FALSE TWISTING DEVICE
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This invention relates to a device for imparting a twist to a running length of textile yarn, and more particularly to apparatus for false twisting such yarns.

Early apparatus for false twisting textile yarns was hindered by the fact that the speed of rotation which could be imparted to the twisting means was seriously limited. In recently developed devices there has been a tendency to increase the rate of rotation of the twisting head quite considerably, for example up to about 200,000 r.p.m. and even more. At these high speeds it is possible to greatly increase yarn feeding speed and to thereby very significantly increase the rate of production of creimp yarn.

In one popular apparatus which imparts a very high rotational speed to the twisting head, the twisting tube is supported on freely rotatable axially parallel rollers and is in tangential contact with these rollers. Rotation is imparted to the twisting tube directly by means of a high speed driving belt in contact therewith which also press the tube against the rollers. Because of the relatively small diameter of the twisting tube or any built up spiral portion thereof, such apparatus requires the use of a very high speed driving belt in order to impart the aforementioned high rotational speeds. In such apparatus the false twisting tube and rollers must be adapted to prevent axial displacement of the tube in the direction of yarn travel over the twisting head. Since the twisting tube is held in against the rollers by belt pressure, access to the tubes is possible only if the entire apparatus is lifted off or otherwise completely disengaged from the driving belt. It is an object of the present invention to provide a false twisting device which overcomes these salient drawbacks of currently available devices.

It is a further object to provide an apparatus wherein rotational speeds of 200,000 r.p.m. and more are indirectly imparted to the false twisting tube, and in which the twisting tube is easily accessible and removable.

The false twisting device of the present invention comprises a pair of spaced rollers, a twisting tube in tangential frictional contact with each of said rollers and magnetic means acting upon the twisting tube to maintain the same in contact with said rollers. The rollers are so spaced as to provide a crotch or throat therebetween and one of the rollers is driven, and the other is an idler. Rotation is imparted to the twisting tube as a result of its frictional contact with the driven roller, and the tube in turn imparts rotation to the other roller which is simply an idler. Frictional contact between the twisting tube and the driven and idler rollers is maintained through the force of either an electromagnet or a permanent magnet acting upon said twisting tube and holding the same in the crotch or throat between the rollers.

For a further understanding of our novel false twisting device, reference will now be made to the drawings wherein:

FIG. 1 is a partially broken away inverted plan view of one embodiment of a false twisting device in accordance with the present invention;

FIG. 2 is a sectional elevation taken on the line A—A of FIG. 1;

FIG. 3 is a side elevation of the apparatus of FIG. 2 in the direction of the arrow B;

FIG. 4 is an enlarged sectional elevation on the line C—C of FIG. 1, but with the magnet rotated 90° from its correct position in FIG. 1 for illustrative purposes only;

FIG. 5 is an enlarged sectional elevation similar to FIG. 4 but illustrating a modified twisting tube and magnet end;

FIG. 6 is an elevation of another embodiment of the apparatus of the present invention, and FIG. 7 is a plan view of the apparatus of FIG. 6.

Referring now to FIGS. 1—4, the carrier plate 11 is provided with an opening 34 to accommodate a driving shaft, for example the shaft 5 of a motor, only a portion of the mounting 34a being shown. The shaft 5 is joined to a driven shaft 35 upon which is mounted a driven roller, which comprises a hub 1 secured to shaft 35 as by means of a set screw 25, and a pair of spaced circular flanges or discs 3, 3', each flange or disc being provided with clamping screws 16 and 29, the latter passing through carrier plate 1. For adjustment of the magnet.
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3 with respect to the twisting tube 4, there is provided a screw 30 mounted in an adjusting ring 31 seated on the magnet and clamped thereto by means of the screw 32. When the screws 16 in the upper part 14a of the bearing clamp are loosened, longitudinal displacement of the magnet is effected simply by turning adjusting screw 30.

Referring now to FIG. 4, the cylinder 12 of low-loss magnetic material is preferably made up of a series of hollow discs of a high permeability low-loss magnetic material such as sheet iron arranged adjacent one another as is usual in the construction of transformers. Preferably discs 21, 21' of non-magnetic material, e.g., brass or stainless steel, are disposed at the respective ends of the series of discs of magnetic material. By reason of the low-loss magnetic material and the position of the magnet closely adjacent thereto axial displacement of the twisting tube is magnetically inhibited.

The embodiment of FIG. 5 is specifically designed to magnetically prevent displacement and to quickly restore the twisting tube to its proper position should axial displacement occur. The face of magnet 13 is provided with teeth 24 and the sleeve on the twisting tube 4 consists of alternate discs of low-loss sheet iron 22 disposed opposite magnet teeth 24 and discs 23 of non-magnetic material positioned between said teeth.

Another embodiment of the false twisting device of the present invention is illustrated in FIGS. 6 and 7, wherein it will be seen that the driven and idler rollers are identical and mounted in the same way upon the carrier plate 11. Both rollers are freely rotatable on bearings which are not shown, and the shift of either roller when the apparatus illustrated, shaft 35 is provided with a friction collar 52 which engages a moving belt 53 when the apparatus is in operating position. The carrier plate 11 is provided with a handle 54 and locking means, not shown, and is drilled and slidable mounted on a pair of guides 11a and 11b. Collar 52 is disengaged from moving belt 53 simply by disengaging the locking means and pulling on handle 54. Obviously other means might be provided for engaging and disengaging the device, for example, carrier plate 11 might be pivotally mounted on the machine base.

It will be observed that in this embodiment of the device the circular flanges or discs 3, 3', 6, 6' of the driven and idler rollers, respectively, are in aligned relationship, as distinguished from the staggered arrangement of the device of FIGS. 1–3. Furthermore, each of the flanges is provided with a rim or tire 50, 50' and 51, 51' of a wear resistant, resilient, friction material to reduce friction between the discs and twisting tube to a minimum. The rim material is preferably a modified natural or synthetic rubber. While the rims or tires are not essential to the apparatus of the present invention it has been found that the modified rubber rim not only minimizes wear on the metal twisting tube, but also provides the best frictional contact therewith. When rims are employed, the flanges or discs of the respective rollers may be metal. If the discs are not provided with wear resistant, resilient rims as in the apparatus of FIGS. 1–3, at least the edge of the disc which comes in contact with twisting tube 4 is constructed of a hard, resilient material, for example a polyamide or phenoplast synthetic resin. Desirably the entire disc is constructed of such material.

In the embodiment of FIGS. 6 and 7 the twisting tube 4 is provided with an enlarged central cylindrical portion 12a and the cylinder 13 of magnetic material consists of the aforementioned discs of sheet iron or other high permeability, low-loss magnetic material, firmly adhered over portion 12a.

In the embodiment the rollers are spaced to form a crotch or throat 41, comprising an upper portion provided between discs 3 and 6 and a lower portion provided between discs 3' and 6'. The magnetic means employed to maintain the twisting tube in throat 41 in frictional contact with the peripheral edges of the rims 50, 50' and 51, 51' is a permanent horseshoe magnet 15, which is supported in position on the carrier plate 11. The pole pieces 15a and 15b of the magnet extend into the space between the aligned roller discs, and the face of each pole piece is shaped as indicated in FIG. 7 to close accommodate cylinder 12 on the twisting tube.

Twisting tube speeds up to approximately 300 r.p.m. and more have been achieved and satisfactorily maintained for several months with the devices illustrated. At these speeds the hub 1 of the apparatus of FIGS. 1–3 and the collar 52 and its shaft 35 of FIGS. 6 and 7 rotate at speeds of only about 20,000 r.p.m. The ratio of tube speed to disc speed is desirably between about 10 and 30:1.

While we have shown and described at least two embodiments of our improved yarn twisting device, we do not wish to be limited to the specific details of construction disclosed, it being understood that changes may be made therein within the range of engineering skill without departing from the spirit of the invention.

We claim:

1. Apparatus for false twisting textile yarns comprising a pair of rollers, at least one of which is driven, spaced one from the other to form a crotch therebetween, a yarn twisting tube positioned in said crotch in frictional engagement with the peripheral edges of said rollers at portions substantially spaced longitudinally of said tube and having means for imparting a twist to yarn passing therethrough upon rotation of said tube, and separate magnetic means located substantially equidistant from the axes of said rollers and acting on said tube between said spaced portions to maintain the tube positioned in said crotch and in said friction engagement, the portions of said tube in frictional engagement with the edges of said rollers having diameters substantially smaller than those of the rollers taken at the corresponding peripheral edges.

2. Apparatus for false twisting textile yarns comprising a pair of rollers, at least one of which is driven, spaced one from the other to form a crotch therebetween, a yarn twisting tube positioned in said crotch in frictional engagement with the peripheral edges of said rollers at portions substantially spaced longitudinally of said tube and having means for imparting a twist to yarn passing therethrough upon rotation of said tube, and separate magnetic means located substantially equidistant from the axes of said rollers and acting on said tube between said spaced portions to maintain the tube positioned in said crotch and in said friction engagement, the portions of said tube in frictional engagement with the edges of said rollers having diameters substantially smaller than those of the rollers taken at the corresponding peripheral edges.

3. Apparatus for false twisting textile yarns comprising a pair of rollers, at least one of which is driven, said rollers being spaced one from the other to form a crotch therebetween, a yarn twisting tube positioned in said crotch in frictional engagement with the peripheral edges of said rollers at portions substantially spaced longitudinally of said tube and having means for imparting a twist to yarn passing therethrough upon rotation of said tube, and separate magnetic means located substantially equidistant from the axes of said rollers and acting on said tube between said spaced portions to maintain the tube positioned in said crotch and in said friction engagement, the portions of said tube in frictional engagement with the edges of said rollers having diameters substantially smaller than those of the rollers taken at the corresponding peripheral edges.
nally of said tube and having means for imparting a twist to yarn passing therethrough upon rotation of said tube, at least one of said rollers including a pair of spaced flanges forming the peripheral edges thereof, and separate magnetic means located substantially equidistant from the axes of said rollers and between said flanges and acting on said tube between said spaced portions to maintain the tube positioned in said crotch and in said frictional engagement, the portions of said tube in frictional engagement with the edges of said flanges having diameters substantially smaller than those of the flanges taken at the corresponding peripheral edges thereof.

4. Apparatus for false twisting textile yarns comprising a pair of rollers, at least one of which is driven, spaced one from the other to form a crotch therebetween, a yarn twisting tube positioned in said crotch in frictional engagement with the peripheral edges of said flanges at portions substantially spaced longitudinally of said tube and having means for imparting a twist to yarn passing therethrough upon rotation of said tube, said twisting tube intermediate its points of engagement with said peripheral edges being provided with a mass of low loss magnetic material and a separate magnet having at least one pole located substantially equidistant from the axes of said rollers and between said flanges and acting on said tube between said spaced portions to maintain the tube positioned in each crotch and in said frictional engagement with the edges of said flanges having diameters substantially smaller than those of the flanges taken at the corresponding peripheral edges thereof.

5. Apparatus for false twisting textile yarns comprising a pair of rollers each formed with a pair of spaced flange pairs disposed in opposed staggered relation and at least one of which rollers is driven, said pairs of flanges spaced one from the other to form a crotch therebetween, a yarn twisting tube positioned in said crotch in frictional engagement with the peripheral edges of said flanges at portions substantially spaced longitudinally of said tube and having means for imparting a twist to yarn passing therethrough upon rotation of said tube, and separate magnetic means located substantially equidistant from the axes of said rollers and between said flanges and acting on said tube between said spaced portions to maintain the tube positioned in said crotch and in said frictional engagement, the portions of said tube in frictional engagement with the edges of said flanges having diameters substantially smaller than those of the flanges taken at the corresponding peripheral edges thereof.

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