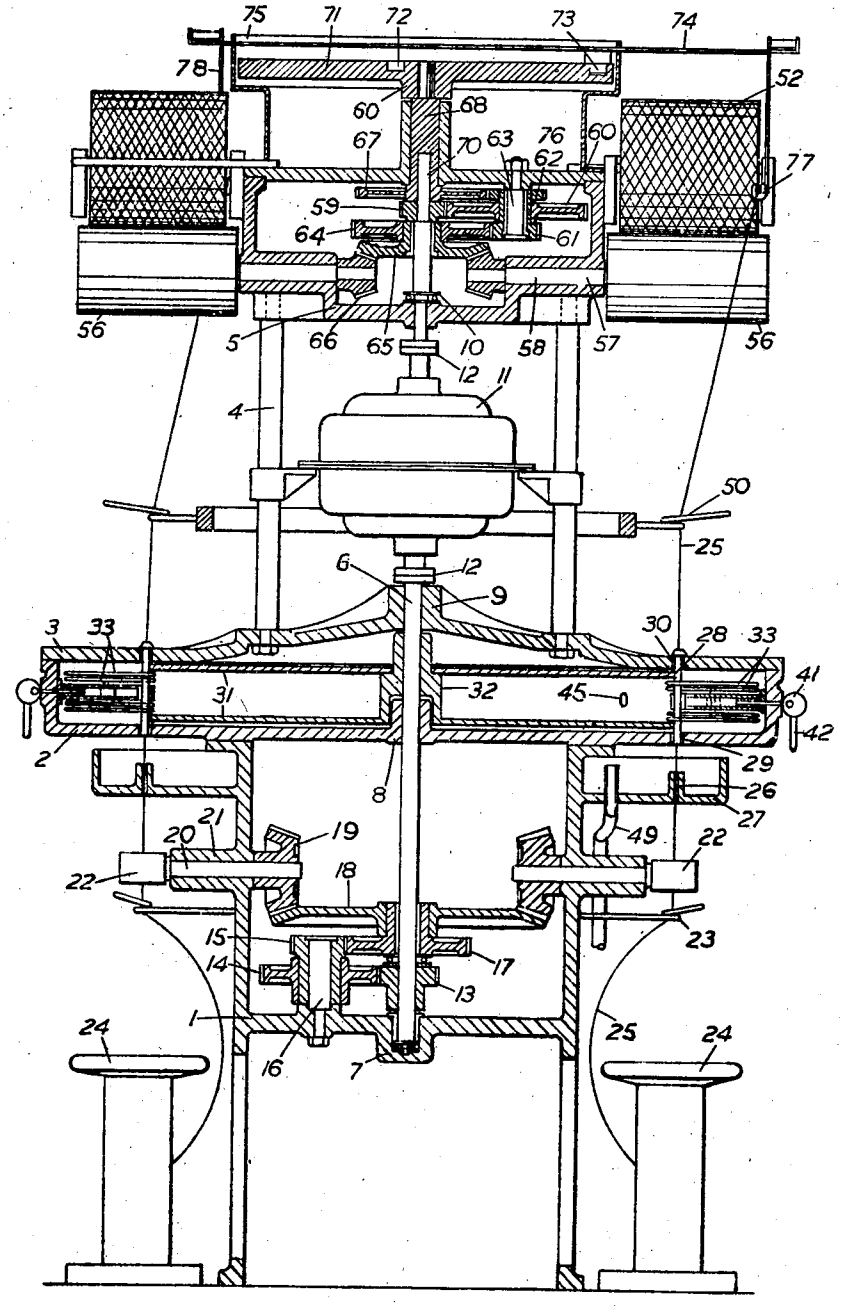
Jan. 7, 1941. W. POOL 2,227,910

TWIST TUBE

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FIG. 1



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FIG. 3

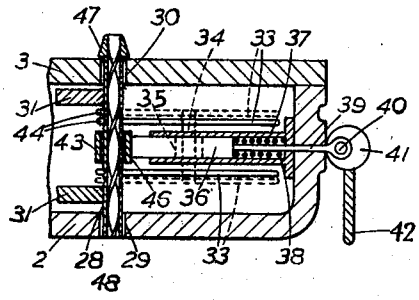


FIG. 4

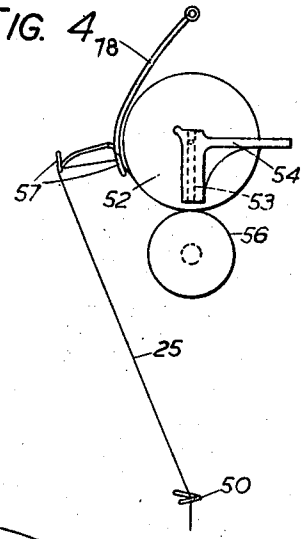
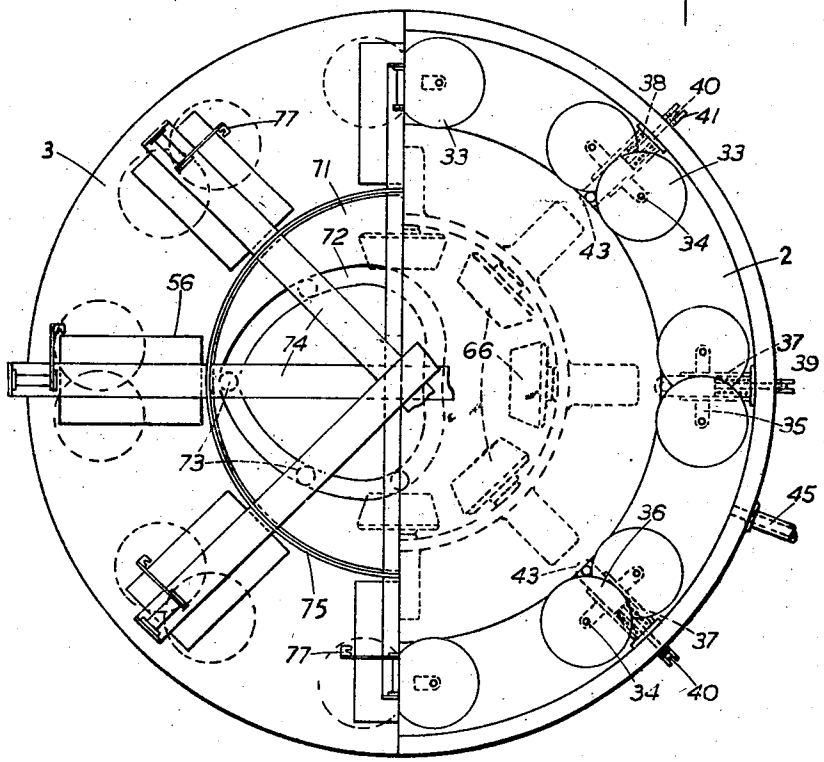


FIG. 2



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Patented Jan. 7, 1941 2,227,910

UNITED STATES PATENT OFFICE

2,227,910

TWIST TUBE

William Pool, Spondon, near Derby, England, assignor to Celanese Corporation of America, a corporation of Delaware

Application October 3, 1939, Serial No. 297,669
In Great Britain October 10, 1938

9 Claims. (Cl. 57—35)

This invention relates to means for twisting textile yarns and like materials and is particularly concerned with devices of the type known as twist tubes.

According to the present invention a twist tube device comprises a short hollow spindle adapted to make frictional contact with a yarn or thread passing through it, a friction wheel adapted to make external driving contact with said spindle and anti-friction means for holding said spindle in engagement with said friction wheel. By the use of a friction wheel of relatively large diameter and of a rotating spindle in the form of a short light tube held in contact with said wheel in such a way that little frictional resistance is offered to the rotation of the spindle, very high speeds of rotation may readily be obtained.

In order that the twist tube may have the desired twisting effect upon the yarn or thread passing through it, it is necessary that frictional contact should be maintained between the yarn or thread and the interior of the spindle. While for this purpose any convenient trapping means may be provided to ensure that the yarn or thread cannot pass through the spindle without making firm frictional contact with some rotating part thereof, a convenient method of achieving this end is to provide the spindle with an internal helical passage along the length of the spindle. This may be done for example by inserting and securing in the bore of the spindle a twisted strip adapted to fit the internal diameter of the spindle and so to divide its bore into two helical passages along one of which a yarn or thread may pass. In order to prevent endwise movement of the spindle, small flanges may be formed outside the tube to engage with a convenient locating means.

For the purpose of maintaining contact between the rotating spindle and the friction wheel which is to drive it, a convenient form of anti-friction means is a pair of anti-friction wheels, that is to say a pair of overlapping wheels each mounted on an axle whose diameter is small relatively to the diameter of the wheel. Two such pairs of anti-friction wheels may be employed, one pair engaging on each side of the point of engagement between the spindle and the driving wheel, and on the opposite side of the spindle to the driving wheel. The two pairs of friction wheels may be mounted as a unit in a frame, and in order that the spindle may be readily removable the frame may be pivoted at one side and held in working position by a weighted lever, springs, or like means.

The twist tube of the present invention may be employed in any process in which twist tubes have heretofore been employed. It is particularly convenient in the crimping of yarns in the manner described for example in U. S. Patents Nos. 2,089,198, 2,089,199 and 2,111,209, according to which a crimp is imparted to yarns by setting twist in the yarns while they are travelling and subsequently removing the twist from the yarns. Each of the above specifications describes the use of a false twisting device, whereby the removal of the twist from the yarns is automatically provided for, and the twist tube of the present invention may be used as a false twisting device for this purpose.

By way of example one form of apparatus in which the twist tube is employed for the purpose of crimping yarns will now be described in greater detail with reference to the accompanying drawings, in which

Fig. 1 is a side elevation in section of the apparatus;

Fig. 2 is a half-plan view, partly in section; and

Figs. 3 and 4 are details.

The apparatus comprises a frame 1 on which is mounted a flat circular vessel 2 having a cover 3. Vertical pillars 4 mounted on top of the cover carry a gear box 5 for the winding mechanism of the apparatus. The main shaft 6 of the apparatus runs up through the centre thereof, being mounted in a footstep bearing 7 carried by the frame 1, passing through a bearing 8 in the vessel 2 and a bearing 9 in the cover 3, and being supported by a thrust bearing 10 in the centre of the gear box 5. An electric motor 11 for driving the main shaft 6 is mounted in the middle of the shaft by means of couplings 12.

The lower end of the shaft 6 carries a gear 13 engaging with gear 14 secured to a further gear 15 mounted on the shaft 16 in the frame 1. The gear 15 engages with a gear 17 freely mounted on the shaft 6, which in turn is secured to a bevel gear 18 engaging with a plurality of bevel gears 19 carried on shafts 20 mounted in bearings 21 in the frame 1. At the outer ends of the shaft 20 are carried rollers 22. Beneath each of the rollers 22 is a thread-guide 23 carried by the frame 1. Beneath each of the thread guides 23 is stood a bobbin 24 of continuous filament yarn from which the yarn 25 is drawn through the guide 23 by means of the roller 22. From the roller 22 the yarn proceeds through an aperture 26 in the bottom of a circular tray 27 carried by the frame 1. After rising through the tray 27 the yarn passes through a twist tube 28 in accord-

ance with the invention, the twist tube being mounted in the casing 2 and passing through openings 29, 30 in the bottom of the casing 2, and the cover 3, respectively.

Each of the twist tubes 28 engages with the periphery of each of two large friction wheels 31 mounted at 32 upon the main shaft 6 and adapted to rotate therewith. Each tube 28 is held in engagement with the friction wheels 21 by means of two pairs of anti-friction wheels 33 which are shown in plan view on the right-hand side of Fig. 2. The wheels 33 are mounted on vertical spindles 34 at the ends of arms 35 projecting from a block 36 mounted in guides 37 extending inwardly from the peripheral walls of the chamber 2. The block 36 is pressed towards the centre of the chamber by means of a spring 38. A rod 39 projecting radially outwards from the block 36 passes through a casing 2 and is secured to a pin 40 in an eccentric cam 41 having a handle 42. By these means, when the handle 42 is turned upwards the rod 39 is pulled outwards so compressing the spring 38 and withdrawing the friction wheels 33. An extension 43 of the block 36 surrounds the twist tube 28 and draws it out of engagement with the friction wheels 31. Normally, however, the handle 42 hangs downwards so that the cam 41 permits the spring 38 to press the block 36 together with the friction wheels 33 radially inwards, whereby the twist tube 28 is held against the friction wheels. The four friction wheels 33 engage, as is shown in Fig. 3, with four grooves 44 round the twist tube 28, so as to hold it in position.

The whole chamber 2 is filled with steam through an inlet 45 and the steam enters the twist tube 30 by means of small holes, one of which is shown at 46 in Fig. 3. It will be seen from Fig. 3 that the twist tube 28 is in the form of a tube with a conical flange 47 at the outer end, and contains a twisted strip of metal 48 secured in the bore thereof so as to divide the bore into two helical passages up one of which the yarn is caused to pass.

By means of the friction wheels 31 the twist tube 28 is rapidly rotated, and the yarn 25, as it passes through the twist tube, is given a very high degree of false twist. At the same time, while this twist is possessed by and is being imparted to the yarn 25 moist steam entering through the holes 46 acts upon the yarn and sets the false twist therein, in the manner described in U. S. Patents Nos. 2,089,199 and 2,111,209. The yarn 25 emerges at the upper end of the twist tube with no twist therein as between the several continuous filaments, but with each filament distorted by the twist temporarily imparted to the yarn by the twist tube 28.

Any condensation in the tube 28 or in the chamber 2 drips out through the hole 29 into the tray 27 which may, if desired, be maintained full of water so as to wet the yarn before it enters the twist tube 28. A draining tube 49 is provided in the tray 27 in order to drain off any excess of liquid in the tray.

On leaving the twist tube 28 the yarn proceeds through a guide 50 carried on the columns 4, and thence proceeds to a take-up package 52. The package 52 is mounted in slots 53 (Fig. 4) in a bracket 54 mounted on the gear box 5 and rests with its surface on a drum 56. The drum 56 is mounted on a shaft 57 carried in a bearing 58 in the gear box 5 and serves to drive the package 52 at a constant peripheral speed so as to take up the yarn and to draw it at a constant linear speed from the roller 22 by means of which it is drawn from the bobbin 24. Within the gear box 5 and secured to the main shaft 6 is a gear 59 engaging with a gear 60 secured to two other gears 61, 62 and mounted with them on a shaft 63 in the gear box 5. The gear 61 engages with gear 64 freely mounted on the shaft 6 the gear 64 being secured to a bevel gear 65 engaging with a series of bevel gears 66 secured to the inner end of each shaft 57. By these means the drums 56, and so the take-up packages 52, are driven. The gear 62 engages with a gear 67, which is formed in one piece with a shaft 68 passing through a bearing 69 at the top of the gear box 5. A recess 70 in the shaft 68 constitutes a bearing for the upper end of the main shaft 6. The shaft 68 carries a large cam 71 having a cam groove 72 therein, engaged by cam followers 73 mounted on arms 74, of which one is provided for each diametrically opposite pair of packages 52. The arms 74 are guided at each end by horizontal slots in a guide 75 secured at 76 to the upper face of the gear box 5. At each end of each of the arms 74 is a traverse guide 77 depending on a rod 78 from the end of the arm 74 so that each package 52 is provided with a traverse guide through which the thread leaving the thread guide 50 is traversed on to the package 52.

Having described my invention, what I desire to secure by Letters Patent is:

1. A twist tube device for the handling of textile yarns, said device comprising a short hollow spindle adapted to make frictional contact with a yarn passing through it, a friction wheel adapted to make external driving contact with said spindle, and anti-friction means for holding said spindle in engagement with said friction wheel.

2. A twist tube device for the handling of textile yarns, said device comprising a short hollow spindle having an internal helical passage along its length adapted to distort a yarn passing through it and to ensure making frictional contact with said yarn, a friction wheel adapted to make external driving contact with said spindle, and anti-friction means for holding said spindle in engagement with said friction wheel.

3. A twist tube device for the handling of textile yarns, said device comprising a short hollow spindle having a plain bore, a twisted strip of width equal to the diameter of said bore secured within said bore so as to divide said bore into two helical passages adapted to distort a yarn passing therethrough, and to ensure making frictional contact with said yarn, a friction wheel adapted to make external driving contact with said spindle, and anti-friction means for holding said spindle in engagement with said friction wheel.

4. A twist tube device for the handling of textile yarns, said device comprising a short hollow spindle adapted to make frictional contact with a yarn passing through it, a friction wheel adapted to make external driving contact with said spindle, and at least one pair of overlapping anti-friction wheels mounted on parallel axes and adapted between them to hold said spindle in engagement with said friction wheel.

5. A twist tube device for the handling of textile yarns, said device comprising a short hollow spindle adapted to make frictional contact with a yarn passing through it, a friction wheel adapted to make external driving contact with said spindle, a frame, a pivot for one end of said frame, two pairs of overlapping anti-friction wheels

mounted on parallel axes in said frame and adapted between them to hold said spindle in engagement with said friction wheel, and releasable means for pressing the other end of said frame towards said friction wheel.

6. A twist tube device for the handling of textile yarns, said device comprising a short hollow spindle having a plain bore, a twisted strip of width equal to the diameter of said bore secured within said bore so as to divide said bore into two helical passages adapted to distort a yarn passing therethrough, and to ensure making frictional contact with said yarn, a friction wheel adapted to make external driving contact with said spindle, a frame, a pivot for one end of said frame, two pairs of overlapping anti-friction wheels mounted on parallel axes in said frame and adapted between them to hold said spindle in engagement with said friction wheel, and releasable means for pressing the other end of said frame towards said friction wheel.

7. A yarn crimping device comprising a short hollow spindle having a perforation in the wall thereof and adapted to make frictional contact with a yarn passing through it, a friction wheel adapted to make external driving contact with said spindle, anti-friction means for holding said spindle in engagement with said friction wheel, a casing adapted to surround said spindle and to contain an agent adapted to set in said yarn a temporary twist imparted by said spindle and to supply said agent through said perforation to the interior of said spindle.

8. A yarn crimping device comprising a plurality of short parallel hollow spindles each having a perforation in the wall thereof and being adapted to make frictional contact with a yarn passing through it, a friction wheel adapted to make external driving contact with each of said spindles at different points on its periphery, anti-friction means in connection with each of said spindles for holding said spindle in engagement with said friction wheel, and a chamber surrounding said friction wheel, spindles and anti-friction means, and adapted to be supplied with an agent for setting in each of said yarns a temporary twist imparted thereto by said spindles.

9. A yarn crimping device comprising a plurality of short hollow spindles each having a plain bore and a perforation in the wall thereof, a twisted strip of width equal to said bore secured within the bore of each spindle so as to divide said bore into two helical passages adapted to distort a yarn passing therethrough and to ensure making frictional contact with said yarn, a friction wheel adapted to make external driving contact with each of said spindles at different points around its periphery, a frame in connection with each spindle, said frame being radially movable and urged towards the axis of said friction wheel, two pairs of overlapping anti-friction wheels mounted on parallel axes in each of said frames and adapted between them to hold the corresponding spindle in engagement with said friction wheel, and a chamber surrounding said friction wheel, spindles and anti-friction means, and adapted to be supplied with an agent for setting in each of said yarns a temporary twist imparted thereto by said spindles.

WILLIAM POOL.