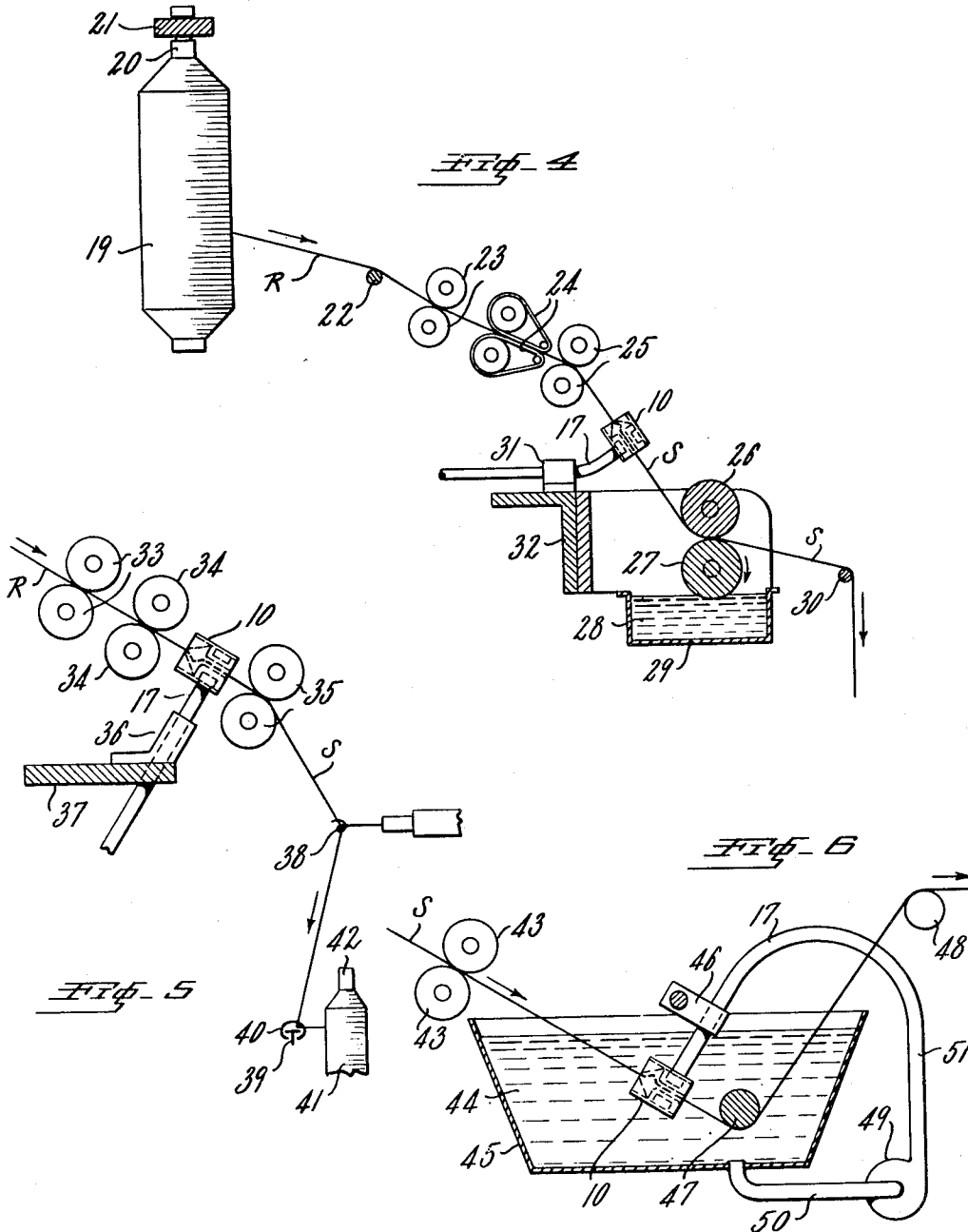
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UNITED STATES PATENT OFFICE

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APPARATUS FOR IMPARTING FALSE TWIST
TO STRANDS

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This invention relates to a novel apparatus for imparting false twist to textile strands, and more particularly to the utilization of a rotating fluid in direct contact with such strands to give them false twist.

In the textile industry it is common practice to impart what is known as false twist to a moving strand, such as a strand of loosely twisted fibers, to momentarily increase the strength of the strand so that the tendency of the strand to pull apart at a particular point of its travel will be reduced. The false-twisting devices employed heretofore have usually been complex mechanisms power-driven in timed relation with the associated strand-advancing mechanism, and these twisting devices used heretofore commonly consist of two strand-advancing rolls between which the strand is gripped and pulled forward, the rolls being mounted in a revolving head that rotates about the strand to impart a false twist thereto.

The present invention contemplates an apparatus for imparting false twist to a traveling textile strand without requiring the use of any moving mechanical part. The desired false twist is imparted to the strand by a vortex of whirling fluid such as water or air that rotates about the axis of travel of the strand in direct contact therewith whereby the vortex carries a short, crank-shaped or angular reach of the strand bodily around a circular path and thus imparts the desired false twist to the strand. The apparatus required to impart such false twist to the strand is very simple in construction and it may be so small that it is not over an inch long and is less than an inch in diameter, and it can be easily and quickly secured in operating relation with other textile apparatus operating upon a strand.

The apparatus of the present invention may be variously constructed and the preferred embodiment comprises a small cylindrical receptacle having a central axial passage therethrough through which the textile strand may pass freely. The operating fluid is supplied to this cylindrical receptacle by a tube attached to a port in the side wall of the receptacle, and this tube preferably serves also as a support that retains the false twister in the desired operating position. A whirling movement is imparted to the liquid or gas within the twister receptacle, as by introducing the same through several inclined ports that discharge into a chamber within the receptacle so that the fluid will whirl therein in direct contact with the strand to give the strand a false

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twist. The spent fluid exits from the receptacle through the same openings that are provided for the passage of the strand. The relative diameters of these openings may be made such that the fluid will exit primarily through the one or the other, and so exerts a tractive force on the strand in the direction of that opening through which the fluid has the greater flow. This effect may be utilized as an ejector to make the device self-threading and to advance the strand through the false twister.

The amount of false twist imparted to the strand may be readily controlled by controlling the rate of flow of the fluid supplied to the false twister.

The present false twister may be employed in various positions upon textile machinery where it will help to prevent a weak, low-twist strand from breaking while it is being processed. For example, the present device may be used to impart false twist to a strand immediately after it leaves the ordinary drafting rolls, or it may be located between spaced pairs of such rolls, or it can be employed in various other positions.

The above and other features of the present invention will be further understood from the following specification when read in connection with the accompanying drawings, wherein:

Fig. 1 is a side view of a false twisting device constructed in accordance with the present invention.

Fig. 2 is a longitudinal sectional view through the device of Fig. 1.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a side elevation with parts in section showing the twisting device of Fig. 1 disposed near the discharge end of conventional drafting rolls.

Fig. 5 is a side elevation with parts in section showing the twisting device of Fig. 1 positioned between the second and third pairs of rolls of ordinary drafting mechanism;

Fig. 6 is a side elevation with parts in section showing the false twister of Fig. 1 immersed in a strand impregnating liquid; and

Fig. 7 is a schematic side elevation showing a series of drafting rolls and false twisters.

Since the present invention in its broadest aspect contemplates the use of whirling fluid in direct contact with an advancing strand to impart false twist thereto, the apparatus for carrying out the present invention may, as above stated, be variously constructed. As shown, the false twister comprises a cylindrical casing 10

which may be formed of metal, plastic or other suitable material. Within this casing is formed a central strand-receiving passage through which the strand to be twisted may pass freely. This passage, is given the desired shape, in the construction shown, by mounting tightly in the casing 10 near one end thereof the head 11 having the strand-receiving opening 12, and from this opening the inner walls of the head 11 diverge to form the relatively large, conical, fluid-receiving zone 13.

Within the rest of the casing 10 is tightly mounted the spool-shaped body member 14 having a central axially disposed conduit 15, and flanges at either end which make a fluid-tight fit with the outer casing. An annular space 16 bounded by the inner wall of the casing, the outer wall of the conduit, and the inner faces of the flanges, is supplied with operating fluid under slightly superatmospheric pressure by a pipe 17 that passes inwardly through an opening in the wall of the casing 10.

The fluid supplied to the annular passage 16 escapes therefrom through inclined ports 18, four being shown in the drawings. The slope of these ports is such that they will direct the fluid into the conical zone 13 more or less tangentially so that it will whirl rapidly therein in contact with the strand S and will carry a short reach of the strand bodily around with it and thus impart a false twist to the strand. When the passage 15 is made considerably larger than the strand inlet opening 12, the greater part of the fluid that is supplied to the zone 13 will escape therefrom through the passage 15 with an ejector action to exert a pull on the strand in that direction. This pull may be utilized for threading the strand through the device and for advancing the strand therethrough.

It is obvious that in place of the tubular ports 18 having a circular cross-section, there may be used slanting passages of various shapes for directing the fluid stream into the conical zone 13. From the revolving angular reach of strand, within the conical zone 13, the twist runs in either direction as far as the nearest supports or guides for the traveling strand. Thus, when the false twister is located between two pairs of draft rolls, or between feed rolls and draft rolls, the false twist runs back, and forward, as far as the nips of said rolls.

The false twister of this invention works equally well with air or with a mobile liquid such as water as the whirling fluid which imparts the twist. Such liquid may, if desired, be an impregnating composition or other treating agent, in which case the impregnation or other treatment and the false twisting occur simultaneously.

Since the false twister contemplated by the present invention does not have to be power driven in timed relation with the operating parts of the textile machine with which it is associated, it can be quickly and easily set up in operating relation with various types of textile mechanisms, as illustrated in Figs. 4 to 7 inclusive of the drawings.

In Fig. 4 of the drawing is shown drafting means for drafting or attenuating a loose textile strand such as a cotton roving R supplied by the package 19 wound on the core 20 that is supported at 21 so that this package may rotate as the roving is unwound therefrom. The roving upon leaving the package 19 passes over a guide rod 22 and then to drafting mechanism of well known construction and consisting of a first pair of draft

rolls 23, an intermediate pair of draft rolls about which travel a pair of draft aprons 24, and the last pair of draft rolls 25. The roving R upon leaving the rolls 25 will have been drafted or attenuated to such an extent that it is hardly strong enough to bear its own weight; therefore, in order to temporarily increase the strength of this attenuated strand, it is passed through the false twister 10 having the construction above described and adapted to impart considerable false twist to the strand, to prevent it from breaking as it moves downwardly from the rolls 25 to the nip of cooperating rolls 26 and 27. The lower roll 27 is preferably power driven at approximately the same surface speed as the rolls 25, and the roll 27 is shown as contacting a liquid such as an adhesive 28 confined within the receptacle 29. The weight of the upper roll 26 resting upon the attenuated low twist strand S will serve to flatten out this strand into the form of a narrow ribbon which will be impregnated by the adhesive supplied thereto by the rotating lower roll 27. This adhesive will immediately increase the strength of the flattened strand S an appreciable amount so that it may be passed over the guide bar 30 and thence to drying or collecting means, not shown, without breaking. The false twister 10 as shown in Fig. 4 is conveniently supported in its operating position by its fluid supply pipe 17 which is held by a bracket 31 mounted upon the tank supporting structure 32. The mechanism of Fig. 4 is well adapted to form the latex bonded flat textile strand shown and described in the Foster application, Serial No. 709,001, filed November 9, 1946.

In the construction of Fig. 5 of the drawing there is shown conventional drafting mechanism comprising the first pair of rolls 33, the second pair of rolls 34 and the third pair of rolls 35, the distance between the second and third pair of rolls being shown as greater than usual, and in order to prevent the drafted strand from parting between these two pairs of rolls the false twister 10 is mounted between these rolls as shown. It is supported in its operating position by the pipe 17 that is held by a bracket 36 mounted on the support 37. This drafted strand upon leaving the nip of the rolls 35 is shown as passing downwardly to the pigtail guide 38, then to the usual spinning mechanism including the ring 39, traveller 40, and package 41 mounted upon the rotating spindle 42.

The false twister of the present invention will work satisfactorily even when completely submerged in a liquid as will be apparent from Fig. 6, wherein a slightly twisted strand of textile fibers S is shown as passing between the feed rolls 43 and then downwardly into the liquid such as water or adhesive 44 contained within the tank 45. In order to temporarily increase the strength of this low twist strand so as to permit the strand to be drawn through the bath and impregnated with the liquid 44, it is caused to pass through the false twister 10, which is supported by its pipe 17 so that it is completely submerged in the liquid 44. The pipe 17 is supported by the clamp 46. The strand S after passing through the submerged false twister passes around the revolving roller 47 and then upwardly out of the liquid to a second rotating roller 48. In the arrangement shown in Fig. 6 the false twister is supplied with the liquid 44 as its operating fluid. To this end a power driven pump 49 is provided having the supply pipe 50 leading from the bottom of the tank 45, and the fluid discharged from the pump 49 is conveyed

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by the pipe 51 to the inlet pipe 17 supplying the false twister. As a result of this construction the liquid 44 forced through the false twister 10 will impart a false twist to the strand S to temporarily increase its strength and at the same time im-

pregnates the strand.

The false twister of the present invention may very advantageously be used for carrying sliver or roving from one set of draft rolls to another in a long-draft system, as shown schematically in Fig. 7. Three complete drafting units 52, 53 and 54 are used in series in order to convert sliver S to fine yarn continuously in one machine, thus doing away with slubbers and other intermediate drafting machines. Each of the drafting units in Fig. 7 comprises the usual three pairs of draft rolls. Between the first drafting unit 52 and second drafting unit 53 is located a false-twisting device 55 of the present invention and between the units 53 and 54 is located the false twister 56. These false twisters serve to gather up the spread-out band of fibers which issues from the front draft rolls and to condense it into a cylindrical strand for feeding to the next drafting unit. The drafted strand upon leaving the unit 54 passes through the pigtail guide 57. In this capacity the twisting devices of Fig. 7 are much more efficient than the power driven rotating trumpets used heretofore, between pairs of drawing polls.

Since the false twister of the present invention is small in size, simple in construction, and has no moving parts, it can be easily and very economically set up and operated in various positions relative to textile equipment. It can be employed to exert as strong a twisting force as desired and also a strong ejector force to advance the strand.

Having thus described our invention, what we claim and desire to protect by Letters Patent is:

1. Apparatus for imparting a false twist to a textile strand, comprising a casing having a passage therethrough through which said strand may pass freely, means for supplying a fluid to the casing under pressure and for causing it to rotate in the casing about the strand in direct contact therewith to impart false twist to the strand, and strand advancing means for positively pulling the strand away from the casing.

2. Apparatus for imparting a false twist to a textile strand, comprising a casing having a passage therethrough through which said strand may pass freely and the passage being enlarged between its ends to provide an area in which a laterally displaced reach of the strand can rotate, and means for supplying a fluid under pressure to the casing so that it will form a laterally displaced reach in the strand and rotate in said enlarged portion and rotate the reach to impart false twist to the strand.

3. Apparatus for imparting a false twist to a textile strand, comprising a casing having a central passage therethrough through which said strand may pass freely and having a larger strand outlet opening than the strand entrance opening, means for forcing a fluid into the casing to

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whirl therein in direct contact with the strand and pass out of the strand outlet opening with an ejector action to advance the strand and impart a false twist thereto, and strand advancing means for positively pulling the strand away from the casing.

4. Apparatus for imparting a false twist to a textile strand, comprising a casing having a central strand-receiving passage and an enlarged area between the ends of said passage, said casing also having several inclined ports disposed about the central axis of the casing to lead into said area, and means for supplying fluid under pressure to said ports to cause the fluid to whirl in said area in direct contact with the strand to impart a false twist thereto.

5. Apparatus for imparting a false twist to a strand, comprising a casing having a strand-receiving passage that is larger at its strand discharge end than at its strand-receiving end, means for supplying a fluid to the casing under pressure so that it will rotate therein in direct contact with the strand to impart a false twist thereto and escape from the larger end of the passage so as to produce a strand threading action within the casing, and strand advancing rolls for pulling the twisted strand away from the casing.

6. Apparatus for imparting a false twist to a textile strand, comprising a casing having a central strand-receiving passage and an enlarged annular space between the ends of said passage, a separate pressure chamber surrounding said passage and provided with inclined ports leading into said annular space, and means for supplying fluid under pressure to said pressure chamber so that it will pass therefrom through the inclined ports to whirl in said space in direct contact with the strand to impart a false twist thereto.

7. Apparatus for imparting a false twist to a textile strand, comprising a casing having a passage therethrough through which the strand can pass freely, means for supplying a fluid to the casing under pressure and for causing it to rotate about the strand in direct contact therewith to impart false twist to the strand, and strand advancing rolls for pulling the twisted strand away from the casing.

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