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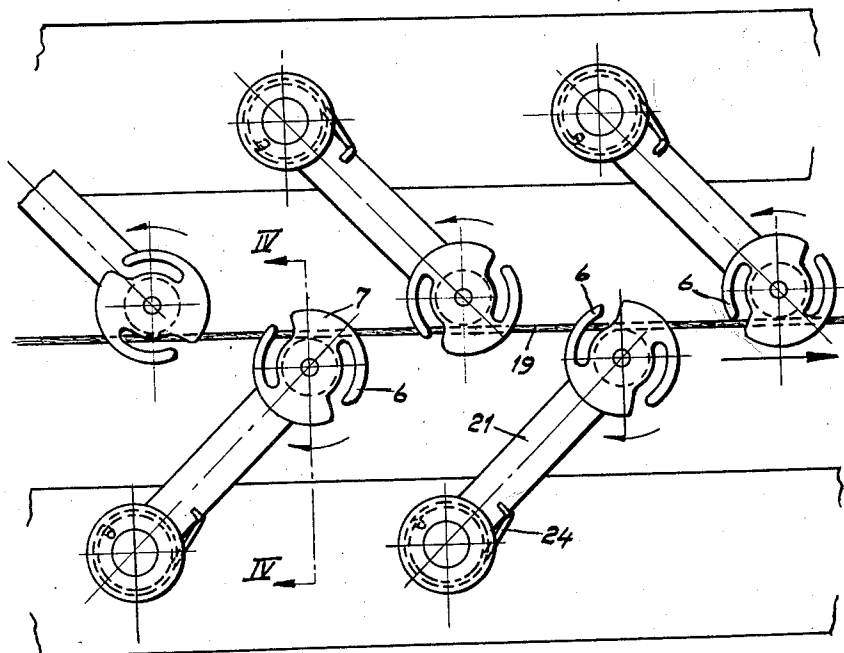
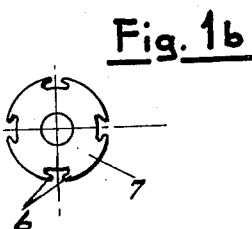
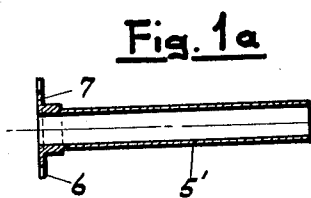
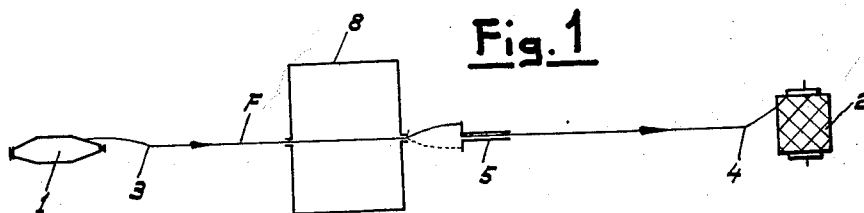
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3,085,390

APPARATUS FOR REFINING YARNS

Filed March 25, 1955

2 Sheets-Sheet 1



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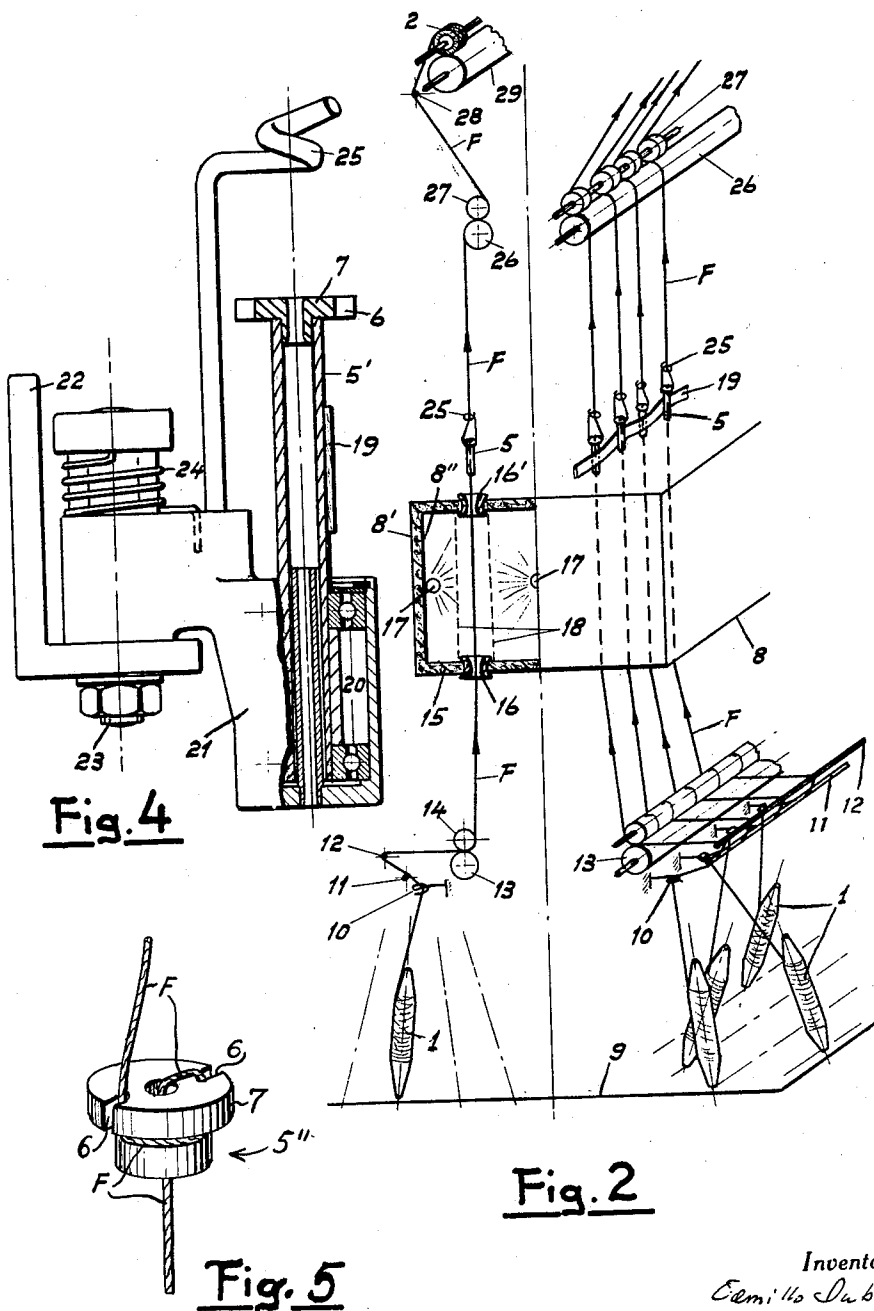
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APPARATUS FOR REFINING YARNS

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2 Sheets-Sheet 2



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APPARATUS FOR REFINING YARNS

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There have already been proposed and widely used processes and apparatus for refining yarns, viz. for imparting to yarns of any kind improved characteristics of elasticity, heat insulation, feel and touch, appearance and so on, which processes generally comprise imparting to the yarn an overtwist, subjecting the yarn so twisted and wound up on spools to a heat treatment to obtain the fixing of the deformations produced by said overtwist, and removing at least part of said twist by twisting the yarn in the opposite sense, after a previous, optional drying.

All these operations had of course to be carried out so far in distinct and successive stages of processing, in special and very complex apparatus; frequent re-winding of the yarn was necessary to put it on supports suited for the various stages of processing, whence refining processes turned out to be very long and consequently expensive and affected unfavorably the price of the refined yarn.

These drawbacks are eliminated in the apparatus according to the present invention, which is characterized by the fact that the various operations of deformation and fixing are carried out in a single working phase. This is done by acting onto at least a length of yarn comprised between two fixed points and continuously passing from a feeding member to a collecting member, said members being positioned externally of said points, and the fixing of said deformation being obtained by means of heat treatment onto at least one portion of the said length.

In one single passage can, thus, be obtained a refined yarn having the desired improved characteristics of elasticity, heat insulation, appearance and touch.

According to a further feature of the invention, the deformation is impressed onto the yarn in the novel apparatus by causing it to freely cross the hollow axis of a runner or twister at an elevated number of revolutions, located between said fixed points, downstream of the length subjected to a heat treatment. Said yarn is made to pass before and afterwards said crossing through a hook eccentrically integral with said runner so that a high temporary twisting is imparted to said yarn.

The invention has fundamentally the object to provide an apparatus which is distinguished by its simplicity of structure and consequently by the possibility of being made with reduced space requirement and at low cost.

A fundamental element of said apparatus is in fact the above mentioned hollow runner or twister which essentially consists of a tubular hollow body situated with its axis substantially in the path of the yarn crossing same, and provided in correspondence of one of its extremities with a flange having peripheral slits thereon acting as hooks in which slidably engages the yarn. Said slits are, of course, so shaped as to be able to entrain the yarn both in right and in left rotation.

The apparatus in its whole comprises, in vertical succession from bottom upwards, a loading floor for receiving a plurality of reels or spools of yarn, at least one line of thread-guides towards which the yarns coming from the individual bobbins converge, at least a first driven cylinder with which cooperates a plurality of idle rollers located side by side for the feeding of the yarn, a chamber for the heat treatment, located above said idle rollers and provided on its lower face and upper face, respectively, with entry thread-guides and exit thread-guides, respectively, for the passage of the yarn coming from said first

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driven cylinder, at least one line of hollow runners or twisters provided with eccentric hooks, rotated at very high speed and located above said thread-guides in alignment therewith, at least a second driven cylinder with which cooperates a plurality of idle press rollers for withdrawing the yarn from the hollow runners or twisters and above said second driven cylinder, at least a third driven cylinder for frictionally controlling at constant peripheral speed a plurality of spools for collecting the treated yarn.

The accompanying drawing shows by way of non limitative example, for a better understanding of the invention, a diagram of embodiment of the apparatus and some of its details. In the drawing:

FIG. 1 represents diagrammatically the process carried out with the apparatus according to the invention, in which the yarn is imparted deformation by twist;

FIGURES 1a and 1b are a longitudinal section and a front view respectively, from the left side of FIG. 1a, of a member used in the diagram of FIG. 1;

FIG. 2 is a schematic view, in vertical cross-section, of an apparatus for the simultaneous treatment of many threads according to the diagram of FIG. 1;

FIG. 3 is a plan view, on enlarged scale, of one of the two lines of hollow runners or twisters;

FIG. 4 is an elevation of one of said twisters, partially sectioned according to line IV—IV of FIG. 3; and

FIG. 5 is a perspective view on a further enlarged scale of a slightly different embodiment of a top piece or flange of said runners or twisters.

According to the embodiment of the process as diagrammatically represented in FIG. 1, the yarn F to be treated is continuously unwound from a spool 1 and is wound up after refining on a spool 2, between which it passes through two fixed points 3 and 4. It is just on the path of the yarn between 3 and 4 that the yarn is subjected to deformation and is fixed.

Deformation is obtained according to the embodiment illustrated in FIG. 1, at a point intermediate between the fixed points 3 and 4, the yarn being made to pass inside of a hollow runner or twister 5 turning at high speed, after it has been inserted in one of peripheral hooks 6 of one of its end flanges 7. The yarn, which is entrained from one fixed point to the other through said twister in rapid rotation, twists firstly between 3 and 5 according to a determined number of revolutions and untwists then between 4 and 5 according to an equal number of revolutions, since twisting and untwisting are produced by the same rotating body. By making the yarn pass in its state of temporary twist through a chamber 8 heated to a suitable temperature, the deformation originated by the twist is fixed in a permanent manner and remains a feature of the yarn even after untwisting. That is to say, the yarn is collected on the spool 2 without the least alteration of its original twist.

The heated chamber 8 may be equipped with an electric stove or other equivalent means capable of providing a surrounding of hot air at constant predetermined temperature corresponding to the kind and count of the yarn, to the intensity of the deformation undergone by said yarn, to the length of the heating chamber in the direction of the path of the yarn and to the speed at which the yarn passes through said chamber.

The twister 5 may, of course, be replaced by another equivalent member provided with suitable means for hooking-in the yarn and compelling it to turn with said member, permitting it to slide at the same time; it must be of small diameter to enable the balloon to be reduced and the number of revolutions to be increased, e.g. in the range of some millimetres and it must be of reduced length. Experience has shown that it is easy to impart to a member of this kind a speed of rotation up to and beyond

20,000 revolutions per minute with negligible consumption of power.

The fixed points 3 and 4 may be formed by one of the known methods in ordinary twisting machines, be they doublers or ring twisters or consist in simple transmission means.

An apparatus for treating the yarn as shown in FIG. 1 and heretofore described is the one schematically shown in FIG. 2 wherein the same reference numerals have been used to indicate parts corresponding to the parts of FIG. 1. Said apparatus comprises a loading floor 9 for the yarn, located in its lower part, and wherein the spools 1 of yarn are supported by pins (not shown) which have axes converging towards two lines 10 of thread-guides from which the yarn passes, through bars 11, 12 adjustable to vary the tension of the yarn, to two feed cylinders 13 with which cooperate a plurality of idle press rollers 14 for withdrawing the yarn F from the spools 1, complying at the same time to the function of fixed point 3 of FIG. 1. The two cylinders 13 are driven at constant speed (variable of course in accordance with the yarn, the twist to be imparted thereto and the treatment to be made).

The yarn F rises in vertical direction while it is subjected to the desired twisting effect, entering into the fixing chamber 8 which it leaves, still vertically, to enter into the twister 5 and to be then hooked at the exit thereof in the peripheral hooks 6 for right and left torsion of very hard material, which drag it in rotation thus imparting thereto in the length between the cylinders 13 and the twisters 5 a determined twist in quantity as well as in direction.

The fixing chamber 8 is preferably constituted by a double-walled box, its outer wall 81 being of a plate of appropriated material, the inner wall 84 being of stainless steel, and by an interposed layer 15 of insulating material of convenient thickness. Both on the bottom and on the cover of the box, in perfect correspondence with the axes of the twisters, there are provided holes for the passage of the threads, wherein there may be fastened tubular thread-guides 16, 16' of glass, porcelain or other suitable material, in the shape of funnels oriented with their flares upwards. These funnels serve to facilitate the threading from above of a hooked needle passing through the whole height of the fixing chamber so as to permit easy hooking of the thread to be treated, either at the beginning of the treatment or in case of breakage of the thread.

In the interior of the chamber and over its whole length there are provided suitable heating means 4, conveniently screened, to obtain a constant temperature of desired value for the fixing of the yarn.

The operation of the twisters 5 is effected by a belt 19 which can simultaneously control the two lines of twisters and which, however, tangentially bears on each of the twisters, alternately passing from one side to the other side thereof (FIG. 2) in such a manner as to impart thereto equal rotations but alternately in opposed sense. To this purpose, each twister consists of a tubular body 5' carrying at one end the flange 7 provided with hooks 6, and freely rotatably mounted, by means of ball bearings 20, in a support 21 in the shape of a swinging arm. The flange 7 may be provided, as is shown in FIGS. 4 and 5, in a top piece 5'' of the twisters 5 of a low friction coefficient material, e.g. a ceramic material inserted by force into the tubular body 51. In the instance of FIG. 5, hooks 6 consist of simple radial notches. The support 21 is mounted in a fixed frame 22 in a freely rotatable way around the stem of bolts 23, having its axis parallel to the axis of the tubular body 5', and is subjected to the action of a spring 24 which tends to rotate the said support 21 in the sense of securing the adherence of the tubular bodies 5' of the twisters to the belt 19. Onto the support 21 is also fixed a thread-guide 25 for guiding the yarn at the exit from the twisters 5.

The yarn F leaving the twisters 5 keeps rising, always in the vertical direction, under the action of the two driven cylinders 26 whereon there rest sets of idle press rollers 27.

Also these cylinders may be driven at a speed equal, higher or lower than that of the cylinders 26, so as to adjust at will the winding modalities of the yarn F onto the spools 2.

The driven cylinders 20 may turn with a peripheral speed identical to that of the feed cylinders 3, accomplishing in this case the simple function of the fixed point 4 of FIG. 1. Things, however, may also be arranged in such a manner that the peripheral speed be slightly higher than that of the cylinders 13 in order to give the yarn a slight draft, in order to permit the yarn to take a slight shrink.

From the driven cylinders 26 the threads then pass through thread-guides 28 to collecting bobbins 2 frictionally rotated by cylinders 29.

Things may be arranged in such a manner that the various movements be derived through suitable transmissions from one single motor supported by the framing of the apparatus in such a way that the latter forms an independent unit.

As will be seen from the above, the process hereinbefore described does not require any particular "winds" of the yarn, which may be unwound indifferently from spindles, cones, spools and the like and may again be collected on cones, spools and the like. The yarn to be refined may therefore be fed from the very support on which it is delivered by the spinning mill, and it may then be collected after one single pass through one single apparatus, in already completely refined condition on its definitive winding support. This, with the same production, permits to attain a considerable saving in the number and hence in the consumption of supports as compared with other apparatus, contributing thus to render the practising of the present invention more economical.

Finally, thanks to the alternately inverted rotational drive of the twisters of each line and to their closely spaced arrangement, it is also possible to directly collect together two yarn heads, in an easy and cost sparing way, onto the same spool, of which one has a right twist and the other one a left twist, an expedient which required heretofore complicated handling.

Besides these considerable advantages, the apparatus described hereinbefore also affords the following further advantages:

The yarns to be treated are subjected to less deterioration during treatment because they undergo only one pass from their original supports from which they are unwound to the definitive support on which they are wound up again;

Since the fixing of the deformation is undergone by the yarn in a continuous manner on its whole length, and not in bulk, the fixing effect results to be absolute uniform.

Having thus described my invention what I claim and desire to protect by Letters Patent is:

1. A false twister comprising in combination: a hollow tubular body, and a flange at one end of said body, said flange being provided with at least two oppositely arranged recesses for engagement with a thread running through the inside of the hollow tubular body.

2. An apparatus for the treatment of threads of synthetic fibres, comprising in combination: a first row of a plurality of spaced rotatable false twistlers, at least one additional row of a plurality of spaced rotatable false twistlers, said rows being parallel to each other and the rotatable twistlers of said two rows being alternately offset relative to each other, a belt drive including a belt passing in a substantially straight run between said rows of rotatable false twistlers and being in operative engagement with one side of each of said false twistlers whereby the false twistlers of one row are rotated in one direction of rotation and the false twistlers of the adjoining row are rotated in the opposite direction, and swingably attached

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support means for each of said false twistors for urging same in a direction opposite to the travel of and into engagement with said belt.

3. An apparatus for the treatment of threads according to claim 2, wherein said first row of false twistors and one of said additional rows of false twistors constitute a first pair of rows, further comprising a second pair of rows formed by a similar first row of false twistors and a similar additional row of false twistors, said belt drive passing in an endless path consecutively between the respective parallel rows of both pairs of rows, said pairs of rows and the associated belt runs being non-contiguous with each other.

4. In an apparatus for the treatment of threads of synthetic fibers, having means for simultaneously feeding a plurality of threads to a common heat-fixing chamber, and spaced rotatable false twistors at the exit of said chamber, the improvement comprising, in combination, a rotatable false twister for each thread, said false twistors forming two pairs of parallel rows, the false twistors of said rows of each pair being off-set relative to each other, a belt drive including a belt passing between the two rows of said false twistors of each pair of rows and being in operative engagement with one side of each of the false twistors of said rows, whereby the false twistors of one row are rotated in one direction of rotation and the false twistors of the adjoining row are rotated in the opposite direction, oscillating supports for each of said false twistors, and resilient means mounted on said supports for urging said false twistors into engagement with said belt.

5. An apparatus for the treatment of threads of synthetic fibers, comprising in combination: a first row of a

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plurality of spaced rotatable false twistors, each of said false twistors including a hollow cylindrical body, a flange arranged at one end of said hollow cylindrical body, and at least two oppositely arranged engaging means on said flange for engagement with a thread passing through the interior of said hollow cylindrical body, a second row of a plurality of spaced rotatable false twistors similar to the twistors of said first row, said rows being parallel to each other and the rotatable twistors of said two rows being offset relative to each other, a belt drive including a belt passing between said two rows of rotatable false twistors and being in operative engagement with each of said false twistors whereby the false twistors of one row are rotated in one direction and the false twistors of the other row are rotated in the opposite direction, said belt being in operative engagement with the outer surface of said hollow cylindrical bodies, said engaging means being formed by recesses arranged in the flange of the hollow cylindrical body.

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