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3,129,485

PRODUCTION OF NOVELTY BULKED YARN

Filed June 30, 1961

2 Sheets-Sheet 1

Fig. 1.

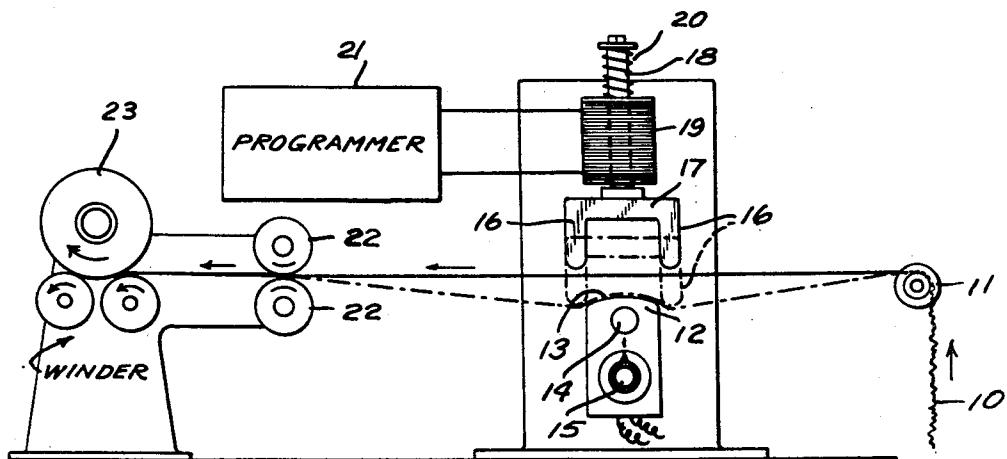
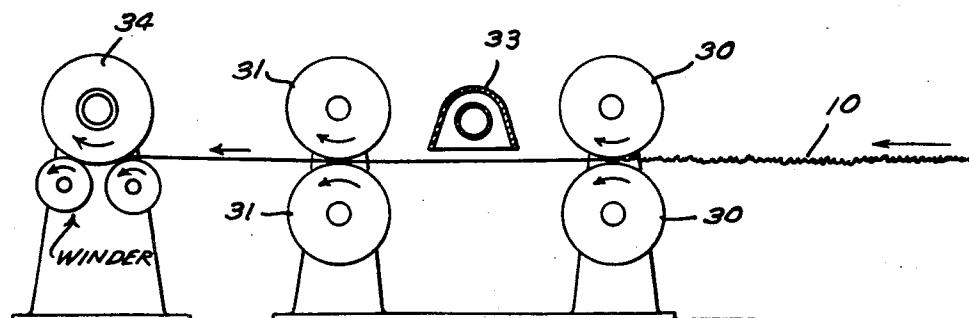


Fig. 2.



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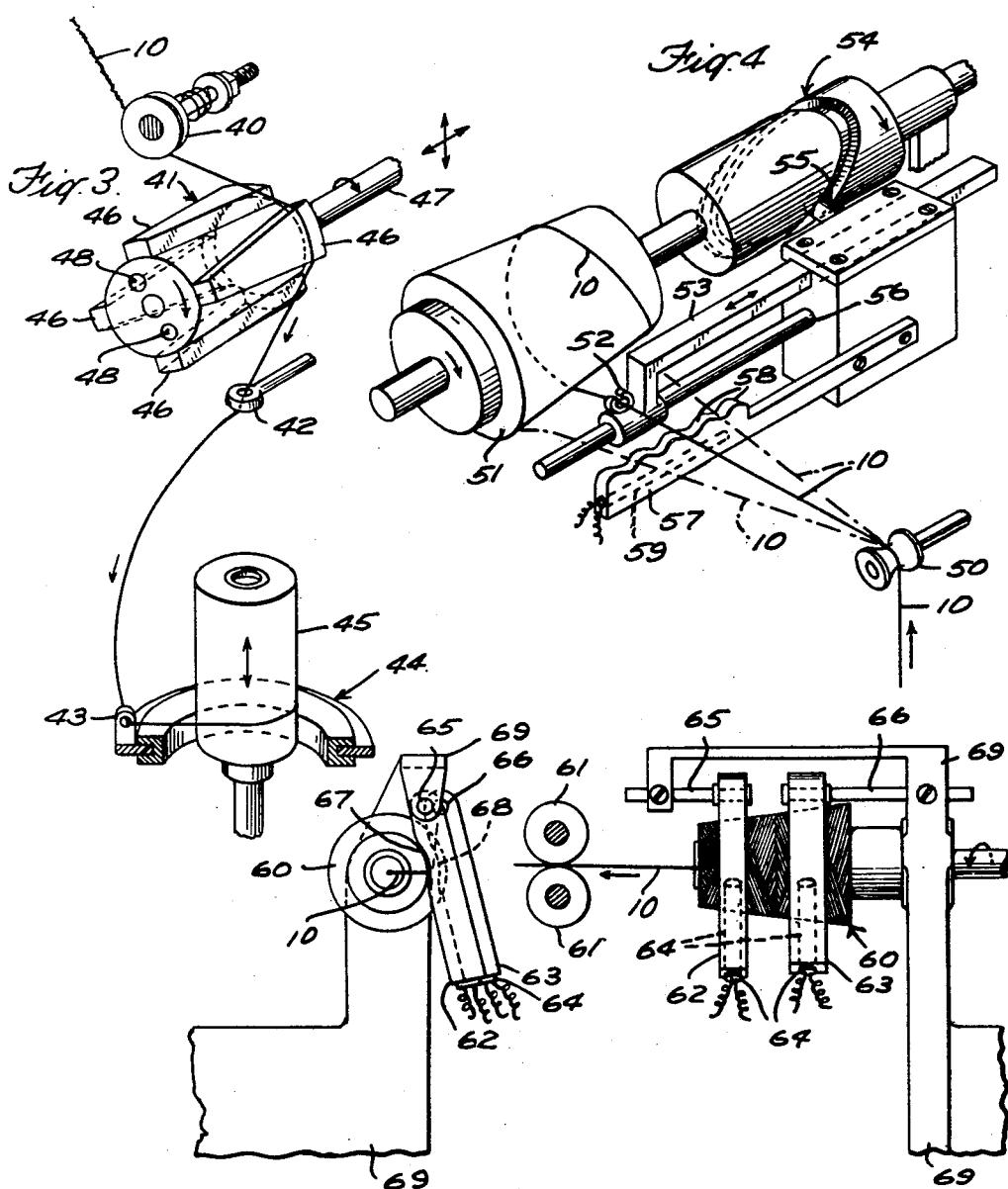


Fig. 5.

Fig. 6.

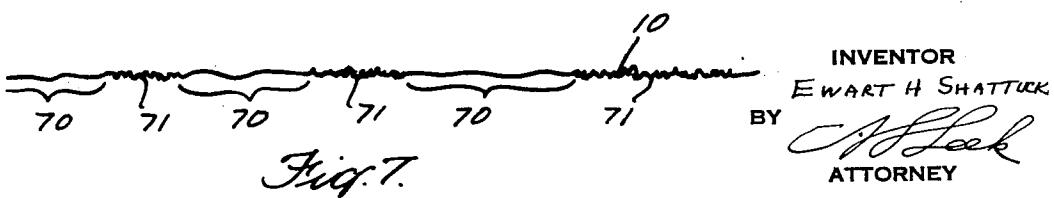


Fig. 7.

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PRODUCTION OF NOVELTY BULKED YARN
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9 Claims. (Cl. 28—1)

This invention relates to the production of novelty yarns and more particularly to a novelty bulked yarn wherein the crimp or bulk is varied along the yarn in a controlled or in a random manner.

An object of the invention is to provide a novelty bulked yarn of the above type.

Another object is to provide an improved method and apparatus for producing such a yarn.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

The nature of the invention will be better understood from the following description, taken in connection with the accompanying drawings in which certain specific embodiments have been set forth for purposes of illustration.

In the drawings:

FIG. 1 is an elevation showing one form of apparatus embodying the invention;

FIG. 2 is a similar elevation illustrating a further embodiment of the invention;

FIG. 3 is a perspective view of a treating apparatus utilizing a heating roller;

FIG. 4 is a similar perspective view of an apparatus in which the yarn passes over a heating bar having a serrated surface;

FIG. 5 is an end elevation of an apparatus wherein the yarn is variably heated as it is unwound from a package;

FIG. 6 is a side elevation of the apparatus of FIG. 5; and

FIG. 7 is a detail of the yarn product.

Referring to the drawings more in detail the invention is shown in FIG. 1 as applied to a crimped or bulked yarn 10 which has been crimped or bulked in any standard manner as in a stuffer crimper or by a false twist or by an air jet or by being passed over a sharp edge, and suitably treated to set the crimp into the yarn. In the case of continuous filament synthetic yarn such as nylon or the like the crimp may be set into the yarn by heat applied while the yarn is held in crimped form.

This crimped yarn 10 may have been wound under tension on a package wherein the crimp is pulled out but is free to return when the yarn is unwound and the tension thereon is relaxed.

In some instances the yarn 10 may represent a bundle of filaments in a down twister which have been crimped or bulked and the crimp temporarily pulled out by the tension of the twister.

In any event the yarn 10 from whatever source is fed through a treating zone over a guide roll 11 which may be of the type adapted to apply a friction drag to the yarn as it passes therethrough.

The treating zone comprises a heating shoe 12 having an arcuate top surface 13 disposed below the normal path of the yarn 10. The shoe 12 may be heated by any suitable means shown as a heating rod 14 the temperature of which can be controlled by a thermo switch 15. A pair of guide fingers 16 are disposed above the shoe 12. These fingers are mounted on a bracket 17 attached to a core 18 of a solenoid 19. A spring 20 holds the core 18 and fingers 16 in elevated position.

The solenoid 19 may be energized to advance the fingers 16 by a suitable control mechanism 21 which may comprise a timed switch operating at predetermined intervals or may comprise a magnetic tape having program indica-

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tions thereon adapted to cause energization of the solenoid 19 in a predetermined time pattern.

The yarn 10 is fed from the treating zone by a pair of delivery rolls 22 and is then fed to a winder 23. In the case of a down twister the treating zone is inserted between the final guide rolls and the twister frame.

In the operation of this embodiment the yarn is fed above the upper surface 13 of the heated shoe 12 when the fingers are in raised position and is wound normally on the package 23. Whenever the solenoid 19 is energized the fingers 16 press the yarn 10 against the upper surface 13 of the shoe and cause the yarn to become heated to an extent to remove the crimp set and to reset the yarn in straight uncrimped form. Thereafter, when the tension on the yarn is relaxed the yarn remains in straight uncrimped form in the areas where it has been heated by the shoe 12 but retains its crimp in other areas. The yarn is thus bulked in spaced areas and is straight or less highly bulked in other areas. These areas may appear at regular intervals or may be randomly dispersed according to the programming of the control tape.

In the embodiment of FIG. 2 the uncrimped areas are produced by applying a varying tension to different portions of the yarn.

In this embodiment the yarn 10 which has been crimped or bulked is fed between a first pair of feed rolls 30 and a second pair of delivery rolls 31 which are normally operated at the same speed. Means is provided for operating the rolls 31 at a faster rate at predetermined times as by the programming mechanism of FIG. 1. When so operated the crimp is pulled out of the yarn in the zone between the pairs of rolls. Heat is applied to the yarn in this zone by a heater 33 which is shown as of the radiant heat type so that the yarn is set in the state in which it passes the heating zone. Thus when the two pairs of rolls 30 and 31 are operated at the same speed the yarn is crimped as it passes the heater and the crimp is set therein, but when the yarn passes the heating zone in straight form the yarn is set in straight condition. In this way a random bulked effect is obtained as in the embodiment of FIG. 1. The treated yarn from the rolls 31 is wound onto a package 34.

In the embodiment of FIG. 3 the crimped yarn 10 first passes through a tension device 40, thence over a portion of a heating cylinder 41, through an eye 42, to the traveller 43 of a ring twister 44 where it is wound onto a package 45. The cylinder 41 is formed with a plurality of peripherally spaced wedge shaped bosses 46 which are adapted to engage the yarn as it passes thereover so as to heat the yarn at spaced zones the length of which depends upon the width of the wedge at the zone of contact. The cylinder 41 is mounted on a shaft 47 by which it may be rotated and which may be mounted for axial reciprocation so as to vary the position of the cylinder 41 with respect to the yarn. Heating units 48 provide heat for the cylinder 41.

In this embodiment the previously bulked yarn passes over the cylinder 41 in straight form and is set in this form in the zones of contact with the wedge surfaces. Between these zones the yarn will rebulk when the straightening tension is relaxed. The relative length of the straight and bulked areas can be varied by varying the axial position of the cylinder 41 either in a pattern or in a random manner.

The cylinder 41 may also be shifted in a direction transverse to the axis so as to vary the area of contact of the yarn with the cylinder. In this way the degree of heat applied to the yarn can be controlled. For example when the yarn is nearly tangent to the cylinder a minimum heat would be supplied. Whereas, as the arc of contact is increased a greater amount of heat would be supplied. This heat supply determines the extent to

which the crimp is removed, that is the crimp amplitude can be varied from a maximum corresponding to the amplitude in the bulked areas to a minimum of substantially 0, corresponding to a straight length of yarn and it is to be understood that as used herein, the term "straight" is intended to include any crimp amplitude which is obtained in the unheated portions of the yarn.

In the embodiment of FIG. 4 the yarn is fed over a guide roll 50 to be wound on a package 51 through a traversing guide 52 carried on a bar 53 which is reciprocated by a grooved cam 54 having a cam follower 55. A fixed rod 56 guides the bar 53 in its path of movement. A heating bar 57 having a serrated top surface 58 is mounted in the path of the yarn 10 so that the yarn wipes over the surface 58 in its path from the roll 50 to the traversing guide 52. The bar 57 is heated by a heating rod 59.

As the yarn reciprocates transversely of the heating bar 57 it alternately contacts the high portions of the serrated surface 58 of the bar and passes over the valleys between the raised portions. The yarn is thus heated at randomly spaced areas and as in the previous forms it is set in straight unbulked form in the areas of contact. In the other areas the crimp returns when the tension is relaxed.

In the embodiment of FIGS. 5 and 6 the yarn is variably heated as it is unwound from a package. In this form the yarn is unwound from a package 60 between a pair of delivery rolls 61. The yarn on the package 60 has been bulked and wound under a straightening tension. A pair of fingers 62 and 63 which may be heated by heating rods 64 are pivotally mounted on rods 65 and 66 respectively and have arcuate surfaces 67 and 68 which are adapted to rest upon the winding of the package 60. The rods 65 and 66 are mounted for independent axial adjustment in a frame 69.

The arrangement is such that various portions of the yarn are heated as the yarn is pulled from the package 60. The yarn is set in straight form in such heated areas and the crimp remains in the other areas. These areas will be randomly spaced due to the nature of the winding. The random effect can be enhanced by rotating the package 60 slowly as the yarn is withdrawn.

The nature of the final product is better illustrated in FIG. 7 wherein the yarn 10 is shown as having areas 70 which are straight or of low crimp amplitude with interspersed areas 71 of high crimp amplitude. The degree of crimp in the areas 70 can be varied by control of the pressure, time-temperature relationship and yarn tension as above described having crimps of a predetermined amplitude. It is to be understood that the nature of the crimp may vary depending upon the type of previous treatment to which the yarn has been subjected. A crimp of the type produced in a stuffer crimper has been shown for purposes of illustration only.

What is claimed is:

1. The method of making a variably bulked yarn composed of continuous filaments of a heat-settable material, which comprises imparting an artificial crimp to said filaments, heat-setting said crimp in said filaments, placing said filaments under a tension adapted to substantially pull out the crimp and bring the filaments to straight form, temporarily setting the filaments in straight form under conditions such that the crimp is restored when the temporary straight set is relaxed, and heating selected areas only of said filaments while in such straight form to a temperature adapted to effect a permanent set suited to cause the filaments to remain permanently in straight form and thereafter subjecting said filaments to a tempera-

ture less than said last mentioned temperature, but sufficiently high to relax the filaments and remove said temporary straight set in the nonselected areas whereby the crimp is restored in said non-selected areas while the filaments remain in straight form in said selected areas.

5 2. The method set forth in claim 1 in which said straight set is produced by passing the filaments continuously over a heated surface and causing the filaments to contact said surface intermittently as they advance.

10 3. The method set forth in claim 1 in which said straight filaments are wound onto a package and are caused to contact a heated surface intermittently in their path to such package.

4. The method set forth in claim 1 in which said 15 straight filaments are wound onto a package and are caused to contact a heated surface intermittently as they are removed from said package.

5. The method set forth in claim 1 in which a program device is adapted to control the spacing of the 20 heated yarn areas.

6. Apparatus for making novelty crimped yarn which comprises a winder having a traversing guide, means feeding a crimped yarn in substantially straight form to said traversing guide from a fixed point whereby the length 25 of yarn therebetween reciprocates transversely and a heating bar having a serrated surface disposed in the path of said reciprocating length of yarn and so arranged that the yarn successively traverses high and low portions of said serrated surface and means heating said surface for 30 thereby applying a setting heat to spaced areas along said yarn as it advances.

7. Apparatus for producing an intermittently crimped 35 yarn which comprises a member having a heated surface adapted to receive a crimped yarn, means adapted to present the crimped yarn to said surface under a tension adapted to pull out the crimp and bring the yarn to substantially straight form, and means to cause said crimped yarn while in said straight form to intermittently contact said heated surface whereby the yarn is set in straight uncrimped form in selected areas only.

8. Apparatus according to claim 7 including a program device connected to actuate said latter means at selected intervals.

9. Apparatus according to claim 7 including a support 45 for a yarn package consisting of crimped yarn wound in straight form on said package, spaced heating fingers disposed to apply heat to selected areas of said package as it rotates and means withdrawing the yarn from said package whereby the crimps are removed from the heated 50 portions only of said yarn and the intervening portions of said yarn retain their crimped form.

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