

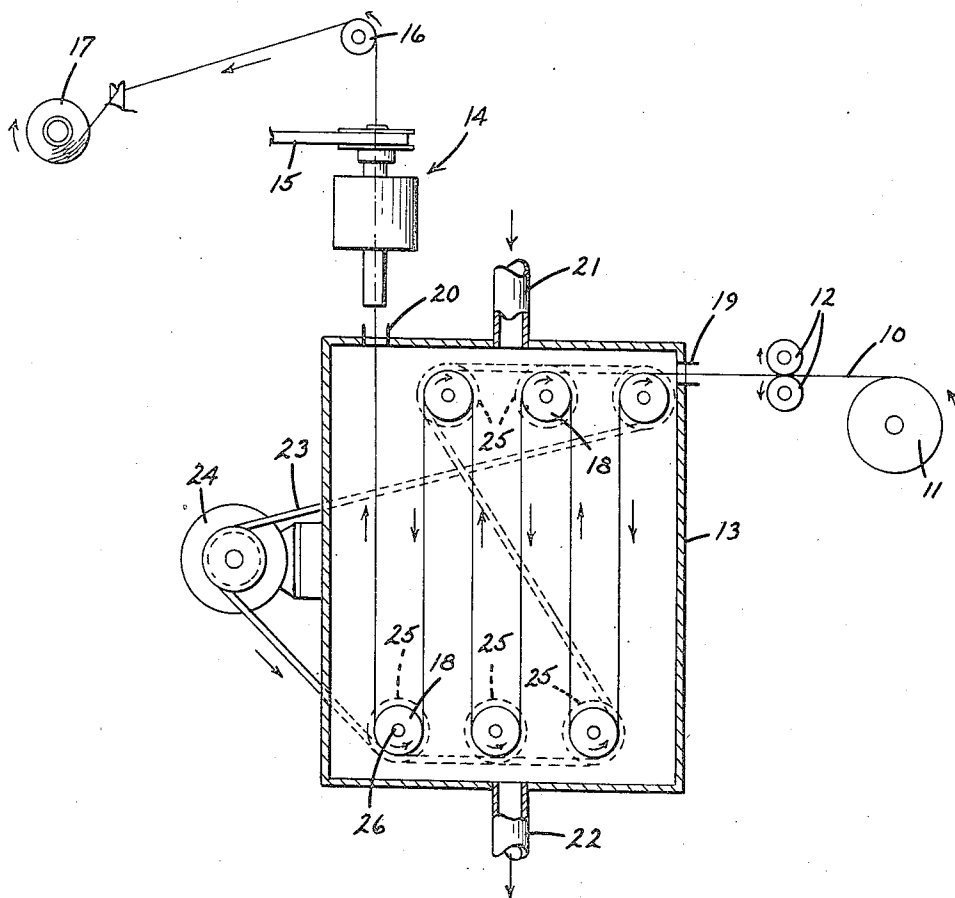
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METHOD AND APPARATUS FOR TWISTING STRAND MATERIAL

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METHOD AND APPARATUS FOR TWISTING STRAND MATERIAL

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This invention relates to twisting of continuous strand material, and in its broadest aspects, to a method and apparatus for causing a twist to run back along a strand which is traveling in a tortuous path. In its more particular aspects the invention deals with the false twist method of bulking or crimping artificial textile yarn and especially with a method and means for providing a long residence time within a treating chamber for a strand passing through the chamber in a false twisted condition.

Although the invention is especially valuable and will be described in connection with bulking or crimping of artificial yarns by the false twist method, it will be readily apparent that the utility thereof is by no means so limited.

One of the commercial and well known methods of crimping artificial yarn strands is the so-called false twist method wherein the yarn strand is fed or pulled from a source of supply, through a treating chamber, through a false twist device and then wound onto a package. The false twist device is rotated at high speed and causes a twist to run back along the moving strand through the treating chamber wherein the crimp caused by the false twist is set into yarn, usually by the action of heat, so that in its final form the yarn strand exhibits an elastic quality because of the crimp, and cloth made from the yarn has greater warmth and bulk than would be the case with the same weight of yarn without this treatment. It is a well known phenomenon that the false twist will run back along the strand only to the nearest point of contact of the yarn with a surface such as a yarn guide, that is, the twist will run freely to that point and can normally be forced over or past the guide only when a very high degree of twist is inserted, and in the case of low denier yarn, it is ordinarily not possible to insert a sufficient amount of twist so that the twist will move over the guide without breaking the strand. According to certain crimping processes, and depending somewhat upon the raw materials used, it is highly desirable to heat the twisted yarn strand for an appreciable period of time, but since the false twist would not travel past a guide member it has been necessary to run the strand at a comparatively low speed in order to obtain the necessary residence time in a straight line heating chamber. By means of the present invention it is possible to provide a heating or other treating chamber in which a relatively long residence time may be given the yarn, even though the strand is traveling at high speed, by having it pass over a number of guides so as to describe a tortuous path through the chamber and at the same time cause the false twist inserted by the false twist device to run all the way back through the chamber.

It is an object of this invention to provide a method and apparatus for twisting a continuous strand over an appreciable length while the strand is traveling in a tortuous path.

Another object of the invention is to provide an improved method and apparatus for treating a yarn strand while in false twisted condition and more particularly for causing the false twist to travel back along the strand

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through a treating chamber through which the strand is passing in a tortuous path.

Other and further objects, features and advantages of the invention will become apparent from the following description of an actual embodiment thereof.

Referring now to the drawing:

The figure is a diagrammatic representation of a method of crimping artificial yarn and shows the method and means of this invention for causing a false twist to run back along the yarn strand while the strand is passing through a tortuous path.

The yarn to be crimped in accordance with the present invention may be composed of any of the thermosetting fibers such as polyesters, polyamides, acrylics, etc., but the invention is of more particular importance, because of the more exacting heating requirements, in connection with rayon yarn impregnated with any of various known chemical formulations which impart a thermosetting quality to the yarn, several examples of which are given in the patent to Heberlein et al., No. 2,463,618.

The yarn strand 10 is drawn from a source of supply such as a spool 11 by means of a pair of feed rolls 12 and fed in a tortuous path through a heating chamber 13. From the chamber 13 the yarn strand passes through a false twist device generally indicated at 14 and which may be of any known suitable construction. The false twist device is rotated as by means of a belt 15 and the yarn strand is so articulated to the false twist device that each rotation of said device imparts one turn of twist to the yarn strand, which twist travels back along the strand toward the feed rolls 12 as will presently be more fully explained. After leaving the false twist device the yarn strand may be lead over a suitable guide pulley 16 to a take-up device 17 such as a reel or spool.

The reason that this invention is particularly applicable to chemically impregnated rayon yarn is that in order to set a crimp in yarn of this type it is necessary to provide a fairly long residence time in a heating chamber while the strand is in false twisted condition in order to set the twist into the strand. Thus, the chamber 13 comprises a suitable enclosure, such as shown in cross-section in the drawing, rotatably mounted in one wall of which is a plurality of guides in the form of rollers 18 over and around which the yarn strand is led in the manner shown in the drawing to provide a relatively long path for the yarn between the entrance 19 to the chamber and the exit 20. For heating the yarn during its passage through the chamber 13 hot air is admitted thereto through a pipe or tube 21 and exhausted therefrom through a pipe 22.

With the structure thus far described the false twist inserted into the yarn by the device 14 will travel back along the yarn strand toward the feed rollers 12 only so far as the lower left-hand guide 18, that is, it will travel freely only that far. If a particularly high degree of twist is put into the yarn strand it may be possible to force the twist to pass over the lower left-hand roller 18 and up as far as the upper left-hand roller, but in the case of low denier yarn it will ordinarily not be possible to twist the yarn to this extent without breaking the strand.

It has now been discovered, and herein is believed to reside a very surprising feature of this invention, that by rotating the guides 18 in the direction opposite to the travel of the yarn, the twist inserted by the device 14 will run back along the strand all the way through the chamber 13. This running back of the twist through the chamber 13 will not take place if the guides 18 are made stationary, nor will it occur if the guides are freely rotatable so that they will rotate in the direction of movement of the yarn strand due to the passage of the strand thereabout. The theory behind the idea of rotating the

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guide rollers in the direction opposite to the travel of the yarn strand is that this is the direction of movement of the twist as it attempts to run back away from the false twist device and that by so rotating the guides the twist is helped along, so to speak, by said guides.

While any suitable means may be provided for driving the rollers 18, a simple way of accomplishing this is by means of an endless belt 23 driven by a motor 24 and engaging pulleys 25 secured to shafts 26 which carry the rollers. The pulleys 25 and belt 23 may advantageously be located on an outside wall of the chamber 13.

The above described discovery of the method of causing a false twist to run back over a guide member enables the heating chamber 13 to be constructed of such a size that the yarn strand will reside in it in a twisted condition for a substantial period of time even though the strand is being moved at a high rate of speed. Thus the invention enables the construction of a heating chamber which may more efficiently and effectively heat a substantial length of yarn while said yarn is in false twisted condition to thereby produce a superior crimp in the yarn.

It will be apparent that this discovery of a method of twisting a strand while the strand is moving in a tortuous path around a guide is susceptible to a wide range of application.

Having thus described the invention, what is claimed is:

1. The method of twisting a running strand while the strand is passing over a guide member comprising the steps of inserting a twist into the strand at a point beyond the guide member and rotating the guide member in the direction opposite to the movement of the strand whereby the twist will run back along the strand past the guide member.

2. The method of false twisting a substantial length of a running yarn strand comprising providing a plurality of rotatable guide members, feeding the yarn strand in a tortuous path about the guide members so as to provide a substantially great length of yarn in a comparatively small space, twisting the yarn strand by means of a false

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twist device at a point in its travel beyond the guide members, and rotating the guide members in the direction opposite to the travel of the yarn strand so as to cause the false twist to run back along the strand past the guide members.

3. In the false twist method of bulking artificial yarn wherein a false twist device is employed for causing a false twist to run back along a yarn strand moving through a treating chamber wherein the false twist is set into the yarn due to the action of a treating medium in the treating chamber; the improved method of increasing the residence time of the yarn within the chamber without decreasing the linear speed of the strand comprising the steps of guiding the strand in a tortuous path through the chamber by means of a plurality of rotatable guides, and rotating the guides in the direction opposite to the direction of travel of the strand to thereby cause the false twist to run back along the strand past the guides.

4. In apparatus for bulking artificial yarn by the false twist method wherein a false twist device is employed for causing a false twist to run back along a yarn strand moving through a treating chamber containing a treating medium which sets the false twist into the yarn; an improved treating chamber for accommodating a substantial length of false twisted yarn comprising an enclosure, means for introducing a treating medium into said enclosure, an entrance and an exit in said enclosure whereby a running yarn strand may pass therethrough, rotatable guide means in said enclosure, said guide means providing a tortuous path for the yarn strand passing therearound, and means for rotating said guide means in the direction opposite to the movement of the yarn strand whereby the false twist is caused to travel back along the strand past said guide means.

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